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Draft Environmental Impact Statement

North and West Big Hole Allotment Management Plans

Wisdom and Wise River Ranger Districts, Beaverhead-Deerlodge National Forest
Beaverhead and Anaconda-Deerlodge Counties, Montana

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Draft Environmental Impact Statement
Beaverhead and Anaconda-Deerlodge Counties, Montana

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Western pearlshell mussel, 665, 717, 718, 719, 720, 721, 722, 723

Western toad, 664, 717, 718, 719, 720, 721, 722, 723

Westslope Cutthroat Trout, 3, 2, 647, 648, 650, 662, 666, 692, 715

Whitebark pine, 357, 363, 364, 367, 369, 370, 372, 373, 375, 376, 377, 378, 381, 382, 384, 385, 386, 387, 389, 390, 391, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 404, 405, 406, 407, 409, 410, 412, 413, 414, 416, 418, 420, 421, 422, 424, 426, 427, 428, 429, 430

Wilderness, 1, 2, 1, 110, 111, 112, 117, 118, 119, 120, 122, 123, 124, 125, 127, 129, 130, 131, 132, 133, 139, 140, 151, 152, 156, 161, 162, 163, 174, 194, 739, 753, 754

Wildlife, 3, 4, 19, 71, 169, 185, 221, 356, 357, 364, 382, 383, 384, 385, 386, 387, 390, 391, 394, 395, 398, 399, 403, 404, 408, 409, 412, 413, 416, 417, 418, 420, 421, 422, 423, 424, 426, 427, 470, 643, 646, 651, 652, 724, 725, 731, 732, 733, 735, 738, 739, 748, 753, 806, 819, 841, 850

Wolverine, 726, 733, 747, 749, 751, 753, 851

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Chapter 3 –Affected Environments and Analysis

This Chapter discloses the social, economic, physical, and biological environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis and rational for the comparison of alternatives presented in chapter 2 of the Draft Environmental Impact Statement (DEIS).

This section is organized by resource. Under each resource, the existing condition, effects analysis, and a comparison of the effects by alternative is discussed and disclosed.

Summary of Project Area Existing Condition

Prior to settlement of the Big Hole Valley by Europeans and others, the area was settled by Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes. There are no known cultural landscapes or traditional cultural properties (TCP's) in the eleven allotments. Three of the allotments are covered by archeological districts consisting mostly of historical mining districts.

Ranching as a way of life has occurred in the project area since the late 1800's. Prior to the 1970's, domestic sheep grazing occurred on many of the allotments. Since the 1970's, there have been no domestic sheep livestock grazing on any of the eleven allotments in the project area. Currently all of the allotments are summer domestic cattle, with the exception of the Ruby Allotment, which has use by both domestic cattle and horses.

Ranching's contributions to the economy of the Beaverhead and Anaconda-Deer Lodge counties by adding about 1.93 jobs for every 1,000 Animal Unit Months (AUM's).

Other activities in the area include, recreation such as hiking, camping, and skiing. The Anaconda-Pintler Wilderness covers portions of two allotments, Mudd Creek and Pintlar Creek. The Anaconda-Pintler Addition Hellroaring covers a portion of the Mussigbrod allotment (See Table 7 in chapter 1,).

The landscape character, scenic attractiveness, visibility, and the scenic integrity all combine to describe the visual landscape in the eleven allotments. The visual landscape of the area is ranching oriented with fences, exclosure's, water tanks, livestock, and houses. The visual landscape is also dotted with past mining equipment and towns.

The eleven allotments cumulatively contain approximately 12, 525 acres of suitable primary, secondary, and transitory range. The majority of the primary and secondary range is comprised of rangland type vegetation. The majority of the suitable transitory range consists of conifer regeneration that is less than thirty years old and has less than sixty percent conifer canopy cover.

The rangeland vegetation in the eleven allotments is dominated by grasslands, shrublands, and riparian areas. Forested areas are dominated by conifers (pine, fir, and spruce) with minor

inclusions of other vegetation such as aspen (See Table 2 and 3 in the Range section below pgs. 215-217). Some areas are in an early seral forested stage due to past timber harvest activities. The rangelands are dominated by Idaho fescue/slender wheatgrass and mixed perennial grasses. The shrublands are dominated by sagebrush-grasslands. They consist mostly of big sagebrush/Idaho fescue and mountain big sagebrush/bluebunch wheatgrass. The riparian areas are dominated by willows and sedges, and wet grasslands. The dominant willow and sedges include Geyer willow/beaked sedge, Yellow willow/beaked sedge, and Drummond willow/beaked sedge. The wet grasslands are dominated by tufted hairgrass/sedge.

There are noxious weeds in the project area. The dominant one is Spotted knapweed (*Centaurea stoebe*). Other's currently have very low infestations (See Table 4 in the Noxious Weed section under Range below pgs. 218-219). There are also non-native invasive plants in the project area such as bull thistle (*Cirsium vulgare*), musk thistle (*Carduus nutans*). Cheatgrass is in the project area at low densities and is listed by the Montana Department of Agriculture as a regulated plant. Currently there are no federally listed threatened or endangered plant species in the project area. There are six sensitive plant species in the project area (see Table 1 below in the Sensitive Plant section below, pgs. 359-365). All allotments were found to have sensitive plant species present.

The northern portion of the project area is dominated by granitic geology. The west and south of the area is dominated by belt rock with area of glacial moraines, and some tertiary sediment's. One allotment, the Saginaw allotment is dominated by sedimentary valley-bottom deposits. The soils in the project area range from deep to very deep, well drained to excessively drained, to wet, with textures of loams, silt loams and organics that are gravely, very gravely, cobbly to very cobbly to stoney. There are some small areas of sandy loams, sandy clay loams, ashy loams, and ashy silt loams.

The project area is covered by parts of twenty-five sub-watersheds within the Big Hole River drainage. All the watersheds in the project area flow into the Big Hole River or area diverted for irrigation on private land along the way, but all originate on Forest Service lands. The project area is covered by five restoration and two fish key watersheds. There are no municipal watersheds in the project area. There are thirteen 303(d) listed streams in the project area or directly down-stream. No streams are listed for fecal coliform. Most are listed for sediment or impacts to streamside vegetation. There are wetland and riparian areas within the project area. There are several amphibians and fish species in the project area. There are no Threatened or Endangered aquatic species in the project area. There are three aquatic sensitive species (Western Toad, Artic Grayling, and Westslope Cutthroat Trout) in the project area. Currently there are no aquatic nuisance species in the project area. There is one Management Indicator Species (MIS), the mayfly (*Drunella doddsi).*

There is one federally listed species, the grizzly bear (*Ursus arctos horribilis*) and one candidate species, greater sage-grouse (*Centrocercus urophasianus*) that have the potential to occur within the terrestrial wildlife analysis area (See Appendix A7 for terrestrial wildlife analysis areas and Table 1 in the Terrestrial Wildlife section below, pg. 725 for the list of threatened, endangered, and candidate species). The project area is covered by three Elk/Deer Hunting Units (319, 321, and 329). Habitat for other terrestrial wildlife species that are

analyzed in detail exist within the project area and can be found in Appendix B8 and discussed on pgs. 724-748 of the Terrestrial Wildlife section.

Below is the listing by ownership of the past, present, and reasonably foreseeable actions that may have affected, are still affecting, or may affect in the future the resources. Not all past, present, and reasonably foreseeable actions apply to each resource. Only those actions that show continued relevant impacts in the same time and location as the actions proposed in the different alternatives, are analyzed and discussed. See the individual resource sections below for specific analysis. See Appendix A8 for a map of the past actions.

Past, Present, and Reasonably Foreseeable Future Actions in the Project Area

Activity	Decade/Year	Past	Present	Reasonably Foreseeable Future
NFS lands within the allotment boundaries				
Domestic Livestock Grazing	1800-2012	x	x	x
Noxious Weed Control (use of herbicides)		x	x	x
Sagebrush manipulation (burning, spraying)		x		
Prescribed Fire		x	x	x
Wildland Fire Suppression		x	x	x
Timber Management – All Harvest types	1960-2012	x		Fleecer, Pintler Face
Hazard Tree Removal – Developed sites and roadsides	2009-2012	Roadside 5	Road side 7	Roadside 7
Pre-commercial Thinning				
Public Firewood cutting		x		
Water Impoundments		x	x	
Fish barriers		x	x	
Road and Trail Maintenance		x	x	x
Road Construction		x		
Insect and Disease outbreak (bark beetle, Spruce Bud worm, etc.)		x	x	x
Conifer encroachment treatment		x		
Range Improvements (fences, water tanks, spring development, etc.)		x	x	x
Dispersed Recreation		x	x	x
Irrigation Withdrawals		x	x	
Natural disturbances (Flooding and Mass Wasting)		x	x	x
Travel Management		x		x
Motorized Vehicle Travel permits (off route or behind closed gates)		x	x	x
Mining		x	x	
BLM lands within the allotment boundaries				
Prescribed burning		x		
Livestock Grazing		x	x	x
Range Improvements		x	x	x
Fire Suppression		x	x	x

Activity	Decade/Year	Past	Present	Reasonably Foreseeable Future
Noxious Weed Control		x	x	x
Road Maintenance		x	x	x
Road Construction		x		
Timber Sales		x		x
State lands (Fish, Wildlife , and Parks) within the allotment boundaries				
Livestock Grazing		x	x	x
Range Improvements		x	**x**	**x**
Road Maintenance		x	**x**	**x**
Noxious Weed Control		x	**x**	**x**
Fire Suppression		x	**x**	**x**
Timber Sale		x		**x**
Arctic Grayling Re-introduction in Ruby River	2013			**x**
Private lands within the allotment boundaries				
Livestock grazing		x	x	x
Range Improvements		x	x	
Road Maintenance		x	**x**	**x**
Road Construction		x	**x**	
Noxious Weed Control		x	**x**	**x**
Fire Suppression		x	**x**	**x**

Social and Economics

Existing Condition

Regulatory Framework

Table 1 contains applicable laws, regulations and policy.

Table 1:.Applicable Laws, Regulations, and Policy

Authority Level (Federal, Regional, State, County, Forest)	**Law, Regulation, Policy**	**How it is Applicable to This Project**
Federal	National Environmental Policy Act of 1969 (NEPA) as amended	This Act requires that natural and social sciences be integrated in all planning and decision-making that affect the human environment. This project would affect the biological and physical environment and the relationship of people to that environment.
Federal	National Forest Management Act of 1974 (NFMA)	The National Forest Management Act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of national forests.
Federal	Bankhead-Jones Farm Tenant Act (Sec 33); 50 stat. 526; 7 USC 101 - stipulates that 50% of grazing receipts be returned to the Grazing Association, 25% of receipts be returned to counties.	This law provides that 25% of all permit fee revenue is returned to the counties.
Federal	Executive Order 12898, February 11, 1994- orders Federal agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations. The Order also directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife.	This executive order requires that the agency ascertain if minority and/or low-income populations, or subsistence hunting and fishing in the project area would be disproportionately and adversely impacted by this decision.

Table 1:.Applicable Laws, Regulations, and Policy

Authority Level (Federal, Regional, State, County, Forest)	Law, Regulation, Policy	How it is Applicable to This Project
Federal	Beaverhead-Deerlodge Land and Resource Management Plan, or Forest Plan (2009) (Law)	Directs management activities on National Forest System Lands within the Beaverhead-Deerlodge National Forest boundaries. Actions being proposed, including livestock grazing, need to be consistent with direction contained in the LRMP.

Forestwide Desired Conditions

People and communities benefit from programs and infrastructure that support livestock grazing and an array of forest products and services. This project's purpose is to update eleven domestic livestock grazing permits so that they balance ecological desired conditions while they continue to support livestock grazing.

Forest Plan Goals

Livestock Grazing
Grazing Opportunities: Sustainable grazing opportunities are provided for domestic livestock from lands suitable for forage production.

Forage Use: Use of forage by domestic livestock will maintain or enhance the desired structure and diversity of plant communities on grasslands, shrub lands, and forests. Use will be managed to maintain or restore riparian function as defined in the allotment management plan.

Economic and Social Values
Economy Contribution: Contribute to the social and economic well-being of local communities by promoting sustainable use of renewable natural resources. Provide timber for commercial harvest, forage for livestock grazing, exploration and development opportunities for mineral resources, and recreation settings consistent with other resource goals. This goal highlights the intent to contribute to society as well as manage ecological conditions.

Coordination: Increase coordination with federal, state, county and tribal governments and strive for coordination and dialogue with a broad range of stakeholders. This goal points to the need to work with partners including BLM, State of Montana, landowners, and other identified as stakeholders in the attempt to balance ecological conditions and contributions that benefit people.

Economic Efficiency: The best available methods are used to contribute products to local communities while maximizing the ability to achieve Forest targets.

Forest Plan Standards

Livestock Grazing

Standard 2 - Domestic livestock grazing will not be allowed in developed recreation sites unless specifically permitted.

Standard 3 - Allotment management plans will identify specific criteria for special areas, such as wet meadows, where limiting grazing at certain times of the years or under certain conditions is necessary to protect resources.

Standard 4 - Base Property Requirement - ownership of facilities and land capable of producing feed for livestock 50% of the time permitted livestock are not grazing on National Forest, will be demonstrated before issuing grazing permits.

Methodology

Spatial Scale

The North and West Big Hole allotments are a portion of the B-DNF Range Program is located within the Beaverhead-Deerlodge National Forest. There are currently 17 permittees with 2,650 cow/calf pairs and 28 horses using these allotments during the summer for 6,771 cattle HMs and 85 horse head months (HMs). This represents approximately 4.2 % of all the HMs on the BDNF. This grazing occurs in the following eleven grazing allotments (Pintlar Creek, Dry Creek, Mudd Creek, Ruby Creek, Fishtrap, Mussigbrod, Seymour, Twin Lakes, Monument, Pioneer, and Saginaw) which are the focus of this analysis. The project area is located completely within the Beaverhead-Deerlodge National Forest social and economic impact area used during the recent forest plan revision (includes Broadwater County, which is not shown in Figure 1). As a result, some of the social information collected at that scale will be used. However, the demographic and economic assessment of existing conditions focuses on Anaconda-Deer Lodge and Beaverhead Counties, Montana; the two counties hosting the project area allotments and the counties most likely to be affected by changes to management in these allotments.

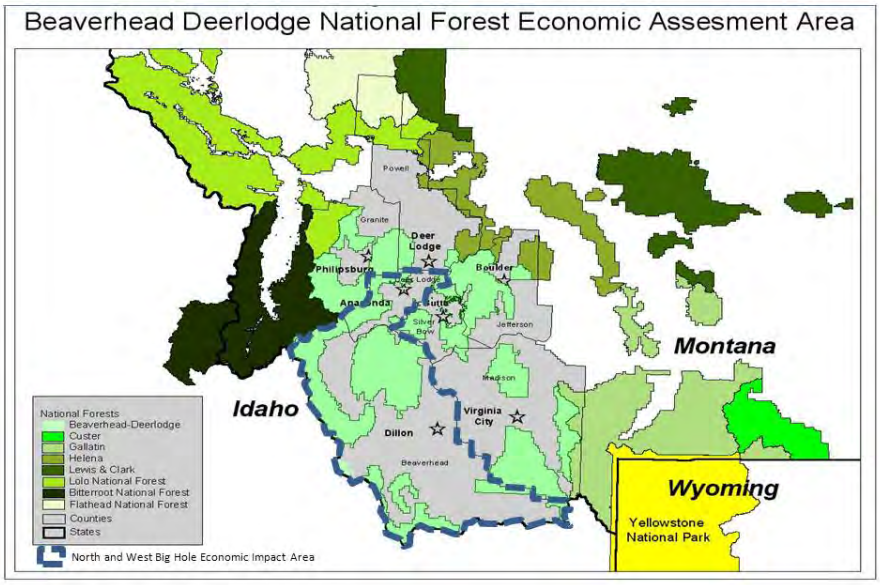

Figure 1: Notrh and West Big Hole Economic Area, part of the larger Beaverhead-Deerlodge National Forest Economic Impact Area

Temporal Scale
The temporal scale for the assessment of existing conditions looks at data from the period 1970-2012 to consider long-term trends in population and economic growth. Other indicators are presented for shorter periods of time or selected years when that is all that is available. The temporal scale for environmental consequences is a ten-year analysis period for financial efficiency, and both annual and a ten-year period for contributions to employment and labor income.

Resource Indicators to be Assessed for Existing Conditions
The indicators evaluated in this existing condition assessment include population change, total employment, average annual unemployment, total personal income, per capita personal income, labor and non-labor income, salaried and proprietor income, natural resources dependency, payments to counties and social setting. IMPLAN labor income data from 1993, 2003 and 2010 is used to describe Beaverhead County and Anaconda-Deer Lodge County dependence on five wildland related sectors for those three years. The affected environment section references the Economic Profile System - Human Dimensions Toolkit (EPS-HDT, Headwaters Economics 2013) reports for Anaconda-Deer Lodge and Beaverhead Counties that synthesize primary demographic and economic data collected by various agencies, including the Bureau of Census, Bureau of Labor Statistics, and Bureau of Economic Analysis. The social setting of the affected environment is described by referencing the Social Assessment of the Beaverhead-Deer Lodge National Forest (Northern Economics 2002).

Current contributions to employment and labor income
In addition, the BLM compiled data from the National Agricultural Statistics Service (NASS), American Community Survey and IMPLAN to calculate estimates for direct and total

economic contributions per 1,000 AUMs of cattle grazing. Part and fulltime employment and labor income contributions estimated with these calculations are also presented to describe the importance of agriculture and livestock grazing to Anaconda-Deer Lodge and Beaverhead Counties, MT.

In the fall of 2009 Secretary of the Department of the Interior (DOI) Ken Salazar requested a report analyzing the economic impacts of DOI programs. Specifically, he wanted to quantify the employment, labor income, and economic output that result from the Department's activities. The BLM looked closely at methods they and the Forest Service have used in the past and found two problems.

The largest issue identified resulted from using the "Cattle and Calves," counts from NASS. For cattle, those numbers include both beef and dairy cattle, as well as other animals that would not necessarily use public lands forage. Using these figures substantially over counts the number of livestock using federal forage and decreases the "reliance" on public lands forage.

The other issue was that the IMPLAN sector we had used for beef cattle (Sector 11) includes other operations such as feedlots. Since these operations are supposed to be captured in the indirect impacts, using Sector 11 likely over counted the impact from public lands forage. On the other hand, IMPLAN does not include unpaid or family labor. In agriculture operations families can provide a substantial amount of the labor, so not including this factor led to some undercounting of employment impacts.

The BLM decided to develop a new, more detailed methodology that addressed each of these problems. The goal with this methodology was to measure the economic contribution of BLM forage based on AUMs. Essentially, they wanted to develop a ratio of employment, labor income, and output to AUMs (e.g. 2.1 jobs per 1,000 AUMs of forage). Each ratio was calculated by state to account for regional variations in the economy and livestock industries. To analyze the economic impacts that are attributable to BLM forage, it was first necessary to determine the total economic contribution (i.e., employment, labor income, and output) for the beef cattle and sheep and goat industries as a whole.

The major data source for this analysis was the 2007 Census of Agriculture, specifically Table 62 (by state) titled "Summary by NAICS Industry." As the title suggests, this table summarizes data collected through the Census of Agriculture by NAICS industry, including Beef Cattle Ranching and Farming (Industry 112111). Using this table allowed BLM to analyze the relevant industries without incorporating additional sectors as we did in the previous methodology. Data from the 2007 Census of Agriculture was used because it is the most recent dataset. To fill in small data gaps, two other data sources were used, including the 2005-2009 American Community Survey Estimates and the 2007 IMPLAN data by state. These years were used to match the timeframe of the Census of Agriculture.

Direct Employment

For the purposes of this analysis, direct employment (i.e., the employment occurring on ranching operations) was calculated in two parts. First, the number of hired farm laborers

(including both full-and part-time employees) was taken from the Census of Agriculture for the beef cattle ranching and sheep and goat farming sectors.

The second part of the direct employment analysis required calculating the number of unpaid and self-employed individuals in each of these sectors. The 2005-2009 American Community Survey includes information on the class of worker (e.g., self-employed, local government, unpaid family worker) by two-digit NAICS industry. For the purposes of this analysis, they used the data for agriculture, forestry, fishing and hunting (NAICS Industry 11). Data for more specific industries was not available. Using these data, they calculated a ratio between paid to unpaid/self-employed individuals for the agriculture, forestry, fishing and hunting sectors. Because more detailed industry data were not available, they assumed that the ratio for Industry 11 was constant across all sub-sectors. Direct employment was calculated using this ratio and the number of paid employees gathered from the Census of Agriculture.

Direct Labor Income
The methodology for calculating direct labor income is very similar to that used for direct employment. Labor income is made up of two parts: employee compensation and proprietor income. Employee compensation is taken from the Census of Agriculture, based on "Farm Production Expenses – Hired Labor." Proprietor income was calculated using the ratio between employee compensation and proprietor income in IMPLAN, which was then applied to the spending on hired labor from the Census of Agriculture. For beef cattle ranching we used IMPLAN Sector 11. While this sector includes operations outside of the specific industries they are examining, it is a good substitute for data that are not readily available in a consistent format.

Indirect and Induced Impacts
Indirect and induced impacts of beef cattle, sheep, and goat ranching were calculated using analysis-by-parts in IMPLAN. Analysis-by-parts is a method of calculating the impacts of a particular activity by separating out the various spending activities of that activity and analyzing their specific impacts. For this analysis, they used farm production expenses from the Census of Agriculture for beef cattle ranching and sheep and goat farming. The Census of Agriculture has farm spending in several categories, each of which had to be assigned to a particular IMPLAN sector. In addition, margins were applied to several of the spending categories to account for retail activity. Census of Agriculture category, IMPLAN sectors, and retail margin information can be found in Table 2. Regional purchase coefficients were set to the local percentage for each particular industry, based on the IMPLAN data.

Several of the spending categories and IMPLAN sector assignments require explanation. Regarding utilities, the Census of Agriculture does not separate electric and water utilities, while IMPLAN does. To apportion the spending data from the Census of Agriculture, IMPLAN data on Sector 11 and Sector 14 commodity demand (spending) were analyzed for each state and utility spending was assigned to either the electric or water utility sectors.

Spending on hired farm labor was included as a household spending pattern to capture the induced impacts of ranch employee incomes. Using data from the Bureau of Labor Statistics, it was determined that the average income in the ranching industry was between $25,000 and

$35,000 for every state in the study. Contract labor was included in the indirect and induced analysis because the impacts of contract spending are better captured through analysis-by-parts. Finally, property taxes paid were modeled using a state and local government (non-education) spending pattern to capture the impacts of government spending revenue received through those property taxes.

Table 2: Census of Agriculture Spending Category IMPLAN Sector and Retail Margins

Census of Agriculture Category	IMPLAN Sector	IMPLAN Sector Name	Retail Margins Applied
Fertilizer, lime, and soil conditioners purchased	130	Fertilizer manufacturing	Yes
Chemicals purchased	131	Pesticide and other agriculture chemical manufacturing	Yes
Seeds, plants, vines, and trees	323	Retail stores – Building material and garden supply	Yes
Livestock and poultry purchased	11 or 14	Cattle ranching and farming or Other animal production	
Feed Purchased	42	Other animal food manufacturing	Yes
Gasoline, fuels, and oils	115	Petroleum refineries	Yes
Utilities (electric and water)	31 (electric); 33 (water)	Electric generation; water delivery	
Supplies, repairs, and maintenance	417	Commercial and industrial machinery and equipment repair	
Hired farm labor	Household Spending Pattern	Households 25-35k	
Contract labor	19	Support activities for agriculture and forestry	
Custom work and custom hauling	19	Support activities for agriculture and forestry	
Cash rent for land, buildings, and grazing fees	360	Real estate establishment	
Rent and lease expense for machinery, equipment, and farm share of vehicles	365	Commercial and industrial machinery equipment rental	
Interest expense	354	Monetary authorities	
Property taxes paid	Institution Spending Pattern	State/Local Gov't (Non-education)	
All other production expenses	19	Support activities for agriculture and forestry	

Per 1,000 AUM Economic Impacts

To determine how BLM forage contributes to the total impacts it was necessary to create a per 1,000 AUM ratio for each impact (e.g., the number of direct jobs per 1,000 AUMs). Doing so first required BLM to calculate the annual feed and forage necessary to support the beef cattle included in this analysis. That number was gathered from the Census of Agriculture, Table 62. Specifically, the inventory for this analysis included beef cows that calved. Including only these animals will help prevent the over counting that occurred in the original analysis, which

included dairy cattle and other animals. Calculating the annual AUM requirements then used Equation 1.

$$Total\ Annual\ AUMs\ Required = Cattle\ \&\ Calves * 12 \qquad \text{(Equation 1)}$$

Applying the total AUM requirements to the impacts resulted in a per 1,000 AUM calculations yielding the following estimates (Table 2). The next step to use these ratios is to convert cow/calf HMs into AUMs. This is done by multiplying HMs by 1.32 for cattle and multiplying horse HMs by 1.25. Afterwards the resulting AUMs are multiplied with ratios for the state which is appropriate for the project area to estimate existing contributions. A final step is to adjust the 2007 labor income figures to 2013 amounts using the Gross Domestic Product Implicit Price Deflators.

Table 3: Economic contributions of beef cattle grazing on public lands (Larson 2012)

	Employment			Labor Income ($2007)		
State	Direct	Indirect & Induced	Total	Direct	Indirect & Induced	Total
MT	1.23	0.70	1.93	$4,936	$20,000	$24,936

Anaconda-Deer Lodge County Population

From 1970 to 2011 the population of the Anaconda-Deer Lodge County declined from 15,677 down 6,378 people to 9,299 a 40.7% decrease, with most of the population loss early in that period, and a relatively stable population since year 2000 when it was 9,409 people. The population also got older since 2000. The median age in 2011 was 46.4 years, up from 42.3 years during 2000. This aging of the Anaconda-Deer Lodge population is occurring at roughly the same rate as the US average, which jumped from 35.3 years during 2000 to 37.0 years by 2011. The age group with the greatest number of residents in the County during 2011 was 50-59 with 1,637 people (US Department of Commerce. 2012. Census Bureau, American Community Survey Office. Washington, D.C.).

The racial composition of the Anaconda-Deer Lodge County population in the analysis area for the period 2007- 2011 is shown in Table 4. The overwhelming majority of the population across the economic impact area is white. Following white alone (93.5%), American Indian alone was the second highest proportion of the County residents (2.3%). Self-identified Hispanic or Latino residents represented 2.6% of the County population.

Beaverhead County Population

From 1970 to 2011 the population of Beaverhead County grew by 1,049 people to 9,198, a 12% increase, with three short periods of pronounced positive population growth (early 1980s, early 1990s and from 2006-2010). At an annual rate, this represented an increase of 0.3%, which was much slower than the average for the US during this period. Total population in 2000 was 9,204 people up 9% from 8,429 in 1990, but it decreased the first five years after the turn of the century before beginning to climb again. The population also got older since 2000. The median age in 2011 was 42.5 years, up from 37.6 years during 2000, and up almost ten years from 32.6 years in 1990. This aging of the Beaverhead population is occurring faster than the US average, which jumped from 35.3 years during 2000 to 37.0

years by 2011. The age group with the greatest number of residents in the County during 2011 was 45-64 with 2,804 people. Due largely to the University of Montana-Western, the second largest age category was 18 to 34 years old (2,087 people or 22.8% of the total - US Department of Commerce. 2012. Census Bureau, American Community Survey Office. Washington, D.C.).

The racial composition of the Beaverhead County population in the analysis area for the period 2007- 2011 is shown in Table 4. The overwhelming majority of the population across the economic impact area is white. Following white alone (92.6%), Asian, Native Hawaiian, other Pacific Islander was the second highest proportion of the County residents (1.6%). Self-identified Hispanic or Latino residents represented 3.4% of the County population.

Economic Impact Area Population

By combining the two counties we see that from 1970 to 2011 the population of the economic impact area declined 5,387 people to 18,497 a 23% decrease, with most of the population loss early in that period, and a relatively stable population since year 2000 when it was 18,613 people. The total population of all races other than white was less than 10% at both the County and economic impact area levels.

Table 4: Racial Composition of 2007-2011 Population

	White Alone	Black or African American	American Indian, Alaskan Native	Asian, Native Hawaiian, other Pacific Islander	Other race or two or more races	Hispanic or Latino (of any race)
Anaconda-Deer Lodge County	91.9%	1.1%	2.2%	0.2%	2.0%	2.6%
Beaverhead County	92.6%	0.2%	0.6%	1.6%	1.5%	3.4%
NWBH Economic Impact Area	92.2%	0.7%	1.4%	0.9%	1.8%	3.0%
United States	64.2%	12.2%	0.7%	4.9%	2.1%	16.1%

U.S. Department of Commerce. 2012. Census Bureau, American Community Survey Office, Washington, D.C.The data in this table are calculated by ACS using annual surveys conducted during 2007-2011 and are representative of average characteristics during this period.

Anaconda-Deer Lodge County Employment

Over the period 1970 to 2011 jobs declined in Anaconda-Deer Lodge County (from 6,259 to 4,584 jobs) did not keep pace with that of the state nor the nation. Employment in Anaconda-Deer Lodge decreased 27%, whereas job growth for the nation increased 92.6% during the same period of time. The most significant job losses occurred from 1972 through 1982. Job losses (2,374) were in wage and salary employment (people who work for someone else) whereas the number of proprietors (self-employed) grew from 524 to 1,223 during this period (US Department of Commerce. Bureau of Economic Analysis, REIS 2012, Table CA30).

Looking at the period where we used the Standard Industrial Classification System, 1970-2000, the employment category whose share of the total gained the most was Services (including health, legal, business and other), which grew 24% (from 2,205 jobs in 1970 to

2,724 in 2000). Non-services employment shrank from 2,406 in 1970 to 569 by 2000, a 76% decrease. From 1970 to 2000, jobs in government jobs fell from 1,647 to 1,017, a 39% decrease. Looking at the more recent period from 2001 to 2010, using the North American Industrial Classification System, it is clear that service sector growth continued. From 2001 to 2010, jobs in services related industries grew from 2,710 to 2,930, an 8% increase. Unlike the earlier period, jobs in non-services related industries, also increased from 492 to 502 jobs, a 2% increase, but jobs in government continued to shrink from 1,000 to 993, a small decrease.

From 1970 to 2010, farm employment increased from 101 to 129 jobs. But from 2001 to 2011 it declined slightly from 126 to 112 jobs. (US Department of Commerce (Bureau of Economic Analysis, REIS 2012, Table CA25 and 30). And despite this decline, during 2010 farm employment in Anaconda-Deer Lodge County at 2.4% of all jobs was still higher than the national average of 1.5%. In 1970, farm proprietors represented 47.5 % of all farm employment. By 2011, farm proprietors represented 89.3 % of all farm employment (U.S. Department of Labor. 2012. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C.).

In 2011, the unemployment rate was 8.0% compared to 8.9% for the nation. This rate climbed since its low for the 1990-2011 period of 4.6% during 2007. The peak for this 21-year period was 10.4%, which occurred in 1992. The monthly unemployment rates from 2008 through the start of 2012 varied from a low of 4.9% in May 2008 to a high of 9.1% in February 2011, indicating an increase of the seasonal unemployment rate between fall and winter months. The most recent information indicates that from July through October of 2012, the monthly unemployment rates in Anaconda-Deer Lodge County stayed below 9.0% dropping to 6.2% in September 2012. (US Department of Labor, Bureau of Labor Statistics, 2012. Local Area Unemployment Statistics).

Beaverhead County Employment

Over the period 1970 to 2011 job growth in Beaverhead County (from 3,240 to 5,829 jobs) did not keep pace with that of the state nor the nation. Employment in Beaverhead increased 79.9%, compared to 92.6% job growth for the nation. The majority of job growth during this time was in wage and salary employment (people who work for someone else), where employment grew by 64%, or 1508 jobs. However, while proprietors (self-employed) saw less absolute job growth (1,083 jobs) their share grew faster (123% increase) during this period (US Department of Commerce. Bureau of Economic Analysis, REIS 2012, Table CA30).

Looking at the period where we used the Standard Industrial Classification System, 1970-2000, the employment category whose share of the total gained the most was Services (including health, legal, business and other), which grew 109% (from 1,474 jobs in 1970 to 3,080 in 2000). Non-services employment grew from 1,110 in 1970 to 1,490 by 2000, a 34% increase. From 1970 to 2000, jobs in government jobs grew from 656 to 1,007, a 54% increase. Looking at the more recent period from 2001 to 2011, using the North American Industrial Classification System, it is clear that service sector growth continued. From 2001 to 2011, jobs in services related industries grew from 2,928 to 3,368, a 15% increase. This stands in contrast with jobs in non-services related industries, which shrank from 1,070 to

1,001 a 6% decrease, and jobs in government which shrank from 1,053 to 1,050, a very slight decrease.

From 1970 to 2011, non-farm employment grew from 2,408 to 5,269 jobs, a 118.8% increase, but farm employment shrank from 832 to 560 jobs, a 32.7% decrease. This has been a continual decrease, going from 832 jobs during 1970 to 679 during 1980, 665 during 1990, 652 during 2000 and 560 during 2011 (US Department of Commerce (Bureau of Economic Analysis, REIS 2012, Table CA25 and 30). And despite this decline, 2011 farm employment in Beaverhead County at 9.6% of all jobs was substantially higher than the national average of 1.5%. In 1970, farm proprietors represented 37.4 % of all farm employment. By 2011, farm proprietors represented 54.8% of all farm employment. In 2011, crop production jobs were 1% of total employment and animal production jobs were 5.8% of total employment in Beaverhead County, the latter was significantly higher than the percent of animal production employment nationally 0.2% (U.S. Department of Labor. 2012. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C.).

In 2011, the unemployment rate was 5.7% compared to 8.9% for the nation. This rate climbed since its low for the 1990-2011 period of 2.7% during 2007. It nearly reached the peak for this 21-year period of 5.8%, which occurred in 1991. The monthly unemployment rates from 2008 through the start of 2012 varied from a low of 3.2% in July 2008 to a high of 6.7% in January 2011, indicating an increase of the seasonal unemployment rate between fall and winter months. The most recent information indicates that from July through October of 2012, the monthly unemployment rates in Beaverhead County stayed below 5.0% dropping to 4.0% in September 2012. (US Department of Labor, Bureau of Labor Statistics, 2012. Local Area Unemployment Statistics).

Economic Impact Area Employment

From 1970 to 2011, employment grew from 9,499 to 10,413 jobs, a 10% increase, while job growth for the nation increased 90.4% during the same period of time. From 1970 to 2011, non-farm employment grew from 8,566 to 9,741 jobs, a 13.7 percent increase. but, farm employment shrank from 933 to 672 jobs, a 28 percent decrease. In 1970, farm proprietors represented 38.5 percent of all farm employment. By 2011, farm proprietors represented 60.6 percent of all farm employment. (US Department of Commerce (Bureau of Economic Analysis, REIS 2012, Table CA25 and 25N).

In 2011, the unemployment rate was 6.7% compared to 8.9% for the nation. This rate climbed since its low for the 1990-2011 period of 3.5% during 2007. It nearly reached the peak for this 21-year period of 8.0%, which occurred in 1992. The monthly unemployment rates from 2008 through the start of 2012 varied from a low of 4.0% in May 2008 to a high of 7.7% in February 2011, indicating an increase of the seasonal unemployment rate between fall and winter months. (US Department of Labor, Bureau of Labor Statistics, 2012. Local Area Unemployment Statistics).

Existing Project Area Employment Contributions

Annually, there are 6,771 cattle HMs, which are converted to AUMs by applying a conversion of 1.32AUMs/1.0HMs. There are also 85 HMs of horse grazing, which are converted at a rate of 1.25 AUMs/1.0HM and added into cattle estimates (BLM method was not completed for horses). The result is a total of 8938 + 106 = 9,044 AUMs. Using the BLM method direct employment estimate of 1.23 direct jobs/1,000 AUMs for Montana, this leads to an estimate of 11.1 part and full time jobs. Expanding the analysis to include indirect and induced impacts associated with this activity, we use an employment estimate of 1.93 jobs for every 1,000 AUMs. These calculations yield total economic contribution estimates of 17.5 part and full time jobs. Using similar calculations these 9,904 AUMs provide roughly $48,939 in direct and $247,233 in total labor income each year.

Anaconda-Deer Lodge County Income

From 1970 to 2011, annual personal income declined from $279.8 million to $277.6 million, a 1% decrease in real (inflation adjusted) terms. From 1970 to 2011, labor earnings from wage and salary employment shrank from $196.6 million to $100.7 million (in real terms), a 49% decrease, while labor earnings from proprietors' employment shrank from $15.7 million to $14.3 million (in real terms), a 9% decrease. During this period, labor income collectively fell from $212.1 million to $149.6 million (in real terms), a 29% decrease.

From 1970 to 2000, personal income in services related industries grew from $65.1 million to $73.2 million (in real terms), a 12% increase. Personal income in non-services related industries shrank from $65.1 million to $18.4 million (in real terms), a 93% decrease, and personal income in government jobs declined from $55 million to $47 million (in real terms), a 15% increase.

From 2001 to 2011, personal income from services related industries grew from $70 million to $82 million (in real terms), a 17% increase. Personal income from non-services related industries remained stable at $15 million. Similarly, from 2001 to 2011, personal income from government jobs remained stable at $47 million (in real terms).

Although from 1970 to 2011, average earnings per job shrank from $38,132 to $31,649 (in real 2011 terms) which was a 17% decrease, real per capita personal income(PCPI) grew from $17,846 to $29,848 (in real terms), a 67% increase; this reflects the growing non-labor income in Beaverhead County during this time period. Despite this $12,002 growth during the 41-year period, during 2011 PCPI in Beaverhead County ($29,848) was still much lower than the national PCPI ($42,433).

The other major component, non-labor income, grew from $67.7 million to $128 million (in real terms), an 89% increase from 1970 to 2011. In 1970, non-labor income represented 24% of total personal income. By 2011 non-labor income represented 46% of total personal income. During 2011, 20.8% of non-labor earnings were from dividends interest and rent, and 25.7% were transfer payments from the government (U.S. Department of Commerce (2012. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C. Tables CA05 & CA05N).

In 1970, farm proprietors' income represented 45.5% of all farm earnings. By 2011, farm proprietors' income represented 208.1% of all farm earnings. Real ($2011) farm earnings declined from $0.6 million/year to -$0.6 million/year, a 193.4% increase which was outpaced by non-farm earnings which grew from $40.5 million/year to $145.7 million/year, a 259.3 % increase.

From 1970 to 2011, cash receipts from livestock and products grew from $1.5 million to a maximum of $4.4 million during 2004, back to $3.0 million in 2011, a 97.8% increase during the 41-year period. From 1970 to 2011, cash receipts from crops grew from $0.3 million to $1.0 million, a 203% increase. From 1970 to 2011, net income including corporate farms ranged from -$3 million/year to $2 million/year. During this time period, 1986-1994 was the last sustained period of positive net farm income.

Each year the US Census Bureau releases a report on Poverty. The interactive mapping tool located at http://www.census.gov/did/www/saipe/data/maps/index.html?reload indicates that during 2011, the most recent year available, the poverty rate in Deer Lodge County for individuals was 20.9%, the rate for families was 14.6% (Figure 2). These were higher than national averages. The individual rate in Deer Lodge County had increased from 17% during 2009 and 18.7% during 2010.

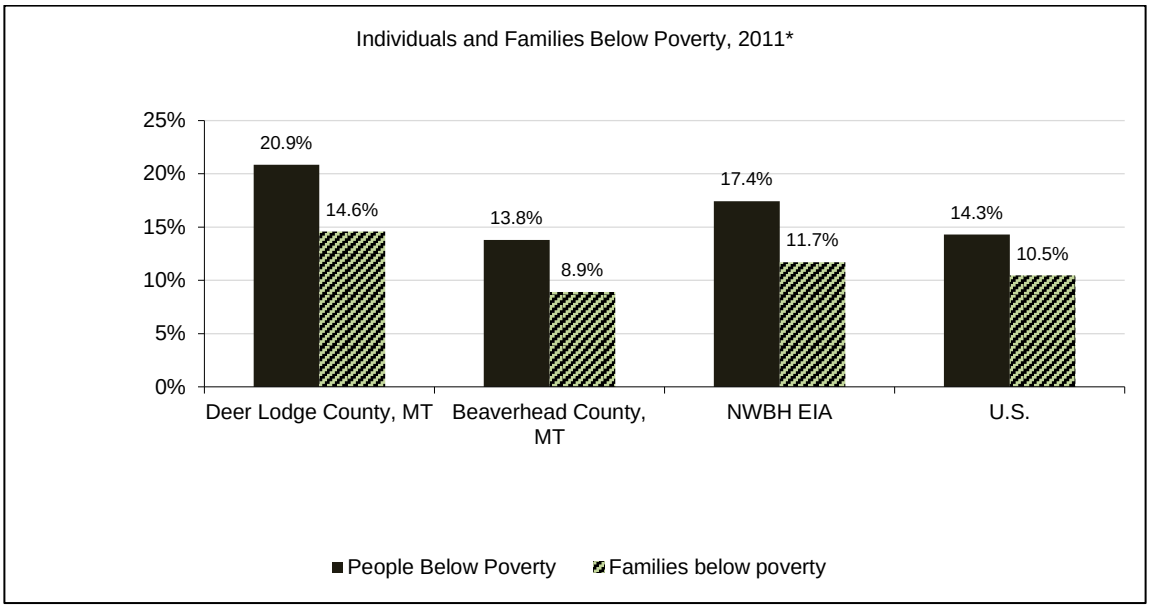

Figure 2: Individual and Family Poverty across the North and West Big Hole Economic Impact Area, 2010. Data Sources: U.S. Department of Commerce. 2012. Census Bureau, American Community Survey Office, Washington, D.C. Beaverhead County Income

From 1970 to 2010, annual personal income grew from $165.7 million to $314.4 million, a 90% increase in real (inflation adjusted) terms. From 1970 to 2011, labor earnings from wage and salary employment grew from $70.5 million to $120.1 million (in real terms), a 71% increase. Whereas labor earnings from proprietors' employment shrank from $42.6 million to $25.4 million (in real terms), a 40% decrease. During this period, labor income collectively grew from $114.6 million to $161 million (in real terms), a 41% increase.

From 1970 to 2000, personal income in services related industries grew from $48.8 million to $85.8 million (in real terms), a 76% increase. Personal income in non-services related industries shrank from $48.8 million to $43.1 million (in real terms), a 5% decrease, and personal income in government jobs grew from $25.9 million to $46.4 million (in real terms), a 79% increase.

From 2001 to 2011, personal income from services related industries grew from $79 million to $82 million (in real terms), a 4% increase. Personal income from non-services related industries shrank from $35 million to $24 million (in real terms), a 31% decrease. From 2001 to 2010, personal income from government jobs grew from $49 million to $55 million (in real terms), a 12% increase.

Although from 1970 to 2011, average earnings per job shrank from $36,979 to $31,276 (in real 2012 terms) which was a 15% decrease, real per capita personal income (PCPI) grew from $20,194 to $34,179 (in real terms), a 69% increase; this reflects the growing non-labor income in Beaverhead County during this time period. Despite this $13,985 growth during the 41-year period, during 2011 PCPI in Beaverhead County ($34,179) was still much lower than the national PCPI ($42,433).

The other major component, non-labor income, grew from $51.1 million to $153.4 million (in real terms), a 200% increase from 1970 to 2011. In 1970, non-labor income represented 31% of total personal income. By 2011 non-labor income represented 49% of total personal income. 2012. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C. Tables CA05 & CA05N).

In 1970, farm proprietors' income represented 60.3% of all farm earnings. By 2011, farm proprietors' income represented -8% of all farm earnings. Real ($2011) farm earnings grew from $6.3 million/year to $10.3 million/year, a 62.5% increase which was outpaced by non-farm earnings which grew from $14.3 million /year to $172 million/year, a 1,100% increase.

From 1970 to 2011, cash receipts from livestock and products ranged from $19.0 million/year during 1970 and 1974 to a maximum of $71.5 million/year during 2005. They ended the period at $61.9 million/year. During this time period, 2007 was the most recent year of positive net income, and 2003-2005 was the last sustained period of positive net farm income.

In 2011, average annual wages in crop production were $22,213 and average annual wages in animal production were $26,493 (U.S. Department of Labor. 2012. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C.)

Each year the US Census Bureau releases a report on Poverty. The interactive mapping tool located at http://www.census.gov/did/www/saipe/data/maps/index.html?reload indicates that during 2011, the most recent year available, the poverty rate in Beaverhead County for individuals was 13.8%, the rate for families was 8.9% (Figure 2). These were slightly lower than national averages. The individual rate in Beaverhead had decreased from 17.5% during 2009 and 18.1% during 2010.

Economic Impact Area Income

From 1970 to 2011, cash receipts from livestock and products grew from $20.5 million to a maximum of $75.4 million during 2005, back to $64.9 million in 2011, a 216.9% increase during the 41 year period. From 1970 to 2011, cash receipts from crops grew from $2.1 million to $31.4 million, a 1423.7 % increase.

Natural Resource Dependency

Wildland dependency data (Gebert and Odell 2006), based on the percentage of total labor income (employee compensation and proprietor income) earned in five wildland resource areas (timber, mining, grazing, recreation and wildlife, and federal wildland-related employment) is available in Table 5 for Anaconda-Deer Lodge and Beaverhead Counties. The portion of labor income earned in economic sectors associated with each resource area was calculated for 1993 and 2003, as was the change over those ten years. These figures were recalculated during 2010, as was the change between 2003 and 2010. Although these numbers can barely support thorough trend analysis, as they are only three snapshots in time and fit into the larger dynamic economy, they do provide some important information.

Table 5: Labor Income Wildland Dependency Percentages by Resource for 2003 and 2010 as well as Changes Between 1993 and 2003 and changes between 2003 and 2010.

County	Grazing	Timber	Mining	Federal Wildland Government	Recreation and Wildlife	Primary	Indirect	Total
Anaconda-Deer Lodge County 2003*	0.67	0.09	1.75	2.15	0.00	4.66	3.68	8.35
Change 1993-2003	-0.40	-0.07	+0.97	-0.46	0.00	+0.04	+1.69	+1.74
Anaconda-Deer Lodge County 2010	0.02	1.09	1.09	4.86	0.76	5.3	1.2	6.5
Change 2003-2010	-0.65	+1.0	-0.66	+2.71	+0.76	+0.64	-2.48	-1.85
Beaverhead County 2003*	3.3	0.6	9.6	5.4	7.7	26.5	12.4	38.9
Change 1993-2003	-6.7	-1.4	+2. 7	-0.8	+6.8	+0.6	-21.2	-20.6
Beaverhead County 2010	1.9	0.1	5.2	8.1	3.4	18.8	5.4	24.2
Change 2003-2010	-1.4	-0.5	-4.4	+2.7	-3.3	-7.7	-7.0	-14.7

(Source: Gebert and Odell, 2006). * Because of data problems for Beaverhead County, original 1993 and original 2003 were used for change calculations.

Southwestern Montana is a heavily wildland dependent part of the nation. Anaconda-Deerlodge earned 6.61% of all labor income directly or indirectly from these five wildland sectors. Beaverhead County earned roughly 59.5% of all labor income directly or indirectly from these five sectors during 1993. By 2003 the picture had changed, and Beaverhead County emerged as less (38.9%) wildland dependent, but Anaconda – Deer Lodge County was slightly more dependent. The 2010 IMPLAN data suggests that trend continued for Beaverhead County but reversed for Anaconda-Deer Lodge County. That year Beaverhead County had only 24.2% of all labor income in the county associated with wildland related employment and multiplier effects and Anaconda – Deer Lodge County was earning 6.5% of all labor income from those five sectors. A reduction in the primary dependence on grazing contributed to the overall declines, with the percentage of all labor income earned in Beaverhead County falling from 3.3% during 2003, to roughly half of that, 1.9% by 2010. Similarly, dependence fell from 0.67% in 2003 to 0.02% by 2010.

The economic contributions of the BDNF grazing program are modest in comparison to those of fish and wildlife related activities, timber harvest and non-wildlife related recreation. Livestock grazing accounts for less than three percent ($16,132/$544,328) of the Beaverhead-Deerlodge National Forest's estimated present net value (Revised Forest Plan FEIS, p.214). However, livestock grazing is still an important part of the local economy. Domestic cattle grazing contribute to the livelihood of permittees, as well as to the economies of local communities and counties.

Across the Beaverhead Deerlodge National Forest economic impact area, grazing is important to specific ranchers operating under BDNF, BLM and MT DFWP permits. To them, the continued opportunity to graze on public lands is important and can be vital to year round operations. As of 2012, 315 livestock operators graze stock on 257 separate BDNF allotments. The permitted level of Animal Unit Months (AUMs) was 233,499 or 87% of 1987 levels when the previous Forest Plans were authorized. Actual use averaged 177,278 AUMs from 2001 through 2003.

The January 2002 inventory from the National Agricultural Statistical Service (http://www.agcensus.usda.gov/Publications/2002/index.php) indicated the larger eight-county BDNF economic impact area produced 472,740 head of cattle. Five years later, the January 2007 inventory from the National Agricultural Statistical Service indicated the eight-county area produced 331,116 head of cattle. (http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Montana/)

These 2007 numbers represented declines of 30.0% for cattle in just five years. Of 56 Montana counties, Beaverhead County is the largest cattle producer (137,888 cattle and calves), it also ranked 69th for all US counties. Very few grain-fed cattle were produced. The focus was on calves and feeder steers along with beef cows or breeding stock. This type of ranching requires large expanses of grazing land.

According to the National Agricultural Statistical Service overall cattle production in Montana has been relatively stable since 1986. The January inventories in 1986 and 2002

reported 2.45 million head with a peak of 2.75 million head during 1996, and a total of 2.59 million head during 2007. Sheep production, on the other hand, showed a general decline across the state (with 272,012 head during 2007), reflecting a broader national pattern. (http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Montana/).

Several economic factors have changed since the early 1980s which might have affected ranching operations in southwest Montana, including rising real estate values, volatile commodity price fluctuations and rising overhead costs for agriculture. These factors along with state and national politics and changing livestock market conditions have affected the livestock industry over the last twenty years. Social factors include the rising popularity of southwest Montana as a place to live, work and play accompanied by related population growth and change.

Changes in forest management are responsible for a large part of the shift in permitted and actual use by cattle on the BDNF. The Beaverhead Riparian Amendment in 1997 and implementation of INFISH grazing standards west of the Continental Divide measurably affected allotment use. Livestock numbers have slowly declined since the original forest plans were written. Permitted use today is roughly 87 % of what it was in 1987. Under this financial stress, grazing permits on federal land are particularly valuable.

Fees are calculated using the formula required by 36 CFR 222.51 and are considerably less than those charged by private landowners. In 2003, the average fee in Montana for grazing on private land was $16 per AUM based on Montana Agricultural Statistics Service, National Agricultural Statistics Service figures, and the minimum fee charged on Montana State Lands was $5.48 per AUM (USDI 2006). The Forest Service and BLM shared the same formula to derive a $1.35 fee in 2010, which makes federal land the least expensive grazing available to area ranchers. Federal grazing permits are desirable for area cattle producers as a source of inexpensive forage, even though additional management costs are usually incurred. Total grazing fee receipts for the BDNF amounted to $208,623 in Fiscal Year 2003. Leased grazing on the MT FWP portion of the Seymour allotment was subject to fees of $6.12/AUM during 2010 (fwp.mt.gov/fwpDoc.html?id=48584, page 21).

Payments to Counties

During fiscal year 2012, Federal land payments to the two counties totaled $2,822,188. Of this amount Beaverhead County received payments of $2,207,364 and Anaconda – Deer Lodge County received $614,825. For Anaconda – Deer Lodge County, PILT represented 55.5% of all payments and Forest Service payments represented 44.4%. On the other hand, Beaverhead County, obtained 60.5% of payments from the Forest Service and 31.5% from PILT. Overall, payments increased dramatically during fiscal year 2008 and then have fallen during each successive year. PILT followed a similar pattern, rising substantially during FY2008, but increased again in FY2009 before beginning to fall (U.S. Department of Interior. 2009. Payments in Lieu of Taxes (PILT), Washington D.C.; U.S. Department of Agriculture. 2009. Forest Service, Washington, D.C).

The Range Resource and the Related Social Setting

(Excerpted from the Social Assessment of the Beaverhead-Deerlodge National Forest, Northern Economics 2002, which assessed people from across a larger area than this project area).

"Grazing lands are an important resource of the B-DNF. Both game and commercial livestock use these resources. Local ranchers and farmers often depend on access to forest-owned lands for grazing their livestock. There are about 350 permittees grazing on 256 allotments, making this (the entire BDNF) the largest range program in Region 1. In the summer, cattle and sheep graze the upper elevations of NFS administered lands (although no sheep graze this project area). During the fall, the animals are brought down for wintering, then, in late spring, after calving and branding, the livestock are returned to graze on NFS lands.

Although mining was an impetus in the region's development, cattle ranching was already established when the first miners found their way into Montana. The Grants and Orrs in the Beaverhead region and the Kohrs in Deer Lodge were grazing cattle and providing beef to local miners as well as to consumers in other parts of the west and east. These early ranchers faced difficult circumstances fighting with Blackfeet and other tribes over territory (see Heritage report) and initially competing with bison for range. Yet, through the 1870s the cattle and sheep business as well as farming continued to expand. By the end of the 1870s, bison were on the brink of extinction. Public lands became more accessible facilitated by an "open range" policy that made available public lands for grazing. Cattle ranching in Montana became another means to "strike it rich" and spurred another rush of settlers and speculators.

Before the boom of the 1880s, most Montana cattle operations were partnerships or family affairs, but many of the new outfits were full-fledged corporations with access to plenty of capital and plenty of livestock. Dozens of corporate ranches held Montana charters by 1886; and many others, such as the Texas-based XIT, &&&, and Continental Land and Cattle spreads, were incorporated in other states or territories. By 1886, at the peak of the open range boom, roughly 664,000 cattle and 986,000 sheep grazed Montana range lands. A large percentage of the animals belonged to the new corporate ranchers, whose managers packed them onto limited ranges with no provisions of winter hay, in hope of quick profits from minimal investments (Malone, Roeder, and Lang, 1991: 157).

A severe drought and hard winter in 1886-87 combined with overgrazing on public lands resulted in severe impacts to Montana's cattle business, with some estimates that half or more of the cattle died (Fletcher, 1960:89-94). Small operators who put up hay adapted better than the "get rich quick" operators did, and after 1887, the cattle industry settled into a period of recuperation and ultimately further expansion as the value of hay for winter feed became apparent (Harrison 1957; Fletcher 1960).

The agricultural boom began to go bust in the post-war depression of the 1920s, and large numbers of Montana farmers moved out of state, leaving a demographic profile that is similar to that of present day Montana: larger numbers of older persons and younger persons with the middle-age demographic group showing sharp declines. Prior to World War II, ranching and farming continued under pressure, but various New Deal programs supported these industries

into World War II, when once again there was a small boom. A combination of weather, world economics, and cultural changes in the United States have continued to influence boom and bust cycles in ranching and farming in southwest Montana. Today these activities remain important to the overall economy and culture of the region, but the face of agriculture and ranching are changing.

Beaverhead, Madison, Jefferson, and Powell Counties have a significant ranching and farming presence in terms of size and total land in agricultural production. These same counties are ones in which ranching and farming is a significant component of the overall lifestyle. Major ranching areas include the Beaverhead and Big Hole Valleys in Beaverhead County, the Ruby and Madison Valleys in Madison County, the Boulder Valley in Jefferson County, and the Deer Lodge Valley in Powell County.

Lifestyle Patterns and Values

Summer months are busy for ranchers, whether they run sheep or cattle. Some sheep ranchers grow grain or hay, and in the summer they harvest those crops. Lessons of the lean1886 winter remain valid for today's cattle ranchers who usually grow and store the feed required to get their cows through winter.

Altitude and weather influence exactly when haying starts, but it usually occurs from July through August. Haying is time and labor intensive. Beaverslides, a structure for stacking loose hay, were once popular as a method of stacking hay and they can still be found scattered throughout the region, especially in the Big Hole where they are said to have originated. Today, however, hay is either stacked or baled (round or square) for winter feeding. Some would say it is the "old timers" who stack hay, while the more "modern" ranchers bale it.

During the summer, ranchers and family members also check their summer pasture to make sure cows have not strayed or that predators are not harassing livestock. During the fall, livestock are gathered from summer pasture—usually higher elevation lands—and brought down to the valley ranchlands for the upcoming winter months. The gathering and moving of cattle is also a family operation, although on some corporate ranches hired hands, or cowboys, assist in moving the cattle.

Winter is a quieter season when pregnant cows begin to calve. During the winter, one of the first daily tasks is feeding the cattle or sheep, and there may be a second feeding during the later part of the day. Calves are also closely monitored to make sure they are healthy and surviving their first Montana winter. Winter is also a time for the repair and general upkeep of equipment and property. As spring approaches, new calves are branded and cattle are gathered and examined before they go to the summer range. Winter, early spring, and late fall are "slower" times in the ranching lifestyle, although there is always work to be done.

Ranchers or their family members may also work as fishing guides or outfitters or in town to supplement their income. Fluctuations in cattle prices, other market forces, and increasing equipment and operating costs require some diversification in order to ensure the fiscal viability of present-day ranching operations. Some choose to lease their lands, or access through them for hunting or fishing and thereby supplement ranch income. It is common for

wives and children to work for the cash needed to keep family and ranching life viable. Unfortunately, for many ranchers, children are not staying on to ranch, either because the isolation and lifestyle demands are not appealing or because financial realities do not allow it.

Values are part of a lifestyle. They influence how people act, what they believe to be true, and what is most important in daily life. Interviews indicated several categories of values associated with ranching lifestyles. There are certainly more ranching values than those described below, but these are the ones expressed in interviews; they may have implications for how ranchers respond to forest management issues.

> *It's a Tough Way to Make Living*[1].

A rancher's comment, it's a tough way to make to make a living, suggests two values about ranching: one is the importance of hard work, and the other is the toughness associated with this way of life. Hard work is a fundamental value for ranchers. The hours required are long, the labor is demanding, and the monetary rewards are not always perceived to be commensurate with the effort required. For example, a rancher commented:

> *Cattle prices make it so hard. For four or five years, things are good, then it goes down. It is hard to be in the cattle business…it is not great income.*

When ranchers comment that what they do is a "way of life," the implication is they are not motivated by monetary rewards: the work and the way of life associated with the work is highly valued. There is also a fierce pride in what ranchers believe are the difficult circumstances of ranching life. For example, one rancher commented:

> *We live in a harsh environment with marginal productivity. The strong survive. It is a tough way to live; with 160-320 acres, you can hardly make a living.*

The volatility of cattle prices, changing world markets, changing American dietary habits, competition with recreationists for water, and other external pressures also contribute to the sentiment that toughness of body, mind, and spirit are required to live the ranching lifestyle. There is also sentiment that this lifestyle and its products contribute to the moral and cultural foundation of the American way of life:

> *I believe in this way of life. It instills the ideals of hard work, independence, and respect for the land in our local community, but it is more than that. It is a foundation of our nation, our heritage is built on those values and what our forefathers did here in Montana.*

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[1] Indented italics indicate a statement from *interviewed* participants that were recorded on tape or written in field notes. Exact word for word transcription did not occur in all cases. However, these statements indicate the meaning of what was said. The process of writing field notes and making transcriptions from tapes often results in approximations of what was said that remain true to the meaning of the statement. Quotations from published or other sources are indicated by indentations but not italics.

This rancher's belief in his lifestyle's value is not consistent with how others may view it:

> *Sometimes I think the public just wants the aesthetic values of ranching and cowboys, they don't appreciate us and what we do beyond that. We make a contribution to the spirit of America, our values of hard work and taking care of the land. We are not looking for any handouts, work. We want to do well for society and to do well for ourselves at the same time.*

The value of hard work and toughness that ranchers attribute to their lifestyle contrasts with what they perceive as American culture's hollow evaluation of their present-day way of life: cowboys, ranches, and cows are artifacts, aesthetic accoutrements of western history that do not resonate with modern day realities. This is a perception ranchers believe needs to changed to be more consistent with their contributions to local communities and national values. Attachment to the land and belonging to it are also fundamental values of the ranching/agricultural lifestyle of southwest Montana. This is succinctly and eloquently stated:

> *Our land is not a place we visit; it is a place we live. We belong to it as much as it to us. We don't have a short-term view of our ownership; we can't have a short-term view and survive.*

This personalizes the relationship of families to their land. People and land are attached; people "belong to it." It is a value borne in historical experience and everyday connection:

> *Our ties to the land are…well, there is a familiarity that only comes with time and contact. You touch the soil, you pick up a rock, you build or tear down a fence, it is a connection that happens. You see things—you see animals giving birth, trees growing and falling—it is like your children….*

This intimate connection between history, family and land instills a sense of belonging and connectedness that goes beyond the ownership conferred by a legal deed. The sense of belonging is enhanced by historical connection, and it contributes to the stewardship values ranchers express:

> *My family has been ranching here since 1865. We know this land, we love it, and we want to be good stewards of the land. I bring that stewardship, my connection to my lands, to the public lands my cattle graze on.*

Tenure on the land leads to familiarity, and that familiarity leads to stewardship that in turn reinforces ties between ranchers and their lands. For these ranchers, the land is not a place they visit. The land, their tenure on it, and their caring for it, is a part of how they construct and evaluate their identity and that of their land-owning neighbors, including public agencies. However, there is also a recognition that not everyone always adheres to those stewardship ideals:

> *There is no doubt there was abuse by greedy self-serving uses of private and public lands. Someone who rapes the land and moves on, that is not the majority. Most*

> *ranchers are good stewards of the land; there is a moral and ethical foundation to that and a sincere desire to do the right thing.*

Utilitarianism and dominion are also expressed values by many ranchers. Utilitarianism is a familiar agriculturalist value. Natural resources are to be used. "Dominion" is the value that man has precedence in the world, if not the moral responsibility, to establish civilization where there is wilderness. Man's place in the natural world is to control and harness natural resources and subdue nature's chaos and make it orderly and functional. The history of the Khors, Grants, and others is one wherein Montana "wilderness" was converted to productive land that created benefit not only for themselves, but also for their community and the nation. In this sense, stewardship is implied in dominion. These are the values of the frontier west, where wolves, coyotes, mountain lions, and other predators were a threat to the order of making a living and living a meaningful life. As one Ruby Valley rancher observed about his "last best place:" *This valley is beautiful not in spite of human interventions, but because of them.* The beauty of the Ruby Valley is a direct result of man's actions to work the land, to take nature, and to make it produce. This is the view expressed in the following quote:

> *You just don't cut down a tree and let it rot. You take it to the mill so someone can make lumber of out of it. We have a waste not and want not philosophy. It is a shame to see something go to waste. We want the land at its best. (long pause) But I know there are times and places when land does not have commodity value.*

The long pause in the last part of this statement suggests there is heart-felt recognition of the amenity and aesthetic values of natural resources and at the same time consternation that some of those resources should be used and not "locked up" or used for less than their "best value." Perhaps the value accorded water resources best expresses this consternation. For many ranchers, their deep-seated utilitarian values result in the evaluation of water resources as "best" used for irrigation to produce crops or hay to feed cattle. However, as demands for water from fishermen, developers, and others have resulted in changes in agricultural water allocations, there is at once recognition of that value, but there is also an evaluation that the "best use" is for irrigation and not trout. Present-day realities are resulting in a change in how ranchers balance changing assessments of resources. For example:

> *We do get our blinders on. A rancher sees a blade of grass and he sees it converted to a pound of beef. But we acknowledge there are legitimate uses, diversified uses, that are not only possible on public lands but necessary.*

Nonetheless, historical and present-day realities contribute to an evaluation of natural resources as best used when they have a productive purpose and when nature is controlled to support those productive purposes. Independence and self-reliance coexist with values about mutual assistance to neighbors and community.

> *Bull-headed self-reliance, the attitude of 'I don't need anything or anyone, if I can't do it myself it don't get done' that hurts the industry, it hurts the individuals who think that way. Independence is part of our heritage, but we also have to work in a mutually beneficial way….*

Repairing your own tractor, treating a sick horse, and otherwise maintaining a ranch requires diverse skills and self-reliance that historically have been highly valued. At the same time, ranchers also recognize a need for mutual assistance when circumstances require it. Independence is tempered with mutually beneficial assistance. As this value is described, the extreme expression of independence and self-reliance, "If I can't do it myself, it don't get done," is not consistent with the self-reliance that recognizes the inter-dependence of those who live ranching lifestyles.

Resource Management Concerns

(Excerpted from the Social Assessment of the Beaverhead-Deerlodge National Forest, Northern Economics 2002, which assessed people from across a larger area than this project area).

Ranchers expressed both issue-specific and "process-related" management concerns. The issue-specific concerns were usually elicited in direct response to questions about forest management concerns and the "process-related" concerns were usually volunteered during other portions of the interviews. These concerns are listed below with a brief elaboration.

Noxious Weeds: Ranchers perceive that noxious weeds are among the most significant items of concern for the management of both public and private lands. Noxious weeds provide essentially no viable feed for cattle, they crowd out native species, and they reduce the diversity of plant material that is necessary for a healthy landscape. Ranchers argue that programs to control noxious weeds on public lands need urgent attention.

Private and Public Land Interface: USFS and BLM lands are often adjacent to ranch lands. Ranchers argue that this interface is a benefit to wildlife and to the overall health of the ecosystem, regardless of land ownership boundaries:

> *The **public** benefits from me taking cattle off the river bottoms on my land and grazing them in the uplands (on public lands). This takes the pressure off the river bottoms; it benefits everyone.*

Balancing Competing Uses: There is expressed concern that competing uses need to be identified as well as how those uses will coexist or be managed otherwise. For example:

> *We want to see competing uses identified, whether or not it is fish and irrigation, pheasant cover and raising alfalfa, or whatever it is, we need to identify it. It is possible to have both and maybe even necessary to have both.… There are people who don't believe we (ranchers) are necessary any longer when we can import all that beef from Mongolia.… It is more than farms are nice to look at, we can sustain the land and have competing uses too.*

Grazing: Ranching dependency on access to USFS land is a well-known and often expressed management concern. Sentiment exists that ranchers are perceived as sometimes overgrazing public lands or allowing damage to riparian areas. One rancher noted:

> *Are there problems with grazing? Yes, there are, but because there are problems everywhere, with all types of uses. The emphasis should be on solving the problems, not eliminating grazing. If you eliminate grazing, then it will have the same effect as what happened with timber: you will have all that forage to burn and then you will have out-of-control fires.*

There is also argument that grazing is a "natural and necessary disruption" of lands that evolved under grazing pressure. From this perspective, grazing continues to have an important ecological function, despite some problems that may need ongoing attention.

Land Management Expertise: Ranchers argue that they have valuable land management expertise and knowledge that is under-used and under-valued by public land management agencies as well as the general public. Their knowledge and expertise is based in long-term relationships with particular pieces of land. From these relationships, they have developed a locally based understanding of ecological processes that can be applied to their use of public lands.

Off Road Vehicles (ORVs): There are two types of expressed concerns about ORVs. One concern is that ORVs are a means whereby noxious weeds are spread on public lands. A policy that opens all areas of the Forest to ORV use is likely to result in more widespread distribution of noxious weeds. A second concern is that ORV use should not be restricted, since public lands should be open to public uses, including ORV use. These two concerns contradict each other, but they express different dimensions of this issue.

Loss of Ranchlands: Open space is an aesthetic value of local landscapes that ranchers value, but it is also an indicator of the availability of grazing lands, public or private. As ranches are sold and then developed into ranchettes or other similar properties, pasture once leased for grazing may not be available. Grazing land is perceived to be decreasing in supply and this will put additional pressures on public lands.

Wolves: Wolves have returned as a management concern for ranchers. One rancher commented:

> *It was a long night. I have not slept well in a few nights; my herd is up on the Gravelly Range, and I know there are wolves in them at night. They shouldn't be there, they shouldn't be there.*

They argue that wolves take more cattle than can be proved and consequently the actual threat to livestock and ranching viability is not known. Wolves are also perceived as threatening elk herds that some ranchers depend on for outfitting purposes, but the larger concern appears to be with the threat to cattle. It appears that ranchers perceive wolves as a part of the environment that now needs management.

Management Process: Ranger and Forest Supervisor turnover is an expressed concern about the process of forest management. Ranchers argue that few rangers have sufficient tenure to understand the land and the requirements for effective management. Those rangers who do

have tenure were acknowledged as individuals with whom they have established solid working relationships. Tenure is important for both understanding the management situation and for developing working relationships to effectively implement management policies. A consequence of the many appeals of various management policies is a perception that local managers "have their hands tied" and cannot manage lands according to sound science. Indeed, there is also a perception that managers may be reluctant to take actions for fear of legal appeals or other objections to management policy. Ranchers interviewed acknowledge a long-standing adversarial relationship with the USFS, but they also expressed a willingness to trust agency decisions if they are made based on "good science" and the assessments of local land managers."

This report also contained a table (Page 2-12) which shows that the number of cattle and horse during that period peaked during 1991 at 43,760. By 1997, numbers had fallen back to 36,702. Most animals spend roughly 3.5 months a year on B-DNF allotments. In 1997 there were an estimated 133,193 AUMs. A more recent assessment of the grazing program by B-DNF staff during the Revised Forest Plan Environmental Impact Statement estimated an annual average of 128,688 Head Months across the entire forest during the period from 2003-2005.

Analysis

Economic effects are described by comparing four alternatives (No Action/No Grazing, Current Grazing, Proposed Action, and Alternative 4). A term grazing permit would be issued and include any modifications to the Allowable Use Levels (AUL's) and seasons of use (SOU). There would also be some new range improvements proposed with both the Proposed Action and Alternative 4. Consequences are first described as expected changes to Forest Service grazing fee revenues, and Forest Service administrative costs in a financial efficiency analysis following implementation of each alternative. The costs and revenues expected from 2015-2024 are analyzed by discounting with a 4% real discount rate to present values and comparing costs to revenues to derive a present net value. Microsoft Excel 2010 software is used to facilitate the calculations of present net value (PNV) for the comparison. The period of 10 years (2015-2024), the length of time for which new allotment management plans will remain authorized is used for the analysis of alternatives. All alternatives will be compared using this timeframe to provide a consistent comparison. Consequences to contributions to employment and labor income, which are described in detail in the methods for assessing existing conditions, are shown across all alternatives. Social consequences are provided next for all alternatives. Environmental Justice is the final set of consequences considered.

Financial Efficiency Analysis

A summary of expected administrative costs, improvement costs and grazing fee revenues are estimated in Table 6. The financial efficiency analysis (Table 7) of the North West Big Hole Grazing Allotments considers the revenues and costs associated with the allotments from for the first ten years after a decision is made, Alternative A shows no grazing revenues. Present Net Value (PNV) from the Forest Service/US Government perspective is based on revenues that will be produced during the life of the allotment plans (ten years) and costs to administer the permit, including range improvement and monitoring investments. All benefits and costs are discounted at four percent annually to bring them into a common base year (2013) allowing for a direct comparison of benefits and costs that may occur at different times during the grazing permit period. The economic reality of all alternatives is that National Forest funds would be required to implement all alternatives because costs exceed revenues for all alternatives. PNVs are also all negative, meaning that the present value of costs exceeds the present value of revenues by $11,623 to $149,056.

Revenues to the Forest Service generated from the allotments are simply the annual grazing fees collected from the permittees adjusted to the 75%, because 75% goes to the US Treasury and 25% goes back to counties. This income derived from 75% (See Bankhead Jones Farm Tenant Act of 1937 above in Regulatory Framework) of the congressionally set rate, currently $1.35 per head month (HM) is multiplied with the number of HMs across all allotments. The costs to the Forest Service are the cost of monitoring and the cost of the material for the range improvements. The permittee typically provides the labor for range improvements. The cost to prepare this Environmental Impact Statement to reissue these permits is not included in the PNV analysis because it is a sunk cost at the time the selection of an alternative is made.
The No Action (No Grazing) Alternative by does not generate any benefits for the Forest Service/Treasury since no annual grazing fees would be collected from 2015-2024. However,

there are some costs associated with monitoring. These monitoring costs are roughly $6,900 during 2015 and 2020. The present net value to the Forest Service/US Government of Alternative A is -$11,623. This value includes only the cost to administer the permit, it does not attempt to put non-market costs or benefits into dollars terms.

The Current Grazing Alternative would allow cattle grazing to continue at the current levels (with a span from 4,738 to 6,856 HMs/year depending if rest rotation is needed or not) with annual monitoring costs of $8,100. The total annual range of grazing fee revenues is approximately $6,396 to $9,256, with $4,797 to $6,942 headed to the US Treasury for each of the first ten years. The present value of grazing fee revenues for the first ten years after selection of this alternative to the Forest Service/US Government is approximately $47,050. The present net value to the Forest Service of Current Grazing Alternative is -$16,121. The cost of administering the permit and monitoring exceeds the amount of money received from the grazing fees. This value includes only the revenue generated from the grazing fees and the cost to administer the permit, it does not attempt to put non-market costs or benefits into dollars terms.

Under The Proposed Action Alternative, the North West Big Hole Allotments would see a span from 4,738 to 6,768 HMs/ year with annual monitoring costs of $8,100. Additional Costs (Table 6) include fencing $30,250, water development improvements $6,000, exclosure improvements $73,750, and hardened crossings $2,250. The total annual range of grazing fee revenues is approximately $6,396 to $9,137, with $4,797 to $6,853 (depending if rest rotation is needed or not) headed to the US Treasury for each of the first ten years. The present value of grazing fee revenues for the first ten years after selection of this alternative to the Forest Service/US Government is approximately $46,559. The present net value to the Forest Service of Current Grazing Alternative is
-$120,394. The cost of administering the permit and monitoring exceed the amount of money received from the grazing fees. This value includes only the revenue generated from the grazing fees and the cost to administer the permit, it does not attempt to put non-market costs or benefits into dollars terms.

Under Alternative 4, the North West Big Hole Allotments would see a span from 4,522 to 6,745 HMs/ year with annual monitoring costs of $8,100. Additional Costs (Table 6) include fencing $16,250, water development improvements $6,000, exclosure improvements $32,500, hardened crossings $2,250 and plantings $18,000. The total annual range of grazing fee revenues is approximately $6,396 to $9,137, with $4,797 to $6,853 (depending if rest rotation is needed or not) headed to the US Treasury for each of the first ten years. The present value of grazing fee revenues for the first ten years after selection of this alternative to the Forest Service/US Government is approximately $44,424. The present net value to the Forest Service of Current Grazing Alternative is
-$149,056. The cost of administering the permit and monitoring exceed the amount of money received from the grazing fees. This value includes only the revenue generated from the grazing fees and the cost to administer the permit, it does not attempt to put non-market costs or benefits into dollars terms.

Table 6:. Expected Administrative Costs, Improvement Costs and Grazing Fee Revenues by Alternative (Year cost is incurred)

	No Action Alternative	Current Grazing Alternative	Proposed Action Alternative	Alternative 4
Fencing Costs	$0	$0	$30,250 (2015)	$16,250 (2015)
Water Development Improvements	$0	$0	$6,000 (2015)	$6,000 (2015)
Exclosure Costs	$0	$0	$73,750 (2015)	$32,500 (2015)
Hardened Crossing Costs	$0	$0	$2,250 (2015)	$2,250 (2015)
Monitoring Costs	$13,800 (2015 & 2020)	$81,000 (Annual)	$81,000 (Annual)	$81,000 (Annual)
Planting Costs	$0	$0	$0	$18,000 (2015 & 2016)
Annual Grazing Fee Revenues to USFS and US Treasury)	$0	$4,797 to $6,942 (Annual)	$4,797 to $6,853 (Annual)	$4,579 to $6,556 (Annual)

Table 7: Present values of Cost and Revenues for the Forest Service/US Government and Present Net Values by Alternative (2015-2024)

	No Action Alternative	Current Grazing Alternative	Proposed Action Alternative	Alternative 4
Present Value of Costs	-$11,623	-$63,171	-$166,953	-$193,480
Present Value of Revenues	$0	$47,050	$46,559	$44,424
Present Net Value	-$11,623	-$16,121	-$120,394	-$149,056

Economic Impact (Employment and Labor Income) Analysis

In order to estimate the employment and labor income contributions from these alternatives, annual head month estimates for grazing use levels that incorporate the rest rotations schedules multiplied by 1.32 for cattle and 1.25 for horses to obtain AUMs and then multiplied with the BLM estimates for the State of Montana (described above). To understand the results, consider a job is defined as the annual average of monthly jobs. Thus, 1 job lasting 12 months = 2 jobs lasting 6 months each = 3 jobs lasting 4 months each. Each of those examples would appear as 1 job. That 1 job lasting 12 months can be either full-time or part-time; but it does last for 12 months. Labor income includes the wages, salaries and benefits of workers who are paid by employers and income paid to proprietors. Impacts are described as changes to expected contributions from results of the Current Grazing Alternative.

No Action (No Grazing) Alternative – under this Alternative the existing economic contribution that North West Big Hole allotments make to Beaverhead and Anaconda-Deer Lodge Counties would be reduced to only grazing on the MT DFWP portion of the Seymour allotment for this alternative. This remaining grazing, roughly 1,399 total HMs per year in the project area, is expected to produce direct, indirect and induced economic contributions associated with the actual use, totaling roughly 3-4 jobs and $46,218 per year in labor income. This change equates to a reduction of roughly 12 jobs and loss of roughly $163,809 per year. Over the 10 –year analysis period this would be a reduction of 116 jobs and $1.64 million in labor income.

Current Grazing Alternative – Under the Current Grazing Alternative, there would be no changes or impacts, and the current levels of grazing and associated economic contributions to Beaverhead and Anaconda-Deer Lodge Counties would continue for the next ten years. The target for future grazing levels on these allotments is between 4,738 and 6,856 HMs per year. The expected variation during the next ten years is used to estimate contributions of 7-11 direct jobs per year totaling 96 during the next 10 years as well as 4-6 indirect and induced jobs per year, totaling 55 jobs during the next ten years. Collectively, total employment is expected to range from 12-18 jobs per year, totaling 151 jobs during the ten-year period. Jobs associated with this alternative are expected to provide between $34,000 and $49,000 per year in direct labor income, as well as $136,000 – $199,000 each year in indirect and induced labor income, for a total ranging from $170,000 to $248,000 each year. Across all ten years, this is $423,862 in direct labor income, $1,717,429 in indirect and induced labor income for a total of $2,141,291 of total annual labor income over the 10-year period.

Proposed Action Alternative – Under The Proposed Action Alternative, there would be some adjustments to cattle management practices, including small changes in authorized and actual head months and infrastructure improvements. Recent actual head months on North West Big Hole allotments have been roughly 6,856 compared to current permitted which is 9,764 HMs per year. The target for future grazing levels on these allotments is between 4,738 and 6,768 HMs per year. The expected variation during the next ten years is used to estimate contributions of 7-11 direct jobs per year totaling 95 during the next 10 years as well as 4-6 indirect and induced jobs per year, totaling 54 jobs during the next ten years. Collectively, total employment is expected to range from 12-17 jobs per year, totaling 150 jobs during the ten-year period. Jobs associated with this alternative are expected to provide between $33,000 and $49,000 per year in direct labor income, as well as $136,000 – $196,000 each year in indirect and induced labor income, for a total ranging from $170,000 to $245,000 each year. Across all ten years, this is $419,462 in direct labor income, $1,699,601 in indirect and induced labor income for a total of $2,119,063 of total annual labor income over the 10-year period. The small reduction in contributions would be approximately 1 fewer direct and 2 fewer total jobs, $4,400 less in direct and $22,228 less in total labor income for the ten-year period than current grazing.

Alternative 4 – Under Alternative 4, there would be some adjustments to cattle management practices, including small changes in authorized and actual head months and added infrastructure. The target for future grazing levels on these allotments is between 4,522 and 6,475 HMs per year. The expected variation during the next ten years is used to estimate

contributions of 7-11 direct jobs per year totaling 91 during the next 10 years as well as 4-6 indirect and induced jobs per year, totaling 52 jobs during the next ten years. Collectively, total employment is expected to range from 11-17 jobs per year, totaling 143 jobs during the ten-year period. Jobs associated with this alternative are expected to provide between $32 and $47,000 per year in direct labor income, as well as $130,000 – $188,000 each year in indirect and induced labor income, for a total ranging from $163,000 to $234,000 each year. This is $400,183 in direct labor income, $1,621,488 in indirect and induced labor income for a total of $2,021,671 of total annual labor income over the 10-year period. The reduction in contributions would be approximately 5-6 fewer direct and 8-9 fewer total jobs and $23,678 less in direct and $119,620 less in total labor income for the ten-year period.

Any impacts under No Action, Current Grazing, Proposed Action or Alternative 4 would likely only affect employment and labor in the economy of Beaverhead and Anaconda-Deer Lodge Counties, felt mainly by a few individual ranchers and individuals manufacturing, selling, and installing range improvements. The investments by the Forest Service in range improvements would lead to slight increases in final demand for supplies such as water tanks, head boxes, pipe, fence posts, barb wire, nails and staples, however we have not attempted to quantify how this small increase in final demand would affect jobs, as this is a normal part of the Forest's range program.

While the economic effects of these alternatives on the agriculture industry and regional economy may be small, they could affect individual operators and firms producing and installing range improvements. The impact would vary from one producer to the next depending upon their relative dependence on BDNF allotments for meeting and effectively managing their grazing needs. Permittees required to adjust timing and location and numbers would likely respond by restructuring their existing operations. For example, they might lease other private pasture, feed the livestock, or change their herd size. The impact analysis does not project the economic effects on individuals or the community if one rancher goes out of business. We have no data to predict if and when loss of public land grazing precipitates a ranch sale.

Social Impacts

(Excerpted from the Social Assessment of the Beaverhead-Deerlodge National Forest (Northern Economics 2002)

"Social setting and lifestyle effects on livestock producers resulting from alternatives are of considerable interest because of the long tradition of grazing on the BNDF and relatively large numbers of grazing permit holders. The principle effect alternatives could have on traditions of livestock grazing will come from changes in grazing levels (AUMs) and number of allotments available. Several factors besides forest management have changed since the early 1980s which also affect ranching operations in southwest Montana and the ability of ranchers to adapt to change. Social factors include the rising popularity of southwest Montana as a place to live, work and play, the ensuing population growth and change in demographics.

Riparian standards in key watersheds may reduce grazing in key watersheds and permittees may have to restructure their existing operations. Permittees, who operate on the margin of

profitability, may find their operations economically unfeasible. The preferred lifestyle of these individuals may be adversely impacted." Forest users whose lifestyle and personal economics are tied to grazing on the BDNF would most likely favor Current Grazing, Proposed Action and Alternative 4 in sequential order. Under these alternatives livestock grazing on the BDNF would be affected the least. Alternative A would garner less favor.

"During Forest Plan Revision, some members of the public expressed a desire to reduce grazing on the BDNF. Some of these individuals consider grazing to be damaging to the environment through overgrazing of forbs and grasses, introduction of noxious weeds, soil compaction, erosion and degradation of water quality. Others feel that domesticated livestock are an unnecessary source of competition for native wildlife and grazing on public lands is an unwarranted subsidy of the livestock industry.

For some, encountering livestock, their droppings or trampling on public lands detracts from the sense of the wild." The No Action (No Grazing) Alternative would likely satisfy people who desire the end of grazing on the forest. Alternatives A, B, C, and D offer varying levels of additional protection for aquatic species in impaired watersheds and would be favored by those concerned about livestock grazing competing with or damaging resources.

"A concern that continues to surface in discussions of public lands and livestock grazing is the link between ranching and open space. This link is important to the setting and lifestyles of people who live and recreate in southwest Montana. Forest Service grazing permits contribute to the success of many of the smaller ranching operations which contribute to open space. Other considerations also contribute to decisions to sell ranch land to real estate developers. A University of Wyoming report (Taylor 2003) cited four factors for loss of open space (ranchland) to development:

- Aging agricultural operators and the effects of estate taxes;
- Limited profitability of agriculture currently, and the availability of higher profits from other uses, especially development;
- Increased agricultural land prices despite the limited profitability of agriculture; and
- Continued uncertainty about livestock grazing on federal lands.

It is apparent ranchers in southwest Montana are offered the opportunity to subdivide their land. Gallatin, Beaverhead and Madison counties were identified as the top three counties in the Rocky Mountain West at risk of losing strategic ranchlands (American Farmland Trust (2002). The risk of ranchland converting to residential and commercial development was based on proximity to public land, presence of major road corridors and transportation, variety of vegetation, water availability, and current rural development housing densities."

It is difficult to predict if shifts in management between alternatives might affect a rancher's choices to subdivide. However, Current Grazing, Proposed Action and Alternative 4 might induce the least change from the current situation.

Environmental Justice

The Forest Service defines environmental justice according to USDA Departmental Regulations. "Environmental justice means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by, government programs and activities affecting human health or the environment."[2] Environmental justice includes the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.[3]

i. Fair Treatment

Fair Treatment means that none of the identified environmental justice populations bears a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental, and commercial operations or programs and policies.

ii. Meaningful Involvement

Meaningful Involvement has four parts:

1. Potentially affected environmental justice populations have opportunities to participate in decision-making processes affecting their environment or health;
2. The contributions of environmental justice populations may influence the agency's decision;
3. The concerns of all participants are considered in the decision-making process;
4. The decision-makers seek out and facilitate the involvement of environmental justice populations.[4]

iii. Defining Environmental Justice Concerns

An environmental justice concern is generally defined as:

- A potential for disproportionately high and adverse impacts on minority and/or low-income populations associated with a proposed action.
- A lack of fair treatment, or meaningful involvement of minority and low-income populations in the planning process.

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[2] USDA Departmental Regulation No. 5600-002, Environmental Justice, December 15, 1997, DR5600-002, http://www.ocio.usda.gov/sites/default/files/docs/2012/DR5600-002.pdf
[3] US Environmental Protection Agency, Environmental Justice, www.epa.gov/environmentaljustice/ Accessed July 10, 2013.

[4] EPA's Action Development Process: Interim Guide on Considering Environmental Justice During the Development of an Action, p. 3, http://www.epa.gov/environmentaljustice/resources/policy/considering-ej-in-rulemaking-guide-07-2010.pdf

By identifying and addressing environmental justice concerns, the IDT ensures that it will be prepared to describe efforts to achieve meaningful involvement and address environmental justice concerns during the development of the proposed action and thereby comply with applicable requirements.

iv. Forest Service Environmental Justice Policy

What is the Forest Service's policy for considering environmental justice in NEPA? Executive Order 12898 and USDA Departmental regulations provide the framework for considering environmental justice in NEPA. The memorandum accompanying the E.O. identifies four important ways to consider environmental justice under NEPA.

1) Each Federal agency should analyze the environmental effects, including human health, economic, and social effects of Federal actions, including effects on minority populations, low-income populations, and Indian tribes, when such analysis is required by NEPA.

2) Mitigation measures identified as parts of an environmental assessment (EA), a finding of no significant impact (FONSI), an environmental impact statement (EIS), or a record of decision (ROD), should, where feasible, address significant and adverse environmental effects of proposed federal actions on minority populations, low-income populations, and Indian tribes.

3) Each Federal agency must provide opportunities for effective community participation in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings crucial documents, and notices.

4) Review of NEPA compliance… must ensure that the lead agency preparing NEPA analyses and documentation has appropriately analyzed environmental effects on minority populations, low-income populations, or Indian tribes, including human health, social, and economic effects.[5]

In the NEPA process, Departmental Regulations strongly recommend that agencies make robust efforts to encourage members of low-income and minority populations to help develop and to comment on possible alternatives. When environmental justice populations are present, efforts would include organizing public meetings to facilitate public input on the alternatives by these populations. Agencies should also notify interested or affected parties of the availability of draft NEPA documents and encourage comment. NEPA documents provide important opportunities to demonstrate how concerns raised by minority and low-income

[5] Environmental Justice Guidance under the National Environmental Under the National Environmental Policy Act, Council on Environmental Quality, December 10, 1997, p. 4-5.

populations during the scoping process have been considered in the development of alternatives as well as to provide opportunities to encourage additional input. [6]

As stated in Executive Order 12898, it is required that all federal actions consider the potential of disproportionate effects on minority and low-income populations in the local region. The principles of environmental justice require agencies to address the equity and fairness implications associated with Federal land management actions. The Council on Environmental Quality (CEQ) (1997) provides the following definitions in order to provide guidance with the compliance of environmental justice requirements:

Minority population
"Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 % or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis..."

Low-income population
"Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect."

Information from the affected environment was reviewed to determine whether one or both of these descriptions apply to portions or the entire economic impact area. Results of this review show that the total population of all races other than white was less than 10% at both the County and economic impact area levels, meaning this is not a minority population. The poverty rate in Anaconda-Deer Lodge County for individuals was 20.9%, the rate for families was 14.6% (Figure 2). These were higher than national averages. The individual rate in Anaconda-Deer Lodge County had increased from 17% during 2009 and 18.7% during 2010. The poverty rate in Beaverhead County for individuals was 13.8%, the rate for families was 8.9% (Figure 2). These were slightly lower than national averages. The individual rate in Beaverhead County had decreased from 17.5% during 2009 and 18.1% during 2010. Collectively, for poverty rate for individuals was 17.4%, the rate for families was 11.7% (Figure 2).

The Anaconda-Deer Lodge County and Economic Impact area individual poverty rates are both higher than the state average, suggesting the presence of an environmental justice population in the economic impact area. It is difficult to know if this population is represented by the workforce potentially affected by this decision, and it is also difficult to assess if this decision would produce a disproportionately high and adverse impact to this particular environmental justice population. However, these findings at least warrant consideration in

[6] DR 5600-002, p. 31

this decision which could affect employment and labor income. The economic impact analysis indicates that current grazing alternative would maintain the greatest income contribution to the two impact area counties, followed closely by the Proposed Action Alternative, and Alternative 4. The No Action (No Grazing) Alternative would be most likely to exacerbate existing poverty. Outreach to potentially affected ranchers could be a useful step in decision-making.

Cumulative Effects

The activities proposed under each of the alternatives would impact the economic impact area in concert with past, present and reasonably foreseeable future activities. A complete listing of these cumulative impacts is broken into National Forest System lands within the allotment boundaries, Bureau of Land Management lands within the allotment boundaries, State of Montana and Private lands and can be found in Chapter 2. In general the impacts described above would be cumulative with those associated with each of the activities listed in this table as well as other external influences on the Beaverhead and Anaconda-Deer Lodge Counties economy. Activities in this list contribute to short and long-term economic impacts, varying by sectors of the economy and magnitude of effect. The financial efficiency ranging from negative $11,623 to negative $149,056 and impacts attributable to each of the alternatives ranging from two to 115 fewer jobs during the next ten years.

Comparison of Alternatives

Regarding the grazing opportunities objective in the Revised Forest Plan, Current Grazing, Proposed Action and Alternative 4 provide longer term sustainable grazing opportunities for domestic livestock from lands suitable for forage production. Alternative A would discontinue nearly all grazing opportunities on these allotments, with the exception of the MT DFWP portion of the Seymour Allotment.

Regarding economic efficiency, from the Forest Service (taxpayers') perspective, all alternatives are financially inefficient. Ranked from least to most inefficient are No Action, , Current Grazing , Proposed Action and then Alternatives 4. The non-market benefits expected through implementation of these alternatives have not been translated into monetary terms. However, descriptions of these non-market costs and benefits regarding ecological conditions are considered as trade-offs in the selection of an alternative and can be found in other sections of this environmental impact statement.

Regarding the contribution to the economy, in decreasing order Current Grazing, Proposed Action and Alternatives 4 would do more than No Action to contribute to the social and economic well-being of local Beaverhead County and Anaconda-Deer Lodge County communities by promoting sustainable use of renewable natural resources and increased investments in range improvements. The action alternatives would all provide forage for livestock grazing, consistent with other resource goals. The No Action Alternative would remove the long-term contribution from grazing these allotments, and prevent cattle from accessing NFS lands currently in allotments. This would be a loss to the ranchers, and the Beaverhead and Anaconda-Deer Lodge Counties economy.

Heritage

Existing Condition

Historical Context - The remains of approximately 12,000 years of human history and prehistory are spread across the Beaverhead-Deerlodge National Forest. Many of these archaeological and historic sites are important for the scientific, historic, cultural, and aesthetic values they possess.

The most common type of prehistoric site in southwestern Montana is the lithic scatter, a site which contains stone tools, and/or flakes of stone left during the process of making or repairing a stone tool, such as a knife, arrow point, spear point, or hide scraper. Lithic scatters may represent the remnants of prehistoric tool manufacturing/maintenance locales, hunting camps, animal butchering sites, or stone quarries. The ubiquitous lithic scatter comprises approximately 70% of recorded prehistoric sites in this part of the state. Other prehistoric site types in western Montana include bison jumps, game traps, tipi ring encampments, vision quest sites, wickiups, and rock art sites, among others.

The most common type of historic cultural resource relates to the mining of gold, silver, lead, and copper during the latter part of the 19th century and the early part of the 20th century. Such properties include mining camp remnants, ghost towns, miners' cabins, mining shafts, adits, mills, smelters, and an assortment of other mining related buildings, structures, and landscape features.

Gold prospectors and a few early settlers began moving into southwestern Montana following the demise of the fur trapping industry. The first wave of mining began in the early 1860s and lasted for about the next 20 years focusing on the mining of placer gold gravel deposits along larger streams and drainages. This was followed by lode, or hard rock, mining of bedrock of gold, silver, and then copper deposits.

By World War I the mining of hard rock gold was essentially over, although some small ventures continued. A revival occurred during the Great Depression era of the 1930s when the price of gold almost doubled. Overnight, the gold mining streams and fields were once again sluiced and mined with pick and shovel. Unlike before though, this was done by out-of-work miners and others who were trying to eke out some sort of livelihood during the harsh economic times of the Great Depression. The Great Depression mining era closed at the outbreak of World War II. Gold mining continues today, generally by large corporations who mine for so-called "flour" gold. The mining of this type of gold requires tons of earth to be removed and the use of highly sophisticated processing techniques in order to retrieve a few ounces of the precious yellow metal. Other historic period sites include transportation networks, lumber mills, homesteads, forgotten cemeteries, irrigation ditches, cow/sheep camps, and trash dumps.
The Beaverhead-Deerlodge Forest recognizes that tribal governments are sovereign nations with a strong interest in National Forest System land management and identifies the need to

support treaty rights and tribal values when planning and implementing forest management activities. The Shoshone-Bannock Tribes of the Ft. Hall Reservation and the Confederated Salish and Kootenai Tribes of the Flathead Reservation maintain active interests in the southwestern Montana. Individual tribal members occasionally use public lands to gather plants or other native materials, cut tipi poles, and hunt or fish. However, these groups have been removed from the area for so long; they are gradually losing the historical and cultural ties to locations that are distant from their current reservations. Continuing consultation efforts with these groups have yet to identify specific traditional cultural properties (TCPs) or areas of religious significance within the proposed project area. They have, however, expressed concerns over the preservation and protection of specific archaeological sites (burial locations and pictograph sites) and any adverse impacts to such sites, though none are currently known to occur in project area.

Within a regional perspective, the development of private lands that are not protected by federal or state cultural resource statutes and regulatory protections decrease the broader resource base, which then affects the understanding of these resources and potentially limiting management options. It is reasonably foreseeable that heritage resources found on the Forest will increase in value and significance as prehistoric and historic sites in other non-federal ownerships are damaged or destroyed by development or other activities. Restrictions on recreational activities in other areas, population growth, resource extraction, and development can increase the use intensity within the planning area, potentially affecting cultural resources. The coordination of regional planning actions could aid in the continued and future protection of cultural resource values.

The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Regulatory Framework

The following table (Table 1) provides a summary of the regulatory framework applicable to this analysis.

Table 1: Heritage Regulatory Framework		
Authority Level (Federal, State, County, Forest, Regional)	**Law, Regulation, Policy**	**How Applicable to This Project**
Federal	The National Historic Preservation Act of 1966, as amended*	Establishes a program for the preservation of prehistoric and historic properties throughout the nation for any federal undertaking. The re-authorization of livestock on USFS lands would be considered an undertaking.
Federal	National Environmental Policy Act of 1969	Require the Forest Service to consider impacts to important prehistoric, historic, cultural and natural aspects of our national heritage. Both known and unknown historic and prehistoric resources are present in the project area.
Federal	National Forest Management Act of 1976	Require the Forest Service to preserve important prehistoric, historic, cultural and natural aspects of our national heritage.
Federal	American Indian Religious Freedom Act of 1978 as amended	Directs that American Indians shall have reasonable access to federal lands for the purpose of conducting traditional religious ceremonies and collecting traditional ceremonial and medicinal plants and materials. It also requires federal agencies to consult with American Indian tribes regarding proposed undertakings in areas that may be of cultural or spiritual interest to them. The re-authorization of livestock on USFS lands would be considered an undertaking.
Federal	Executive Order 13175 Consultation and Coordination with Indian Tribal Governments	Directs federal agencies to carry out trust responsibilities and assess the impacts of their actions on Indian trust resources. This project was part of annual consultation meetings with tribal governments.

Table 1: Heritage Regulatory Framework		
Authority Level (Federal, State, County, Forest, Regional)	**Law, Regulation, Policy**	**How Applicable to This Project**
Federal	Executive Order 13007 Indian Sacred Sites	Directs federal agencies to accommodate access to and ceremonial use of Indian sacred sites, avoid adversely affecting the physical integrity of such sacred sites and requires consultation with tribes to learn tribal concerns for sacred sites on public lands. Sacred sites are not identified at this time in the project area.
Region	Programmatic Agreement with the Advisory Council on Historic Preservation and the Montana State Historic Preservation Office (USDA FS 1995b).	Specific R1 procedures for implementing Sections 106 and 110 of the National Historic Preservation Act. The reauthorization of grazing permits does trigger the need for a Section 106 review.
Forest	Forest Service Manual 2360	Provides guidance for the management of cultural resource values.
Forest	Beaverhead-Deerlodge Forest Plan American Indian Rights and Interests p.12-13 **Standard 1:** No impact to identified TCPs shall occur until Forest officials consult with the tribe or other cultural group who identified the property and their concerns have been considered. TCPs shall be identified through proactive consultation with affected tribes. Heritage Resources p. 22-23 **Standard 1:** Heritage resources determined eligible for listing in the National Register of Historic Places will be preserved in place, or a consensus determination of	Not applicable: there are no currently identified TCPs within the project area. **Standard 1: Avoidance of Direct Impacts-**Cultural resources inventory shall be conducted prior to any ground disturbing activities to identify cultural resource. National Register eligible sites will be preserved in place or a consensus determination of

Table 1: Heritage Regulatory Framework		
Authority Level (Federal, State, County, Forest, Regional)	**Law, Regulation, Policy**	**How Applicable to This Project**
	"no adverse effect" will be reached with the Montana SHPO, the Advisory Council on Historic Preservation, and appropriate Indian tribes.	No Adverse Effect.
	Standard 2: Unplanned discoveries of heritage resources during project implementation shall cause project operations in the area of the discovery to cease until analysis and evaluation of the heritage resources are completed, including consultation with the Montana SHPO and appropriate Indian tribes.	**Standard 2: Avoidance of Inadvertent Impacts -** Should cultural resources be identified during the course of project implementation, operations will cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.
	Standard 3: Heritage protection measures will be added to all appropriate contracts, sales documents, and special use permits.	**Standard 3: Avoidance of Inadvertent Impacts-** Cultural resources awareness and protection language will be appended to each grazing permit.
	Ruby Management Area p.77 **Standard:** Protect and Interpret sites around the Pioneer Town site.	**Ruby Management Area Standard**:: The Pioneer Town site is located within the Ruby Creek Allotment and currently has active livestock grazing taking place.

Seymour

Analysis of the previously defined resource indicators is included in defining the existing condition of the Seymour Allotment. This includes a search of all previously known archaeological resources that are listed, eligible for, or potentially eligible for nomination to the NRHP. If determined to be present in the allotment, a detailed data review is conducted to determine site condition.

Existing conditions on the Seymour allotment can be characterized as having very few known cultural resources. Relatively little previous cultural resource work has been conducted within the allotment boundary, approximately 142 acres or less than 1% of the total acreage of the allotment. Project work has mainly included timber sales and salvage timber sales as most of the

allotment is heavily timbered. Resource indicators identify one previously known heritage property within the allotment that has the potential to be impacted. Site 24DL495 is the La Marche woodcutting camp, which consists of the remains of a temporary residence cabin and horse barn. The site maybe associated with historic small scale commercial woodcutting or with large-scale historic harvesting for the Anaconda Mining Company. Analysis of the site location shows that the site is located in heavy timber and likely not frequented by cattle. The site contains two architectural features including a cabin and barn remains. The site has an "unresolved" eligibility and site files contain no mention of livestock grazing impacts to the overall condition. Given the site's location, it is unlikely that livestock grazing has or will have any effect to the existing integrity of the site regardless of the alternative that is selected.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time. There are currently no identified archaeological districts or cultural landscapes, or traditional cultural properties (TCP's) within the Seymour Allotment.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 2: Previously Recorded Sites within the Seymour Allotment			
SMITHSONIAN	**NAME**	**TYPE**	**NHRP**
24DL0495	La Marche W/C Camp	Hist Logging camp	Unresolved

Table 3: Previous Survey Work within the Seymour Allotment				
PROJECT_NO	**RECORDER**	**SURVEY_DATE**	**EVENT_NO_**	**ACRES**
87-BE-02-04	Zettel, D.	07/13/1987	1987010227004	16
88-BE-02-03	Hamilton, J.	07/27/1988	1988010227003	20
88-BE-02-05	Hamilton, J.	07/25/1988	1988010227005	6
97-BE-02-02	Munger, B.	07/15/1997	1997010227003	323

Fishtrap

Existing conditions on the Fishtrap allotment consists of a single previously recorded archaeological site and relatively few previous surveys. Previous inventories on the allotment consist of 105 acres of cultural resource inventory or 1.6% of the total acreage of the allotment. These inventories resulted in recordation of a single site, the East Fork Fishtrap Ditch (24DL708). This historic site has a consensus determination of 'not eligible' for listing on the NRHP and consideration of potential impacts of management decisions is not warranted. Other resource indicators are not applicable in discussion of the existing condition.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified archaeological districts or cultural landscapes, or traditional cultural properties (TCP's) within the Fishtrap Allotment. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage

resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 4: Previously Recorded Sites within the Fishtrap Allotment

SMITHSONIAN	PROJECT_NO	NAME	TYPE	NHRP
24DL0708	2000-BE-02-01	Fishtrap Ditch	Hist Ditch	Not Eligible

Table 5: Previous Survey within the Fishtrap Allotment

PROJECT_NO	RECORDER	ACRES
2000-BD-02-01	Fulbright, Z.	32
2000-BE-02-01	Fulbright, Z.	2
94-BE-02-01	Munger, B.	21
97-BE-02-04	Munger, B.	55

Mudd Creek

Existing conditions on the Mudd Creek allotment consists of relatively few previous surveys and no known archaeological sites. Previous inventories on the allotment consist of 468 acres of cultural resource inventory or 4% of the total acreage of the allotment. These inventories resulted in negative findings. Therefore, resource indicators are not applicable in this discussion of the existing condition.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified archaeological districts or cultural landscapes, or traditional cultural properties (TCP's) within the Mudd Creek Allotment. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 6: Previous Survey within the Mudd Creek Allotment

PROJECT_NO	RECORDER	SURVEY_DATE	ACRES
89-BE-02-03	Hamilton, J.	07/10/1989	73
96-BE-02-09	Munger, B.	08/05/1996	38
97-BE-02-01	Munger, B.	06/25/1996	653
97-BE-02-06	Munger, B.	03/09/1998	24
98-BD-02-03	Munger, B.	07/08/1998	5
98-BD-02-08	Munger, B.	07/07/1998	3

Pintlar Creek

Existing conditions on the Pintlar Creek allotment consists of a single previously recorded archaeological site and a fair amount of previous surveys. Previous inventories on the allotment consist of 1,454 acres of cultural resource inventory or 19.5% of the total acreage of the allotment. These inventories resulted in recordation of a single site, the Pintlar Exclosure (site 24BE1287). This historic site does not have a consensus determination of eligibility for listing on the NRHP and is treated as 'unresolved'. Although the site does not have a consensus determination of eligibility, the original recording of the site recommended the site as "not eligible" for inclusion to the NRHP. The site consists of a 16'x16' post and pole enclosure likely constructed between 1920 and 1940 in order to study the effects of cattle or wildlife use in the surrounding area. The original recommendation indicates that the site does not warrant further management actions or considerations on effect of management actions. Other resource indicators would not be applicable in further discussion of the existing condition.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified archaeological districts or cultural landscapes, or traditional cultural properties (TCP's) within the Pintlar Creek Allotment. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites,

districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 7: Previously Recorded Sites within the Pintlar Creek Allotment

SMITHSONIA	PROJECT_NO	NAME	TYPE	NHRP
24BE1287		Pintler Exclosure	Other Historic	Unevaluated

Table 8: Previous Survey Work within the Pintlar Creek Allotment

PROJECT_NO	RECORDER	SURVEY_DATE	ACRES
86-BE-02-09	Zettel, D.	08/21/1986	622
88-BE-02-02	Hamilton, J.	08/18/1988	20
88-BE-02-04	Hamilton, J.	07/09/1988	131
90-BE-03-14	Hamilton, J.	08/20/1990	16
92-BE-02-02	Hamilton, G.	08/27/1992	179
92-BE-02-04	Hamilton, G.	08/27/1992	54
94-BE-03-02	Munger, B.	05/05/1994	83
97-BE-02-01	Munger, B.	06/25/1996	653
97-BE-02-06	Munger, B.	03/09/1998	24

Mussigbrod

Existing conditions on the Mussigbrod allotment consists of a single previously recorded archaeological site and a small amount of previous survey. Previous inventories on the allotment consist of 100 acres of cultural resource inventory or 1.9% of the total acreage of the allotment. These inventories resulted in recordation of a single site (site 24BE1707). This historic site is the remains of a historic portable sawmill and does not have a consensus determination of eligibility for listing on the NRHP and is treated as 'unresolved'. Although the site does not have a consensus determination of eligibility, the original recording of the site recommended the site as "not eligible" for inclusion to the NRHP. The site retains little integrity as is described in a monitoring report from 2000. The original and updated recommendations indicate that the site does not warrant further management actions or considerations on effect of management actions. Other resource indicators would not be applicable in further discussion of the existing condition.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified archaeological districts or cultural landscapes, or traditional cultural properties (TCP's) within the Mussigbrod Allotment. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of

artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 9: Previously Recorded Sites within the Mussigbrod Allotment

SMITHSONIA	PROJECT_NO	NAMES	TYPE	NHRP
24BE1707	93-BE-3-1-01		Logging	Unevaluated

Table 10: Previous Survey within the Mussigbrod Allotment

PROJECT_NO	RECORDER	SURVEY_DATE	ACRES
2001-BD-03-06	Fulbright, Z.	06/26/2001	86
2001-BD-03-12	Ryan, M.	08/27/2001	25
91-BE-03-16	Hamilton, J.	07/29/1991	120
93-BE-03-01	Munger, B.	08/31/1993	5
94-BE-03-03	Munger, B.	05/05/1994	2
2010-BD-3-10	T. Ballard	6/10/2010	0

Ruby Creek

Existing conditions on the Ruby Creek allotment consists of 10 previously recorded archaeological sites and a substantial amount of previous survey. Previous inventories on the allotment consist of 1,295 acres of cultural resource inventory or 4.8% of the total acreage of the allotment. These inventories resulted in recordation of cultural resources associated with both the historic and prehistoric periods. The Ruby Creek allotment contains a majority of the general area known as the Pioneer Mining District. The Pioneer Mining District was actively placer mined from 1862 to 1863, and subsequently from 1885 to 1898, and once again in the 1930's. The district as a whole retains significance as one of the first developed gold strikes in Montana history. While individual mining sites within the district may not retain strong amounts of integrity, they may contribute to the whole picture of district, which would make them eligible as a contributing element.

Two previously recorded sites within the allotment (24BE1872 and 24BE0817) have architectural features that would be considered to be grazing sensitive. Site 24BE1872 is the remains of the

Pioneer Town site and associated mining features including ditches and tailings. The site includes the mostly standing remains of several cabins located at the approximate site of the first placer gold strike in Montana (Pioneer Mining District). Due to the potential significance of this site, the current revision of the USDA Forest Service Land and Resource Management Plan (USDA Forest Service 2009) included a specific standard for this site to consider for any actions taking place in this management area. The standard identifies a management goal of "Protecting and Interpreting sites around the Pioneer Town site". This site was monitored in anticipation of the current project. A 2012 condition assessment was made and determined that the site was in similar as it was when originally recorded in 1998. No evidence of livestock grazing impacts to the integrity of sensitive features was noted, although there was evidence that livestock move through the area. Due to the nature of this site, a design feature/mitigation is being implemented to provide for monitoring of this site at least once every two years. Continual monitoring will allow for consistent condition assessments to indicate whether continued livestock management on the Ruby Creek allotment is having any impact on the site. Site 24BE0817 is the remains of two cabins and early placer mining activity likely contemporary with the original development of the Pioneer District. The site is currently in an unresolved eligibility status and is treated as an eligible site. The site retains limited amounts of integrity in regards to livestock sensitive features and is located in a section of the allotment that is not frequented by cattle. Further action at site 24BE0817 is not warranted at this time and other resource indicators would not be applicable in further discussion of the existing condition.

Two additional previously recorded sites (24BE1852 and 24BE0797) also have elements commonly assumed to be sensitive to livestock grazing impacts. Both sites retain an "unresolved" eligibility status and are treated as if "eligible". Review of both site files indicate that impacts from livestock grazing were not apparent. The integrity of the sites has remained intact and other resource indicators would not be applicable in further discussion of the existing condition. The remaining archaeological sites previously located on the allotment either have a "not eligible" determination or do not warrant further consideration as they are not site types that are easily impacted by grazing activities.

The Class I review of the allotment indicates a similar site composition as nearby locations including evidence of logging, mining, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified cultural landscapes or traditional cultural properties (TCP's) within the Ruby Creek Allotment. The allotment does include a majority of the historically

defined area of the Pioneer Mining District. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Table 11: Previously Recorded Sites within the Ruby Creek Allotment

SMITHSONIA	PROJECT_NO	NAME	TYPE	NHRP
24BE1750		Ruby Canal	Historic Ditch	Not eligible
24BE2005	01-BD-03-08	Cow Creek Ditch/Trench	Historic Ditch	Not Eligible
24BE1872	01-BD-03-08	Pioneer Cabins/ditches/tailings	Historic structural	Eligible
24BE1852	01-BD-03-08	Bitterroot Site	Prehistoric Lithic Scatter	Unresolved
24BE1815	01-BD-03-08	Moosehorn Mine	Historic Mine	Not Eligible
24BE1818	96-BD-03-02		Historic Mining	Unresolved
24BE1712		Nickel Bar Creek Tailings	Historic Mining	Not Eligible
24BE0797		Cemetary	Other Historic	Unevaluated
24BE0817		Morgan Lake Cabins	Structure/s	Unevaluated
24BE1511	89-BE-3-3	Ruby Creek Hydraulic	Mining, placer	Unevaluated

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 12: Previous Survey within the Ruby Creek Allotment

PROJECT_NO	RECORDER	SURVEY_DATE	Acres
2000-BD-03-08	Fulbright, Z.	11/06/2000	5
2001-BD-03-07	Fulbright, Z.	08/09/2001	48
2001-BD-03-08	Fulbright, Z.	08/09/2001	58
2002-BD-03-12	Fulbright, Z.	09/04/2002	6
86-BE-03-05	Matthew, K.	07/11/1986	2
87-BE-03-01	Zettel, D.	08/19/1987	211
88-BE-03-03	Hamilton, J.	08/18/1988	41
89-BE-03-03	Hamilton, J.	08/08/1989	30
89-BE-03-06	Hamilton, J.	08/16/1989	37
90-BE-03-08	Ryan, M.	10/26/1999	205
90-BE-03-13	Sell, G.	06/20/1990	188
90-BE-03-17	Hamilton, G.	08/16/1990	444
91-BE-03-05	Hamilton, J.	09/03/1991	13
94-BE-03-01	Munger, B.	05/09/1994	1
95-BE-03-05	Munger, B.	06/20/1995	6
95-BE-03-07	Munger, B.	07/12/1995	6
96-BE-03-02	Munger, B.	12/04/1996	53
97-BE-03-02	Munger, B.	10/04/1996	60
97-BE-03-04	Munger, B.	08/01/1997	327
97-BE-03-09	Munger, B.	07/28/1997	11
99-BD-03-06	Ryan, M.	07/21/1999	16

Dry Creek

Existing conditions on the Dry Creek allotment consists of a single previously recorded archaeological site and a small amount of previous survey. Previous inventories on the allotment consist of 485 acres of cultural resource inventory or 3.2% of the total acreage of the allotment. These inventories resulted in recordation of a single site (site 24BE1524). This historic site is the Twin Lakes Guard Station that has a consensus determination of eligible for listing on the NRHP. Although the site retains a high amount of integrity, site 24BE1524 is part of the Beaverhead-Deerlodge NF rental program and is located within a fenced enclosure. The site is inaccessible to livestock grazing.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches,

and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified archaeological districts or cultural landscapes, or traditional cultural properties (TCP's) within the Dry Creek Allotment. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 13: Previously Recorded Sites Within the Dry Creek Allotment			
SMITHSONIA	**PROJECT_NO**	**NAME**	**NHRP**
24BE1524		Twin Lakes Station	Eligible

Table 14: Previous Survey Within the Dry Creek Allotment			
PROJECT_NO	**RECORDER**	**SURVEY_DATE**	**ACRES**
2002-BD-03-08	Fulbright, Z.	07/18/2002	10
86-BE-03-04	Zettel, D.	09/10/1986	44
92-BE-03-04	Hamilton, G.	07/15/1992	125
93-BE-03-03	Munger, B.	08/31/1993	98
97-BE-03-05	Munger, B.	07/11/1997	208

Twin Lakes

Existing conditions on the Twin Lakes allotment consists of four previously recorded archaeological sites and a small amount of previous survey. Previous inventories on the allotment consist of 277 acres of cultural resource inventory or 2.2% of the total acreage of the allotment. These inventories resulted in recordation of a four heritage properties. All four previously recorded sites are historic in nature and have unresolved eligibility and are treated as potentially eligible. Review of current documentation on file for these sites reveals that none of the sites contain features with significant amounts of integrity to constitute updated condition assessments. Two sites (24BE0162 and 24BE0164) consist of dilapidated historic corrals. Site 24BE161 is the collapsed remains of a log cabin. Site 24BE0796 is the remains of mining activity at Slag-A-Melt mine. The mine is located in an area of the allotment not frequented by cattle. Review of available data does not indicate that sites are or have been impacted in the past by livestock grazing activities. Other resource indicators would not be applicable in further discussion of the existing condition.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified archaeological districts or cultural landscapes, or traditional cultural properties (TCP's) within the Twin Lakes Allotment. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 15: Previously Recorded Sites Within the Twin Lakes Allotment

SMITHSONIA	NAME	TYPE	NHRP
24BE0161		Structure/s	Unevaluated
24BE0162		Other Historic	Unevaluated
24BE0164		Other Historic	Unevaluated
24BE0796	Slag-A-Melt Mine	Mining, lode	Unevaluated

Table 16: Previous Survey Within the Twin Lakes Allotment

PROJECT_NO	RECORDER	SURVEY_DATE	ACRES
2002-BD-03-08	Fulbright, Z.	07/18/2002	10
2003-BD-03-07	Ryan, M.	10/10/2003	15

Table 16: Previous Survey Within the Twin Lakes Allotment			
PROJECT_NO	**RECORDER**	**SURVEY_DATE**	**ACRES**
86-BE-03-04	Zettel, D.	09/10/1986	44
90-BE-03-01	Hamilton, J.	10/03/1990	81
91-BE-03-17	Hamilton, G.	10/22/1991	38
94-BE-03-04	Munger, B.	09/24/1994	89
2010-BD-3-11	T. Ballard	7/15/2010	0

Monument Creek

Existing conditions on the Monument allotment consists of relatively few previous surveys and no known archaeological sites. Previous inventories on the allotment consist of 1,256 acres of cultural resource inventory or 5.4% of the total acreage of the allotment. These inventories resulted in negative findings. Therefore, resource indicators are not applicable in this discussion of the existing condition.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified archaeological districts or cultural landscapes, or traditional cultural properties (TCP's) within the Monument Allotment. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 17: Previous Survey Within the Monument Allotment

PROJECT_NO	RECORDER	SURVEY_DATE	ACRES
2001-BD-03-10	Fulbright, Z.	08/29/2001	38
2001-BD-03-15	Ryan, M.	07/15/2001	12
92-BE-03-07	Hamilton, G.	09/29/1992	1045
93-BE-03-05	Munger, B.	10/28/1993	161
2009-BD-3-03	M. Sant	6/9/2009	0

Pioneer

Existing conditions on the Pioneer allotment consists of relatively few previous surveys and no known archaeological sites. Previous inventories on the allotment consist of 341 acres of cultural resource inventory or 1.8% of the total acreage of the allotment. These inventories resulted in negative findings. Therefore, resource indicators are not applicable in this discussion of the existing condition.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified cultural landscapes or traditional cultural properties (TCP's) within the Pioneer Allotment. The allotment does contain portions of the historically defined Beaverhead Mining District. It also includes a designated section of the Nez Perce National Historic Trail. While the original tread of the trail is not discernible, it is known that the Nez Perce flight of 1877 did pass through Skinner Meadows. A roadside interpretation area has been planned for the Skinner Meadows location alongside forest road 381. Plans for the interpretive area include a log worm fence that will minimize any livestock grazing impacts to the proposed interpretive panels. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest. Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 18: Previous Survey within the Pioneer Allotment

PROJECT_NO	RECORDER	SURVEY_DATE	ACRES
2000-BD-03-04	Fulbright, Z.	06/27/2000	64
2003-BD-03-06	Fulbright, Z.	09/30/2003	1
2003-BD-03-08	Fulbright, Z.	09/30/2003	1
90-BE-03-08	Hamilton, G.	06/22/1990	4

Table 18: Previous Survey within the Pioneer Allotment			
PROJECT_NO	**RECORDER**	**SURVEY_DATE**	**ACRES**
93-BE-03-11		07/15/1993	35
95-BE-03-04	Munger, B.	09/21/1995	32

Saginaw

Existing conditions on the Saginaw allotment consists of a single previously recorded archaeological site and a fair amount of previous survey. Previous inventories on the allotment consist of 2,177 acres of cultural resource inventory or 17.3% of the total acreage of the allotment. These inventories resulted in recordation of a single heritage property (site 24BE0944). This historic site is the remains of a historic log structure and does not have a consensus determination of eligibility for listing on the NRHP. The site is treated as having an 'unresolved' eligibility. The site is likely associated with the nearby remains at Saginaw Mine and the historic Saginaw Mining District. The Saginaw Mine is reported as the only significant property associated with the Saginaw District and was only in production between 1914 and 1917. Site 24BE0944 retains little integrity, associated with a short-term occupation, and was recommended as "not eligible" during the original recordation. The original recommendation indicates that the site does not warrant further management actions or considerations on effect of management actions. Further discussion of resource indicators is not warranted for discussion of the existing condition.

The Class I review of the allotment shows that the allotment has a history of use that includes logging, mining, ranching, and Forest Service Administration. Historic features plotted on GLO plats throughout the Beaverhead and Anaconda Mountain Ranges include various roads, ditches, and trails. Evidence of large-scale historic timber harvesting can be seen within the allotment by the existence of old cutting units and numerous access roads. Previous survey within the allotment supports the notion of a low potential for prehistoric resources within the allotment based on the 'SIS' strategy. The same strategy for this topology and given the history of use in this landscape indicates a moderate-to-high probability for historic resources associated with mining and logging. Components of unknown sites are site specific, but commonly include structural features that may be considered sensitive to livestock grazing. It is impossible to assess conditions on sites that have not been formally recorded.

During the April 2010 annual consultation meeting with the Shoshone-Bannock, Salish-Kootenai, and Blackfoot tribes, this project was discussed. No specific concerns were raised at that time.

There are currently no identified cultural landscapes or traditional cultural properties (TCP's) within the Saginaw Allotment. The allotment does contain portions of the historically defined Saginaw Mining District. The Forest Service is charged with identifying, evaluating, preserving and enhancing significant heritage resources found on National Forest lands in accordance with relevant federal legislation and manual guidance (USDA 2008b). Heritage resources are nonrenewable and include archaeological and historic sites, districts, and cultural landscapes. Heritage properties of traditional cultural value (TCPs) to American Indian and other cultural groups are also considered as nonrenewable. The effect of any management action which adversely impacts heritage properties reduces the total heritage resource base across the Forest.

Once they are destroyed, or allowed to deteriorate, there is no possibility to recover the scientific, cultural, educational and aesthetic values embodied in cultural places and things. The inherent nature of these resources (i.e. nonrenewable) means that the trend is inevitably downward. Natural conditions including erosion, natural deterioration or decay, impacts from animal and human disturbance all work to reduce the number and integrity of heritage sites.

Past activities have influenced heritage resources reducing the integrity of specific resources or have led to their loss altogether. Vandalism of historic mining cabins, removal of weathered wood for decorative use elsewhere, collecting arrowheads or other historic artifacts and disturbance of artifacts and lithic scatters through ground disturbing activities disturb and/or remove the resource. Because these are historic or archaeological resources, once disturbed or removed, the integrity of the site is lost.

Public education about heritage resources and compliance by land management agencies with regulatory requirements to protect known sites has reduced the incidence of actions leading to the loss of a heritage resource. However, this type of action, intentional and unintentional, is expected to continue to some degree.

Currently, the BDNF completes a heritage resource survey of the area influenced by a ground disturbing activity to determine if a site is present prior to implementation. If a previously unknown site is found, it is recorded and impacts are avoided or mitigated. This action is also expected to continue.

Table 19: Previously Recorded Sites within the Saginaw Allotment

SMITHSONIAN	NAME	TYPE	NHRP
24BE0944		Logging/mining	Unevaluated

Table 20: Previous Survey within the Saginaw Allotment

PROJECT_NO	RECORDER	SURVEY_DATE	ACRES
2000-BD-01-11	Fulbright, Z.	09/21/2000	151
2000-BD-03-09	Ryan, M.	09/21/2000	110
2002-BD-01-06	Fulbright, Z.	07/09/2002	266
89-BE-03-02	Hamilton, J.	08/19/1989	42
90-BE-03-11	Hamilton, J.	07/09/1990	16
92-BE-01-12	Hamilton, G.	09/20/1992	1367
94-BE-03-06	Munger, B.	06/15/1994	24
96-BE-03-21	Munger, B.	08/08/1996	5
97-BE-03-06	Munger, B.	07/22/1997	152
99-BD-03-01	Fulbright, Z.	06/16/1999	44

Analysis

Methodology

Spatial Scale

The spatial scale for direct, indirect, and cumulative effects for this analysis is defined as the existing allotment boundaries. This scale was chosen as the USDA Forest Service does not directly manage cultural resources on non-USFS lands. Heritage resources are typically locational specific and are analyzed as to what resources fall within a given area used for grazing (i.e. what resources the livestock can potentially access/impact). The bounds for effects; whether they be direct, indirect, or cumulative, would be considered to be the same. These allotment boundaries constitute the Area of Potential Effect (APE) for the analysis of heritage resources. FS Handbook guidance describes the APE as:

> *Area of potential effects means the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.* (FSH 2309.12)

Temporal Scale

Temporal scales for this analysis are defined as being short-term and long-term in respect to impacts to heritage resources. Short term effects would be those occurring with 1 year of implementing each respective allotment management plan. Long-term effects will be considered to be those that occur within 10 years of the proposed implementation of each respective allotment management plan. Although these time frames are not directed by federal, agency, or state level guidance, they are considered a common management practice in terms of the operating period of the permit being issued.

Resource Indicators to be Analyzed and Units of Measure

Heritage/Cultural Resources - are the physical remains of past human activities (e.g., artifacts, burials, pictographs, Native American ceremonial sites, and the remains of mining, logging, ranching and other historic activities).

The Forest Service is charged with the management of heritage resources that are listed on the National Register of Historic Places (NRHP), have been determined eligible for the NRHP, and those where formal determinations of eligibility are as yet "unresolved". Heritage resources are considered to be eligible for or potentially eligible for listing to the NRHP when they meet the criteria for eligibility defined in the National Historic Preservation Act of 1966, as amended. Heritage resources may be assessed for eligibility based on information and interpretive potential or values important to Native American communities. Along with meeting any one or multiple criteria, the resource must also possess enough integrity to convey its significance (why it is important). It is the integrity of a site, or its characteristics that have the potential to be impacted by grazing activities. The aspects of integrity for heritage resources are defined within the

guidelines of NHPA. These aspects equate to seven characteristics: integrity of location, integrity of design, integrity of setting, integrity of materials, integrity of workmanship, integrity of feeling, and integrity of association. These are the qualities possessed by a resource that can be altered by past, present, and reasonably foreseeable activities such as livestock grazing.

Some heritage resources would be considered to be more "sensitive" to these activities. For example, a heritage resource with standing architecture such as a cabin wall would be considered to be more susceptive to livestock grazing impacts then would be a resource where all architecture is collapsed. Cattle activity within a resource could alter the state of the standing architecture (i.e. knock it down), causing an impact to the integrity of the site and thus the characteristics that make the site eligible for or potentially eligible for listing in the NRHP.

The analysis in this document seeks to determine the presence/absence of significant heritage resources within each grazing allotment in the proposed action. The analysis will address the existing and potential effects of livestock grazing on heritage resources through the use of resource indicators. Resource indicators are those factors which determine whether livestock grazing has had or will have a negative effect on heritage resources. The condition of the heritage resources and the characteristics that contribute to its eligibility (i.e. integrity) within the project area would be considered to be resource indicator in this analysis. This site condition will be measured by making a qualitative condition assessment upon visiting the site or reviewing the most current documentation. The qualitative assessment takes into account all factors, including grazing impacts that have influenced the overall condition of the site. The remaining indicator in a more general sense is the presence or absence of NRHP eligible sites on the allotment and whether they have the potential to be impacted by livestock grazing management.

Forest level guidance directs forest projects to avoid direct impacts to these types of properties. A direct impact to these properties would be considered an "adverse effect". The term adverse effect is described as follows:

> *800.5(a)(1)Criteria of adverse effect. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.* (36 CFR 800.5(a)(1))

The regulations go on to provide examples of an adverse effect such as:

> *800.5(a)(2) Examples of adverse effects include physical destruction or damage; alteration not consistent with the Secretary of the Interior's Standards; relocation of a property; change of use or physical features of a property's setting; visual, atmospheric, or audible intrusions; neglect resulting in deterioration; or transfer, lease, or sale of a property out of Federal ownership or control without adequate protections.* (36 CFR 800.5(a)(2))

These common elements (indicators) between federal, agency, and state level regulations create a framework for the heritage resource analysis undertaken in this document. The framework is identified in the Resource Indicators table below and will be utilized as applicable for the analysis on individual range allotments. The applicability of the second indicator is dependent on the first, while the third can be generally applied to each analysis area.

Table 21: Resource Indicators and Units of Measure

Resource Indicators	Unit of Measure
Grazing sensitive NRHP Eligible sites	Present / not present
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Qualitative condition assessment
Potential for adverse effect to listed, eligible, or potentially eligible sites	Increase or decrease

Analysis Methods and Assumptions

Information used in this analysis comes from a Cultural Resources Class I overview of existing information on file guided by direction from Forest Service Handbook 2309.12. Regional knowledge about the occurrence and distribution of heritage resources come from the National Register of Historic Places, the Montana State Historic Preservation Plan, the Beaverhead-Deerlodge National Forest Master Site/Survey Atlas, previous archaeological survey reports, General Land Office plats, Homestead Entry Survey records, Mineral Survey records, Land Status records, historic Forest Service maps, historic county maps and aerial photographs. A wide range of other historic, ethno-historic, archaeological and anthropological references were also reviewed to gain the widest possible understanding of historic land use and site occurrence across the Forest. The heritage program electronic GIS database is substantially complete for previous surveys, and recorded prehistoric and historic properties on the Beaverhead-Deerlodge National Forest.

All statistics displayed in tabular format within the described existing condition related to heritage surveys and sites are derived from the Master Site/Survey Atlas and/or GIS database. A valid assessment of the existing condition of heritage resources is hampered because information derived from site record forms varies in completeness and quality. Field records from the 1970's and early 1980's are sometimes incomplete and difficult to compare to information collected to a higher standard in a more comprehensive manner over the last 15 years. If these data gaps are encountered during the analysis, an update of the information may be required.

Since a majority of our previous data information comes from previous compliance related projects, there may be some data gaps in areas where very little previous work has taken place. In such cases, assumptions on the potential for heritage resources are based upon the Site Identification Strategy defined in the 1995 Programmatic Agreement regarding cultural resource management on national forest in the state of Montana (USDA FS 1995b). Utilizing this guidance, we are able to make assumptions as to the site composition and time periods of

particular areas based on regional knowledge, topography, and adjacent study areas. These assumptions are discussed within the existing condition of each range allotment.

Once information has been gathered as a result of the Class I overview, it can be reviewed with respect to the potential for impact by livestock grazing activities and conditions (resource indicators) of each alternative. Certain archaeological sites are apt to be sensitive to grazing activities. For example, sites with standing architecture in open terrain may be more vulnerable to grazing impacts than sites with limited numbers of surface artifacts and no architecture. The results of the analysis are summarized in this report and presented by allotment. Data used to assess and current impacts form grazing activities can be found within the site records that speak to site condition. Where applicable, sites with 'grazing sensitive' features were given greater scrutiny. Individual site forms are not included in this report; rather data is summarized within the existing condition of each range allotment.

All action alternatives, those alternatives that involve actual livestock grazing, are assumed to create potential impacts or effects to heritage resources. These effects can be divided into direct, indirect, and cumulative effects. These effects can be described together as a major assumption of the general effects that livestock grazing pose to heritage resources. These effects may impact recorded sites and sites which have not yet been discovered and evaluated for eligibility. The following actions/effects contribute to the overall condition of a heritage resource resulting in a qualitative assessment of how the effect is impacting the characteristics of the site.

Direct Effects:

Trampling: concentrated livestock use will trample archaeological material exposed on the surface of the ground. This trampling results in several kinds of adverse effects to archaeological materials. Archaeological remains (which depend in large measure on depositional context for their significance) will be displaced horizontally across the ground surface. In certain soil conditions (e.g. wet or damp soils adjacent to springs) archaeological materials may also be displaced vertically and come to occupy subsurface locations deeper or shallower than originally deposited. These kinds of displacement make interpreting the site formation processes at work at the site more difficult and sometimes impossible.

Livestock congregation and trailing at or across cultural resource site locations can have direct impacts that damage artifacts and the contexts in which they occur.

Artifact breakage: experimental evidence indicates that one of the effects to be expected from livestock grazing is the breakage of artifacts exposed on the surface. This breakage may be in the form of edge damage to artifacts that can make the interpretation of technological processes used in the manufacture of the artifacts difficult or impossible. Trained lithic analysts are often unable to determine if certain kinds of edge wear evident on artifacts are the result of prehistoric use, purposeful human modification during manufacture, or accidental flaking due to impact from livestock hooves. Again, the scientific interpretation of artifacts is impaired if analysis cannot distinguish between purposeful human cultural behavior and accidental edge damage due to trampling by livestock. Artifacts may also be broken in two or more pieces after being stepped on

by livestock. This type of breakage separates portions of artifacts critical for age dating and morphological typing (e.g. projectile point bases) from the remainder of the artifact.
Soil Compaction: compaction from the concentration of livestock and trampling can be an adverse effect to subsurface archaeological remains. In addition to the horizontal and vertical displacement of artifacts discussed above, this kind of disturbance can impair the stratigraphic interpretation of soils critical to understanding site formation, site function and scientific importance. Soil compaction seems to be a more important problem in damp or wet areas than in dry soils. For example, archaeological sites located in wet or damp areas likely will have been impacted adversely by livestock trampling as much as 15 to 20 cm below the ground surface.

Loafing: Cattle shading and rubbing can damage standing historic structures and prehistoric pictograph panels. Cattle that use unprotected historic structures for loafing sheds, or repeatedly rub against them, will destroy these historic buildings over time. Grazing management which meets established standards will reduce the potential for damage to archaeological and historic sites from livestock grazing.

Indirect Effects:

Excessive trampling at spring sources and along stream banks, cattle trailing, and over grazing can all lead to a denuding of protective vegetation cover and create indirect impacts to cultural resources by accelerating natural erosion and exposing artifacts to illegal surface collection and vandalism. Indirect effects can include:

Reduced Ground Cover: Decreases in vegetative cover increase the potential for sheet and gully erosion. Archaeological sites present in these areas are subject to damage from these erosion processes.

Destabilization of Stream Banks: the riparian areas of streams above the first or second order tend to be high probability areas for the occurrence of archaeological sites. These sites often occupy terraces adjacent to the streambed. If livestock use results in shearing and collapsing of stream banks this will adversely impact archaeological sites present on, or buried in, the terrace.

Cumulative Effects:

Most heritage resources are location specific, fragile, and nonrenewable. Therefore, cumulative impacts could occur through incremental degradation of the resource base from a variety of sources reducing information and interpretive potential or affecting values important to Native American communities. The importance of heritage sites is often enhanced by their context in a larger landscape beyond the immediate physical boundaries of individual sites. Large scale changes to landscapes, whether immediate or cumulative, could adversely affect significant heritage properties. Measures are in place to identify threats to resources and to prioritize management actions; nevertheless, some impacts are unavoidable. Some of these impacts are discussed in the following paragraphs.

Processes of natural deterioration and decay, can seriously affect the integrity of historic properties with wooden structural remains. Natural erosion can also affect the integrity of

prehistoric sites with buried cultural deposits of scientific value. There would continue to be impacts on NHRP-eligible, unevaluated and undiscovered cultural resources, that are associated with unauthorized activities such as OHV use off of designated roads and trails, dispersed recreation, and vandalism. Unauthorized activities, dispersed activities, and natural processes could cause unmitigated impacts on NRHP-eligible resources and/or traditional use areas that would exceed the significance threshold for impacts on cultural resources, (i.e., adversely impact the integrity of the property which may affect it's eligibility for inclusion to the National Register of Historic Places). Non-project related heritage inventories, annual site monitoring, the identification of significant heritage sites, and the preservation and protection of those significant heritage sites can reduce the downward trend in the heritage resource base and lessen cumulative effects from management activities across all landscapes.

Other regional resource, land use, and economic development planning efforts can affect the types and intensity of uses within the planning area and can affect the regional resource base. Development of lands that are not protected by federal or state cultural resource statutes and regulatory protections could decrease the regional resource base or lead to loss of Native American resources, affecting the understanding of these resources and potentially limiting management options within the planning area. It is reasonably foreseeable that heritage resources found on the Forest will increase in value and significance as prehistoric and historic sites in other non-federal ownerships are damaged or destroyed by development or other activities. Restrictions on recreational activities in other areas, population growth, resource extraction, and development can increase the use intensity within the planning area, potentially affecting cultural resources. Coordinating with these regional planning actions could aid in the continued and future protection of resource values.

Past, Present, and Future activities used in the Analysis

The following table represents the past, present, and reasonably foreseeable future actions that have affected, are currently affecting, or have the potential to affect heritage resources**.** have the potential to affect heritage resources.

Table 22: Past, Present, and Reasonably Foreseeable Actions

Activity	Decade/Year	Past	Present	Reasonably Foreseeable Future
NFS lands within the allotment boundaries				
Sagebrush manipulation (burning, spraying)		x		
Prescribed Fire		x	x	x
Wildland Fire Suppression		x	x	x
Timber Management – All Harvest types	1960-2012	x		x
Hazard Tree Removal – Developed sites and roadsides	2009-2012	x	x	x
Pre-commercial Thinning				
Public Firewood cutting		x	x	x
Water Impoundments		x	x	
Road and Trail Maintenance		x	x	x
Road Construction		x		

Analysis
Heritage

Table 22: Past, Present, and Reasonably Foreseeable Actions

Activity	Decade/Year	Past	Present	Reasonably Foreseeable Future
Insect and Disease outbreak (bark beetle, Spruce Bud worm, etc.)		x	x	x
Conifer encroachment treatment		x		
Range Improvements (fences, water tanks, spring development, etc.)		x	x	x
Dispersed Recreation		x	x	x
Irrigation Withdrawals		x	x	
Natural disturbances (Flooding and Mass Wasting)		x	x	x
Mining		x	x	
BLM lands within the allotment boundaries				
Prescribed burning		x		
Range Improvements		x	x	x
Fire Suppression		x	x	x
Road Maintenance		x	x	x
Road Construction		x		
Timber Sales		x		x
State lands (Fish, Wildlife , and Parks) within the allotment boundaries				
Range Improvements		x	x	x
Road Maintenance		x	x	x
Fire Suppression		x	x	x
Timber Sale		x		x
Private lands within the allotment boundaries				
Range Improvements		x	x	
Road Maintenance		x	x	x
Road Construction		x	x	
Fire Suppression		x	x	x

This table provides a context for the actions that have contributed the existing condition described for each allotment. Based on Table 3 above, activities that have the greatest effect on heritage resources include those which result in ground disturbance. These activities include road construction and maintenance, facility construction, range improvements, wildfire, and wildfire suppression. Mining is also included in these types of activities. These activities will be considered in the cumulative effects analysis of each alternative for each allotment.

It should be noted that many of the past and ongoing activities may be considered part of the existing condition. The effects of some of these activities, such as historic mining operations (which may include historic structures, old machinery, and other relics) have added to our known database of heritage resources. Structures associated with older ranching operations (fences, buildings, etc.) have the potential to have the same effect. Not all effects of past and ongoing activities have beneficial impacts to heritage, i.e. roads, trails, wildland fire, insects and disease, etc., but are seen by users and viewers as an accepted part of the forest landscape.

Seymour Allotment

Seymour No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. The potential for adverse effect due to grazing impacts to known and unknown heritage resources would be nil once grazing was phased out. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: One previously recorded heritage property (Site 24DL495) is present within the allotment. The potential for adverse effect due to grazing impacts to known and unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the vicinity of the site, the existing integrity of the site would remain unchanged as would any unknown resources in the allotment.

Seymour Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. The potential for adverse effect would remain unchanged. Any existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. One previously recorded heritage property (Site 24DL495) is located within the allotment. Given the site's location, it is unlikely that the current livestock grazing management will have any effect to the existing integrity of the site. Site condition would likely remain unchanged. The potential for adverse effect due to continued grazing impacts to known and unknown heritage resources will remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase. The potential for adverse effect due to continued cumulative impacts to known and unknown heritage resources will remain unchanged.

SeymourProposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. One previously recorded heritage property (Site 24DL495) is located within the allotment. Given the site's location, it is unlikely that the proposed action alternative will have any effect to the existing integrity of the site. Site condition would likely remain unchanged. The potential for adverse effect due to continued grazing impacts to known and unknown heritage resources will remain unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources. This includes the construction of an exclosure for improved Western Toad breeding habitat that will involve a Heritage clearance prior to implementation.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources (identified above), no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources. This includes the construction of an exclosure for improved Western Toad breeding habitat that will involve a Heritage clearance prior to implementation.

Seymour Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.

- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. With the proposed reduction in livestock numbers in the FS 10 mile pasture, there would be a slight decrease in impacts due to a fewer number of cattle, resulting in a reduction of potential for adverse impacts to unknown resources in that pasture. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. One previously recorded heritage property (Site 24DL495) is located within the allotment. Given the site's location, it is unlikely that the proposed action alternative will have any effect to the existing integrity of the site. Site condition would likely remain unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources. This includes the construction of an exclosure for improved Western Toad breeding habitat that will involve a Heritage clearance prior to implementation.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources (identified above), no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources. This includes the construction of an exclosure for improved Western Toad breeding habitat that will involve a Heritage clearance prior to implementation.

Fishtrap Allotment

Fishtrap No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: The potential for adverse effect due to grazing impacts to known and unknown heritage resources will be reduced once grazing is phased out. With an absence of

cattle grazing in the allotment, the existing integrity of any unknown resources would likely remain unchanged.

Fishtrap Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. Existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The potential for adverse effect due to continued grazing impacts to known and unknown heritage resources will remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. The potential for adverse cumulative effect due to continued grazing impacts to known and unknown heritage resources will remain unchanged.

Fishtrap Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources and the potential for adverse effect. The potential for adverse effect due to continued grazing impacts to known and unknown heritage resources will be slightly reduced due to the implementation of the site specific Allowable Use Levels (AUL's). Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural

resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Fishtrap Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources and the potential for adverse effect. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Mudd Creek Allotment

Mudd Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: The potential for adverse effect due to grazing impacts to unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the allotment, the existing integrity of any unknown resources would remain unchanged. No "eligible" or "unresolved" sites are known within the allotment at this time.

Mudd Creek Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. Existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The potential for adverse effects to heritage resources and the integrity of unknown sites would remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase.

Mudd Creek Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There is new ground disturbing activities (i.e. spring development, tank, and pipeline) proposed, increasing the potential for adverse effect to heritage resources. These projects will be subject to mitigation/design features and likely pose very little risk to heritage resources. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There is new ground disturbing activities (i.e. spring development, tank, and pipelines) proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Mudd Creek Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There is new ground disturbing activities (i.e. spring development, tank, and pipeline) proposed, increasing the potential for adverse effect to heritage resources. These projects will be subject to mitigation/design features and likely pose very little risk to heritage resources. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There is new ground disturbing activities (i.e. spring developments, fencing, pipelines) proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Pintlar Creek Allotment

Pintlar Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to

decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: The potential for adverse effect due to grazing impacts to unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the allotment, the existing integrity of any unknown resources would remain unchanged. One heritage resource with an "unresolved" status would not see a change in integrity, as it is presently considered to have minimal integrity.

Pintlar Creek Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. Existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The potential for adverse effects to heritage resources and the integrity of known and unknown sites would remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase.

Pintlar Creek Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian

vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease potential for adverse impacts to cultural resources. The integrity of known and unknown sites would remain unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Pintlar Creek Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease potential for adverse impacts to cultural resources. The integrity of known and unknown sites would remain unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Mussigbrod Allotment

Mussigbrod No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.
Resource indicators: The potential for adverse effect due to grazing impacts to unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the allotment, the existing integrity of known and unknown resources would remain unchanged. One heritage resource with an "unresolved" status would not see a change in integrity, as it is presently considered to have minimal integrity.

Mussigbrod Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. Existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The potential for adverse effects to heritage resources and the integrity of known and unknown sites would remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase.

Mussigbrod Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.

- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There is new ground disturbing activities (i.e. spring development, tank, pipeline, and fence) proposed, increasing the potential for adverse effect to heritage resources and the integrity of known and unknown sites. These projects will be subject to mitigation/design features and likely pose very little risk to heritage resources. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There is new ground disturbing activities (i.e. spring development, tank, pipeline, and fence) proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Mussigbrod Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There is new ground disturbing activities (i.e. spring development, tank, pipeline, and fence) proposed, increasing the potential for adverse effect to heritage resources and the integrity of known and unknown sites. These projects will be subject to mitigation/design features and likely pose very little risk to heritage resources. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as

the vegetation recovers, which would then decrease impacts to cultural resources. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There is new ground disturbing activities (i.e. spring development, tank, pipeline, and fence) proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Ruby Creek Allotment

Ruby Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. The potential for adverse effect due to grazing impacts to known and unknown heritage resources would be nil once grazing was phased out. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree. Site condition and integrity of known and unknown heritage resources would remain virtually unchanged.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: Several previously recorded heritage properties that are "eligible" or "potentially eligible" are present within the allotment. The potential for adverse effect due to grazing impacts to these and other unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the vicinity of the sites, the existing integrity of the sites would remain unchanged as would any unknown resources in the allotment.

Ruby Creek Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. The potential for adverse effect would remain unchanged. Any existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. Several previously recorded heritage properties that are "eligible" or "potentially eligible" are present within the allotment. The continuation of livestock grazing on the allotment will have the potential to adversely affect those sites considered to be sensitive to grazing activities. Monitoring efforts and site file reviews have shown no current or past grazing impacts to these sites. Site condition and integrity would likely remain unchanged. The potential for adverse

effect due to continued grazing impacts to known and unknown heritage resources will remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase. The potential for adverse effect due to continued cumulative impacts to known and unknown heritage resources will remain unchanged.

Ruby Creek Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There is new ground disturbing activities (i.e. hardened crossings) proposed, increasing the potential for adverse effect to heritage resources and the integrity of known and unknown sites. These projects will be subject to mitigation/design features and likely pose very little risk to heritage resources. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources.

Several previously recorded heritage properties that are "eligible" or "potentially eligible" are present within the allotment. The continuation of livestock grazing on the allotment will have the potential to adversely affect those sites considered to be sensitive to grazing activities. Monitoring efforts and site file reviews have shown no current or past grazing impacts to these sites. Site condition and integrity would likely remain unchanged. The potential for adverse effect due to continued grazing impacts to known and unknown heritage resources will remain virtually unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources. Monitoring of the Pioneer town site (described in the existing condition) will take place once every two years to assess any grazing impacts in compliance with the USDA Forest Service Land and Resource Management Plan (USDA Forest Service 2009).

Cumulative Effects: None anticipated. There is new ground disturbing activities (i.e. hardened crossings) proposed, increasing the potential for adverse effect to heritage resources and the integrity of known and unknown sites. These projects will be subject to mitigation/design features and likely pose very little risk to heritage resources. Naturally occurring erosion process will continue to affect cultural resources. With the implementation of the site specific AUL's and the design features specific to cultural resources (identified above), no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Ruby Creek Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There is new ground disturbing activities (i.e. hardened crossings) proposed, increasing the potential for adverse effect to heritage resources and the integrity of known and unknown sites. These projects will be subject to mitigation/design features and likely pose very little risk to heritage resources. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. This alternative also proposes a reduction in head months and season of use, which would result in a reduction in the potential for adverse effect to heritage resources.

Several previously recorded heritage properties that are "eligible" or "potentially eligible" are present within the allotment. The continuation of livestock grazing on the allotment will have the potential to adversely affect those sites considered to be sensitive to grazing activities. Monitoring efforts and site file reviews have shown no current or past grazing impacts to these sites. Site condition and integrity would likely remain unchanged. The potential for adverse effect due to continued grazing impacts to known and unknown heritage resources will remain virtually unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources. Monitoring of the Pioneer town site (described in the existing condition) will take place once every two years to assess any grazing impacts in

compliance with the USDA Forest Service Land and Resource Management Plan (USDA Forest Service 2009).

Cumulative Effects: None anticipated. There is new ground disturbing activities (i.e. hardened crossings) proposed, increasing the potential for adverse effect to heritage resources and the integrity of known and unknown sites. These projects will be subject to mitigation/design features and likely pose very little risk to heritage resources. Naturally occurring erosion process will continue to affect cultural resources. With the implementation of the site specific AUL's and the design features specific to cultural resources (identified above), no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Dry Creek Allotment

Dry Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: The potential for adverse effect due to grazing impacts to unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the allotment, the existing integrity of any unknown resources would remain unchanged. One heritage resource with an "eligible" status would not see a change in integrity, as it is presently excluded from grazing activity.

Dry Creek Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. Existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The potential for adverse effects to heritage resources and the integrity of known and unknown sites would remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase.

Dry Creek Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing projects proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Overall potential for adverse effect to known and unknown heritage resources will likely remain unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing projects proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Dry Creek Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing projects proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Overall potential for adverse effect to known and unknown heritage resources will likely remain unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing projects proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Twin Lakes Allotment

Twin Lakes No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. The potential for adverse effect due to grazing impacts to known and unknown heritage resources would be nil once grazing was phased out. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree. Site condition and integrity of known and unknown heritage resources would remain virtually unchanged.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: Several previously recorded heritage properties that are "potentially eligible" are present within the allotment. The potential for adverse effect due to grazing impacts to these and other unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the vicinity of the sites, the existing integrity of the sites would remain unchanged as would any unknown resources in the allotment.

Twin Lakes Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. The potential for adverse effect would remain unchanged. Any existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss

of historical/archeological site integrity, such as vandalism, is expected to continue. Several previously recorded heritage properties that are "potentially eligible" are present within the allotment. The continuation of livestock grazing on the allotment will have the potential to adversely affect those sites considered to be sensitive to grazing activities. Monitoring efforts and site file reviews have shown no current or past grazing impacts to these sites. Site condition and integrity would likely remain unchanged. The potential for adverse effect due to continued grazing impacts to known and unknown heritage resources will remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase. The potential for adverse effect due to continued cumulative impacts to known and unknown heritage resources will remain unchanged.

Twin Lakes Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources.

Several previously recorded heritage properties that are "potentially eligible" are present within the allotment. The continuation of livestock grazing on the allotment will have the potential to adversely affect those sites considered to be sensitive to grazing activities. Monitoring efforts and site file reviews have shown no current or past grazing impacts to these sites. Site condition and integrity would likely remain unchanged. The potential for adverse effect due to continued grazing impacts to known and unknown heritage resources will remain virtually unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. With the implementation of the site specific AUL's and the design features specific to cultural resources (identified above), no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Twin Lakes Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources.

Several previously recorded heritage properties that are "potentially eligible" are present within the allotment. The continuation of livestock grazing on the allotment will have the potential to adversely affect those sites considered to be sensitive to grazing activities. Monitoring efforts and site file reviews have shown no current or past grazing impacts to these sites. Site condition and integrity would likely remain unchanged. The potential for adverse effect due to continued grazing impacts to known and unknown heritage resources will remain virtually unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. With the implementation of the site specific AUL's and the design features specific to cultural resources (identified above), no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Monument Creek Allotment

Monument No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: The potential for adverse effect due to grazing impacts to unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the allotment, the existing integrity of any unknown resources would remain unchanged. No "eligible" or "unresolved" sites are known within the allotment at this time.

Monument Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. Existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The potential for adverse effects to heritage resources and the integrity of unknown sites would remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase.

Monument Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.

- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Monument Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural

resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Pioneer Allotment

Pioneer No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: The potential for adverse effect due to grazing impacts to unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the allotment, the existing integrity of any unknown resources would remain unchanged. No "eligible" or "unresolved" sites are known within the allotment at this time. The character of the Nez Perce National Historic Trail will remain unaltered.

Pioneer Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. Existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The potential for adverse effects to heritage resources and the integrity of unknown sites would remain unchanged. The character of the Nez Perce National Historic Trail will remain unaltered.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase.

Pioneer Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation.

The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.

- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources. The character of the Nez Perce National Historic Trail will remain unaltered.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Pioneer Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Proposed mitigation/design features described in Chapter II will have no direct or

indirect effects to heritage resources. The character of the Nez Perce National Historic Trail will remain unaltered.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Saginaw Allotment

Saginaw No Action (No Grazing) Alternative

Direct/Indirect Effects: No direct/indirect effects are anticipated. The absence of cattle on the allotments would negate trampling, breakage, soil compaction, loafing impacts to cultural resources attributed to livestock grazing. Naturally occurring erosion process will continue to affect cultural resources, but on a lesser scale due to the absence of cattle that contribute to decreases in vegetative cover. This will decrease as the vegetation recovers, which would then decrease impacts to cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue, but to a lesser degree.

Cumulative Effects: No cumulative effects are anticipated. The absence of cattle on the allotments would not cumulatively add to the existing impacts.

Resource indicators: The potential for adverse effect due to grazing impacts to unknown heritage resources will be reduced once grazing is phased out. With an absence of cattle grazing in the allotment, the existing integrity of any unknown resources would remain unchanged. One heritage resource with an "unresolved" status would not see a change in integrity, as it is presently considered to have minimal integrity.

Saginaw Current Management Alternative

Direct/Indirect Effects: No direct or indirect effects are anticipated. Existing impacts from trampling, breakage, soil compaction, and /or loafing would continue. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The potential for adverse effects to heritage resources and the integrity of known and unknown sites would remain unchanged.

Cumulative Effects: None anticipated. The continued occurrence of the cattle grazing will overlap in time and place with some of the existing direct effects from trampling, breakage, soil compaction, and /or loafing. These effects are not expected to increase.

Saginaw Proposed Action Alternative

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease potential for adverse impacts to cultural resources. The integrity of known and unknown sites would remain unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Saginaw Alternative 4

Mitigation/Design Feature:

- Any surface disturbing activities (i.e. water developments, livestock management facilities, etc.) associated with the implementation of Allotment Management Plans are subject to compliance with Section 106 of the National Historic Preservation Act and would require intensive cultural resources inventory (Class III) prior to implementation. The identification and avoidance of cultural resources by project abandonment or redesign would mitigate any direct impacts from project implementation as protection measures and would be added to all appropriate surface disturbing actions.
- Should cultural resources be identified during the course of project implementation, operations would cease and the South Zone Archaeologist notified to complete resource documentation and evaluation for eligibility.

Direct /Indirect Effects: None anticipated. There are no new ground disturbing activities proposed. Naturally occurring erosion process will continue to affect cultural resources. Any

activities that were and/or are occurring that contribute to the loss of historical/archeological site integrity, such as vandalism, is expected to continue. The implementation of the site specific Allowable Use Levels (AUL's) are expected to help maintain or improve the upland and riparian vegetation cover and stream bank stability from livestock grazing impacts. Naturally occurring erosion will decrease as the vegetation recovers, which would then decrease potential for adverse impacts to cultural resources. The integrity of known and unknown sites would remain unchanged. Proposed mitigation/design features described in Chapter II will have no direct or indirect effects to heritage resources.

Cumulative Effects: None anticipated. There are no new ground disturbing activities proposed. With the implementation of the site specific AUL's and the design features specific to cultural resources described above, no cumulative effects are anticipated. Proposed mitigation/design features described in Chapter II will have no cumulative effects to heritage resources.

Comparison of Alternatives

Table 23: Summary of Effects by Alternative for Seymour Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative (A)	Current Grazing Alternative (B)	Proposed Action (C)	Alternative 4 (D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have less impacts then Alternative's B or C, but more than alternative A. It will have less than C or B because there is a reduction in allocated numbers.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Remain the same	Decreased due to implementation of site specific AUL's.	Decreased due to implementation of site specific AUL's and reduction in livestock numbers.

Table 24: Summary of Effects by Alternative for Fishtrap Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative (A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4)D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have similar impacts to Alternative's B or C, but more than alternative A.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Remain the same	Decreased due to implementation of site specific AUL's.	Decreased due to implementation of site specific AUL's.

Table 25: Summary of Effects by Alternative for Mudd Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative(A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4(D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have similar Alternative's B or C, but more than alternative A.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Remain the same	Slight increase due to newly proposed ground disturbing activities	Slight increase due to newly proposed ground disturbing activities

Table 26: Summary of Effects by Alternative for Pintlar Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative(A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4(D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have similar Alternative's B or C, but more than alternative A.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Remain the same	Slight increase due to newly proposed ground disturbing activities	Slight increase due to newly proposed ground disturbing activities

Table 27: Summary of Effects by Alternative for Mussigbrod Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative(A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4(D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have similar Alternative's B or C, but more than alternative A.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Remain the same	Slight increase due to newly proposed ground disturbing activities	Slight increase due to newly proposed ground disturbing activities

Table 28: Summary of Effects by Alternative for Ruby Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative (A)	Current Grazing Alternative (B)	Proposed Action (C)	Alternative 4 (D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have less impacts then Alternative's B or C, but more than alternative A. It will have less than C or B because there is a reduction in head months.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Remain the same	Decreased due to implementation of site specific AUL's.	Decreased due to implementation of site specific AUL's and reduction in head months.

Table 29: Summary of Effects by Alternative for Dry Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative(A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4(D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have similar impacts to Alternative's B or C, but more than alternative A.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Unchanged	Unchanged	Unchanged

Table 30: Summary of Effects by Alternative for Twin Lakes Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative(A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4(D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have similar impacts to Alternative's B or C, but more than alternative A.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Unchanged	Unchanged	Unchanged

Table 31: Summary of Effects by Alternative for Monument Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative(A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4(D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have similar Alternative's B or C, but more than alternative A.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Unchanged	Unchanged	Unchanged

Table 32: Summary of Effects by Alternative for Pioneer Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative(A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4(D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have similar Alternative's B or C, but more than alternative A.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Unchanged	Unchanged	Unchanged

Table 33: Summary of Effects by Alternative for Saginaw Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative(A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4(D)
General impacts to Cultural Resources Comparison	Impacts from grazing would be the least under this alternative because livestock would be removed. Effects from natural erosion would decrease over time with the increase in vegetative cover.	Existing impacts would continue as there are no proposed changes to the number of cattle, timing, or changes in infrastructure. Effects from natural erosion would continue at the same rate.	With the implementation of the design features/mitigation this alternative will have more impacts than Alternative A and similar impacts to Alternative B.	With the implementation of the design features/mitigation this alternative will have similar Alternative's B or C, but more than alternative A.
Grazing sensitive NRHP Eligible sites	Unchanged	Unchanged	Unchanged	Unchanged
Site condition (integrity of location, design, setting, materials, workmanship, feeling, and association)	Unchanged	Unchanged	Unchanged	Unchanged
Potential for adverse effect to listed, eligible, or potentially eligible sites	Reduced to zero once cattle are removed	Unchanged	Unchanged	Unchanged

Table 34: Summary of Statutory and Regulatory Consistency

Regulatory Requirement	No Grazing Alternative(A)	Current Grazing Alternative(B)	Proposed Action(C)	Alternative 4(D)
The National Historic Preservation Act of 1966, as amended*	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources
National Environmental Policy Act of 1969	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources
National Forest Management Act of 1976	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources
American Indian Religious Freedom Act of 1978 as amended	Consistent, project was consulted with concerned Native American Tribal affiliates	Consistent, project was consulted with concerned Native American Tribal affiliates	Consistent, project was consulted with concerned Native American Tribal affiliates	Consistent, project was consulted with concerned Native American Tribal affiliates
Executive Order 13175 Consultation and Coordination with Indian Tribal Governments	Consistent; project was consulted with concerned Native American Tribal affiliates	Consistent; project was consulted with concerned Native American Tribal affiliates	Consistent; project was consulted with concerned Native American Tribal affiliates	Consistent; project was consulted with concerned Native American Tribal affiliates
Executive Order 13007 Indian Sacred Sites	Consistent; sacred sites are not identified at this time in the project area.	Consistent; sacred sites are not identified at this time in the project area.	Consistent; sacred sites are not identified at this time in the project area.	Consistent; sacred sites are not identified at this time in the project area.
Forest Service Manual 2360	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources	Consistent, undertaking is following established guidelines for heritage resources

Recreation, Wilderness, and IRA's

Existing Condition

Recreation

Regulatory Framework

Management for recreation activities is governed under the Beaverhead Deerlodge National Forest 2009 Revised Forest Plan (BVRHD Plan 2009). Beginning on Chapter 3 page 26 the standard for livestock grazing states in standard 2: Domestic livestock grazing will not be allowed in developed recreation sites unless specifically permitted. On page 29 and ending on page 33 the specific goals, objectives and standards for the recreation areas are listed with allocations being displayed on maps starting on page54. The following recreation allocations are incorporated in whole or part of the project.

Designated Wilderness:
Provide primitive and semi-primitive non-motorized settings, and offer opportunities for foot, stock, ski, snowshoe travel, dispersed camping, and other activities allowed in Wilderness.

Recommended Wilderness:
Provide semi-primitive non-motorized settings and offer opportunities for foot, stock, ski, snowshoe travel, dispersed camping, and other activities. Recommended Wilderness: Areas allocated as recommended Wilderness are managed to protect or improve their Wilderness character and to protect the area's potential for inclusion in the NWPS as described in Section 2(c) of the Wilderness Act.

Summer Non-Motorized Allocations:
Provide semi-primitive non-motorized recreation settings, and offer opportunities for mountain biking, horse and stock travel, hiking, dispersed camping, and other activities.

Summer Motorized Backcountry Allocations:
Provide semi-primitive motorized recreation settings, and offer opportunities for varied types of travel and recreational activities.

Summer Roaded Allocation:
Provide roaded natural and rural recreation settings, and offer a wide variety of opportunities for dispersed and developed recreational activities.

Winter Non-Motorized Allocations:
Provide primitive and semi-primitive non-motorized recreation settings in these areas, and offer opportunities for ski touring, snowshoeing, and hiking, and other non-motorized activities.

Winter Motorized Allocations:
Provide roaded and semi-primitive motorized recreation settings in these areas, and offer opportunities for a variety of motorized and non-motorized travel and activities. The majority of these allocations provide opportunities for travel by snowmobile.

Allotment Specific Existing Recreation Condition

On page 73 of the Forest Plan the Fishtrap-Mount Haggin Management Area describes the Seymour, Fishtrap, Mudd Creek, and Pintlar Creek Allotment as:

This area is managed as a transition between the level of activity in the Big Hole Valley and the relative solitude of the Anaconda-Pintler wilderness. Developed and dispersed recreation sites compliment wilderness recreation opportunities.

Two fairly distinct areas of recreation settings are included. Summer non-motorized and undeveloped lands parallel the boundary of the Anaconda Pintler Wilderness, and provide wildlife habitat and quiet recreation. The area between the non-motorized area and private lands offer a roaded setting with developed and dispersed campsites, roads, and trails. Hunting, camping, ATV riding, bicycling, and horse riding are common activities. Snowmobile opportunities are available across the lower area though limited in some areas by terrain and vegetation. A winter non-motorized area adds to wildlife security provided by the adjacent wilderness.

Timber harvest and production may take place in the area, as well as livestock grazing. Deep Creek watershed is managed to conserve native fish populations. Sullivan and Seymour Creek are managed to restore desirable watershed conditions. Active restoration is most likely in the roaded parts of these two key watersheds.

Visitors may encounter
Vegetation changes as a result of timber harvest or fire
Motor vehicle and mountain bike riders on roads and trails in the foothills
Campers near roads and at developed campgrounds
Developed trailheads for access to the Anaconda Pintler Wilderness
Snowmobilers
Livestock

Table 1 below shows that the road based recreation dominates the recreation allocation for the Seymour allotment in the summer and demonstrates the winter recreation is allowing motorized travel through the entire allotment.

Table 1 demonstrates the Fishtrap allotment is once again dominated by road based recreation allocations with over half the allotment in this type of allocation and displays the fact that the winter recreation allocation is entirely a motorized setting.

Table 1 below demonstrates some diversity in summer recreation allocations by having a mix of almost half the area as road based and the other half as non-motorized recreation with a small percentage falling within designated Wilderness. Winter recreation is all motorized except for the eight percent located within the Wilderness

Table 1 below demonstrates the summer recreation allocation as being almost half road based and half non-motorized with about one third designated as Wilderness. The winter recreation allocation outside the Wilderness is designated as motorized as displayed in figure eight.

Mussigbrod Allotment
On page 75 of the Forest Plan the Mussigbroad Management Area describes the Mussigbroad Allotment as:

This area is managed as a transition between the Big Hole Valley and the Anaconda-Pintler Wilderness. Developed and dispersed recreation sites compliment wilderness recreation opportunities. Two fairly distinct areas of management are included: summer non-motorized and undeveloped lands which parallel the Hellroaring part of the Anaconda Pintler recommended wilderness addition, and minimally roaded lands between the non-motorized areas and private lands. The non-motorized part provides horse riding, mountain biking, and hiking opportunities. The motorized part provides vehicle access to forest resources, roads and trails, Mussigbrod Lake Campground, and Wilderness trailheads. Mussigbrod horse camp facilities are popular for wilderness trips, particularly in hunting season. Popular snowmobile opportunities are available across the area though limited in some areas by terrain and vegetation. Additional land uses include timber harvest and production, livestock grazing, and irrigation water storage at Mussigbrod Lake. Plimpton watershed is managed to conserve native fish populations.

Visitors may encounter
Vegetation changes as a result of timber harvest or fire
Motor vehicle and mountain bike riders on roads and trails in the foothills
Campers dispersed along roads and at developed campgrounds
Developed trailheads for access to higher elevations
Snowmobilers
Livestock

Table 1 below displays the summer recreation allocation as being split in half as a motorized opportunity and the other half as non-motorized and demonstrates the area as being half available for a motorized winter recreation opportunity.

Ruby Creek Allotment
On page 77 of the Forest Plan the Ruby Management Area describes the Ruby Allotment as:

This area is managed for vehicle access, timber products, livestock grazing, and dispersed recreation. The area has a long history of use associated with travel across the Continental Divide, mining, in-holdings, and timber production. As one of Montana's first gold mining areas the original town site of Pioneer is historically significant. Private in-holdings

originating from patented mining claims are scattered along the Gibbonsville Road, between Idaho and the Big Hole Valley. Mineral potential in the area is high. A roaded setting is provided in most of the area, with a mix of natural appearing and modified appearing scenery. Common recreation activities include dispersed camping, driving or riding motorized vehicles, mountain biking, historic interpretation, or using the area to access non-motorized areas of the West Big Hole and Anderson Mountain areas.

Much of the recreation use here comes from Idaho because it provides road access and winter deep snow for snowmobile opportunities close to Gibbonsville and Highway 93. The backcountry area adjacent to the West Big Hole Special Management Area has a semiprimitive setting in summer to preserve its roadless qualities.

Visitors may encounter
Vegetation changes as a result of timber harvest or fire
Motor vehicles and mountain bike riders on roads and trails in the foothills
Campers dispersed along roads and at developed campgrounds
Snowmobilers
Livestock

Table 1 below demonstrates approximately half of the Ruby Allotment is within an area that allows and is managed for motorized use of wheeled types. During the winter, as figure twelve represents, approximately half of the area is designated as available for motorized use.

Dry Creek Allotment
On page 87 of the Forest Plan the West Big Gole Flats Management Area describes the Dry Creek Allotment as:

This area is managed for livestock grazing, developed and dispersed recreation, and timber production. The recreation setting includes roaded and semi-primitive areas. Motorized activities on roads and trails are common in summer and fall. Snowmobile and cross-country ski opportunities are popular across the winter motorized area except where limited by terrain and vegetation. Challenging winter motorized opportunities are also available.

Visitors may encounter
Vegetation changes from timber harvest or fire
Motor vehicle and mountain bike riders on roads and trails in the foothills
Campers dispersed along roads and at developed campgrounds
Snowmobilers
Livestock

Table 1 below shows the Dry Creek Allotment is mostly available for motorized use for wheeled vehicles during the summer season and that the Dry Creek Allotment is mostly available for motorized use during the winter season.

Twin Lakes Alltoment
On page 87 of the Forest Plan the West Big Hole Flats Management Area describes the Twin Lakes Allotment as:

This area is managed for livestock grazing, developed and dispersed recreation, and timber production.

The recreation setting includes roaded and semi-primitive areas. Lakeside campgrounds are found at Twin Lakes. Motorized activities on roads and trails are common in summer and fall. Snowmobile and cross-country ski opportunities are popular across the winter motorized area except where limited by terrain and vegetation. Challenging winter ATV opportunities are also available.

Visitors may encounter
Vegetation changes from timber harvest or fire
Motor vehicle and mountain bike riders on roads and trails in the foothills
Campers dispersed along roads and at developed campgrounds
Snowmobilers
Livestock

Table2 below displays the Twin Lakes Allotment is dominated by the possibilities of motorized summer recreation. The only exception is the Upper Little Lake pasture which is located entirely within the non-motorized setting. Table 2 also displays the winter recreation as being available for almost completely as a motorized opportunity.

Monument Allotment
On page 87 of the Forest Plan the West Big Hole Flats Management Area describes the Monument Allotment as:

This area is managed for livestock grazing, developed and dispersed recreation, and timber production.

The recreation setting includes roaded and semi-primitive areas. Lakeside campgrounds are found at Miner and Van Houten Lakes. Motorized activities on roads and trails are common in summer and fall. Snowmobile and cross-country ski opportunities are popular across the winter motorized area except where limited by terrain and vegetation. Challenging winter motorized opportunities are also available.

Visitors may encounter
Vegetation changes from timber harvest or fire
Motor vehicle and mountain bike riders on roads and trails in the foothills
Campers dispersed along roads and at developed campgrounds
Snowmobilers
Livestock

Table 2 displays the summer recreation allocation for the Monument allotment as one dominated by a motorized experience. Table 2 also provides some diversity in the winter season with a portion of the Hamby Creek Pasture dedicated as a non-motorized opportunity area.

Pioneer Allotment
On page 87 of the Forest Plan the West Big Hole Flats Management Area describes the Pioneer Allotment as:

This area is managed for livestock grazing, developed and dispersed recreation, and timber production.
The recreation setting includes roaded and semi-primitive areas. Motorized activities on roads and trails are common in summer and fall. Snowmobile and cross-country ski opportunities are popular across the winter motorized area except where limited by terrain and vegetation. Challenging winter motorized opportunities are also available.

Semi-primitive non-motorized settings are provided north and south of the Skinner Meadows area.

Visitors may encounter
Vegetation changes from timber harvest or fire
Motor vehicle and mountain bike riders on roads and trails in the foothills
Campers dispersed along roads and at developed campgrounds
Snowmobilers
Livestock

Table 2 displays the summer recreation opportunities for the Pioneer Allotment. The Skinner and Pioneer pastures provide for both motorized and non-motorized opportunities with a more than half of the pastures dedicated to a non-motorized setting. Table 2 also displays the winter recreation allocations with the Pioneer pasture having the only area dedicated to a non-motorized recreation opportunity.

Saginaw Allotment
On page 87 of the Forest Plan the West Big Hole Flats Management Area describes the Saginaw Allotment as:

This area is managed for livestock grazing, developed and dispersed recreation, and timber production. The recreation setting includes roaded and semi-primitive areas. Lakeside campgrounds are found at Twin, Miner and Van Houten Lakes. Motorized activities on roads and trails are common in summer and fall. Snowmobile and cross-country ski opportunities are popular across the winter motorized area except where limited by terrain and vegetation. Challenging winter ATV opportunities are also available. Semi-primitive non-motorized settings are provided north and south of the Skinner Meadows area. Active restoration of Saginaw Creek watershed takes place in this management area. The area is grazed lightly by livestock.

Visitors may encounter
Vegetation changes from timber harvest or fire
Motor vehicle and mountain bike riders on roads and trails in the foothills
Campers dispersed along roads and at developed campgrounds
Snowmobilers
Livestock

Table 2 displays the summer recreation allocation for the Saginaw allotment with the allotment being dominated by a motorized recreation opportunity. The winter recreation allocation for the Saginaw allotment displayed in Table 2 shows the area mostly available for motorized winter recreation as well.

Table 1: Summer and Winter Recreation Allocation Percents by Allotment by Pasture

Allotment	**Pasture**	**Pastures % of the Aallotment**	**Summer Recreation Allocation Percent**						**Winter Recreation Allocation Percent**					
			Wil	**BC**	**RW**	**RB**	**SNM**	**IN**	**M**	**MR**	**WNM**	**RW**	**Wil**	**IN**
Seymour	Tenmile	22				95.70	4.30			100				
	Sullivan	31				98.95	1.05			100				
	Seymour	47		.26		94.73	.82	4.19		96				4
Fishtrap	West Fork	47		4		57	39	1	99					1
	East Fork	53		3		71	26	.14		100				
Mudd Creek	Mudd Creek	100	8	3		48	41	1		91			8	1
Pintlar Creek	Pintlar Creek	100	32		.03	57	11	.09	68				32	
Mussigbrod	Mussigbrod	71	32	44	.03	57	11			96		3		
	Bender	29		15	1	77	7			99		1		
Ruby Creek	Lower Ruby	45		19		54	24	3		64	33			3
	Cow Creek	40		27		18	45	10	43		47			10
	Butler	15				31	69		41		59			
Dry Creek	Upper Dry Creek	80		47		38	16		93		7			
	Lower Dry Creek	20		66		34		.04		100				

Wil – *Wilderness* **BC** – *Back Country* **RW** – *Rec. Wilderness* **RB** – *Road Based* **SNM** – *Summer Non-Motorized*
IN – *Inholding* **M** – *Motorized* **MR** – *Motorized Recreation* **WNM** – *Winter Non-Motorized*

Table 2: Summer and Winter Recreation Allocation Percents by Allotment by Pasture

Allotment	Pasture	Pastures % of the Allotment	SummerRecreation Allocation Percent						Winter Recreation Allocation Percent					
			Wil	BC	RW	RB	SNM	IN	M	MR	WNM	RW	Wil	IN
Twin Lakes	Upper Little Lake	14					100			100				
	Lower Little Lake	27		92			8	.44		100				
	Upper Big Lake	36		49		49	2			100				
	Lower Big Lake	23		65		35				100				
Monument	Miner Creek	39		83		9	8			99	1			
	Hamby Creek	60		73			27	.08		55	45			
	Special Use Area	1		100						100				
Pioneer	Van Houten	18		86		14		.43	100					
	Skinner Meadows	28		22		2	74	2	100					
	Pioneer	14					100			100				
Saginaw	Pasture 1	27		92			8	.44		100				
	Pasture 2	36		49		49	2			100				
	Pasture 3	23		65		35				100				
	Pasture 4	39		83		9	8			99	1			

Wil – *Wilderness* **BC** – *Back Country* **RW** – *Rec. Wilderness* **RB** – *Road Based* **SNM** – *Summer Non-Motorized*
IN – *Inholding* **M** – *Motorized* **MR** – *Motorized Recreation* **WNM** – *Winter Non-Motorized*

Wilderness

Regulatory Framework

All the following laws, regulations and ploicies authority is at the federal level.

Wilderness Act of 1964 - A portion of the Mudd and Pintler Creek allotments is contained within the Anaconda Pintler Wilderness, designated as a Wilderness at the signing of the Wilderness Act of 1964.

House Report 96-1126 - Provides further definitions of intent to grazing applications from the Wilderness Act of 1964.

Beaverhead Deerlodge National Forest Plan - Provides guidance to Wilderness management.

Anaconda Pintler Wilderness Management Plan - Provides guidance to management of the Anaconda Pintler Wilderness

The grazing of livestock, where established prior to the effective date of this Act, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture." The Wilderness Act of 1964, Section 4(d)(4)(2). The grazing of domestic livestock has been occurring in the Anaconda Pintler Wilderness for the past century. At the time of the signing the Wilderness Act into law in 1964 grazing was occurring with domestic cattle.

Mudd Creek allotment has approximately 875 acres within the Anaconda Pintler Wilderness. This comprises a very small percentage of the entire eleven thousand acre allotment. Very little if any grazing occurs within the Wilderness during the grazing season. A few transient cattle stray from the heard and wander the way through the timber to various small meadows.

Pintler Creek allotment has almost 2400 acres within the Anaconda Pintler Wilderness. However a small portion of this is actually grazed and is dominated by grazing in the Pintler Meadows where Beaver Creek meets Pintler Creek.

Trails bisect the Anaconda Pintler Wilderness with the primary trail within the analysis area being Pintler Creek. Appendix A2 has the maps that display the Wilderness trails and surrounding roads and trails to demonstrate the number of trails bisecting the analysis area. Mudd Creek trail also falls within the Mudd Creek allotment but not receive much use and can be described as a low standard trail

No outfitter guides have basecamps within the analysis area but one is allowed to utilize the Pintler Creek trail to access a basecamp on the continental divide at the head of Pintler Creek. One outfitter guide is allowed to conduct day use hunting trips.

No range improvements exist in the Mudd Creek allotment within the Anaconda Pintler Wilderness. Range developments for the Pintler Creek allotment are limited to native log fencing. A portion of this fence is across the Pintler Creek trail and when cattle are grazing in Pintler Meadows the gate is closed requiring visitors to open and close the gate. Proposed Action range developments by type and location are displayed on the map Wilderness RW IRA Allots map in Appendix A2.

The 2013 Anaconda Pintler Wilderness Management Plan categorizes the areas of the Mudd Creek allotment as management zone one and Pintler Creek allotment within management three respectively (See Appendix A2 Wilderness MZ map) displays the management zones for the Anaconda Pintler Wilderness. Management zone one is defined as:

The following management zone descriptions for Mudd Creek and Pintler Creek are:

Zone I (Most Natural)

Zone I exists in essentially trail-less areas where use and impacts are not focused by destinations. This area has the lowest level of human disturbance and is characterized by a virtually unmodified natural environment. The A-P is primarily Zone I.

Goals
1. This zone has the highest degree of apparent naturalness.
2. Ecological processes operate naturally, with essentially no perceptible or measurable evidence of human impact or use.
3. The area has outstanding opportunities for solitude and a primitive and unconfined type of recreation that requires self-reliance.
4. The area functions as a wild place. It looks and feels wild to those who visit.

Objectives
1. Campsite density is less than 1 per roving radial mile.
2. Barren core areas associated with campsites re-vegetate annually.
3. Non-system trails (social trails and other user-built trails) are generally absent.
4. Encounters with other groups and rangers generally do not occur.

Guidelines
1. Through education and administrative actions, which may sometimes include physical removal, the following will be discouraged or eliminated:
    a. Frequent managerial presence
    b. Base camps for fire suppression or other administrative purposes
    c. Constructed heli-spots; allow old sites to recover
    d. Repeated use of large group camps (includes outfitters)
    e. Barren core areas associated with campsites
    f. Rock campfire rings.

Standards
1. Eliminate or prevent the following in this zone:
    a. Permanent structures (other than heritage resources)
    b. System trails
    c. Directional trail signs.

2. Use of administrative and permitted camps (base or spike camps) may not exceed 15 service or use days per season per site.

Zone III

Zone III includes some popular destinations and more heavily used areas that are along popular routes used for overnight trips. A predominantly unmodified natural environment characterizes this zone, however, some sites are substantially affected by human activity. Such impacts include loss of vegetation and soil along travel routes, at campsites, and at scenic attractions such as lakeshores and viewpoints. The zone has both mainline and secondary system trails. Encounters with other groups and rangers on the trail or in campsites are expected. Campfire rings will exist only in heavily used sites where determination has been made that less damage occurs by concentrating use than by dispersing it. Impacts could persist from year to year but do not exceed the limits defined in the objectives, guidelines, and standards.

Goals
1. The zone has a high degree of wilderness integrity.
a. A minimal level of human disturbance characterizes the zone.
b. Ecological processes operate naturally with limited evidence of human impact.
c. Opportunities for solitude are available.
d. A primitive and unconfined type of recreation, requiring self-reliance, is characteristic of the area.

Objectives
1. Campsite density is less than 6 per roving radial mile.
2. Barren core areas associated with campsites are less than 200 square feet.
3. Non-system trails (social trails and other user-built trails) are generally less than 3 per camp and less than 3 per concentrated use area.
4. Encounters with other groups and rangers are generally less than 3 per day on the trail, and less than 4 per day in camp.
5. Conditions that precipitate user conflicts are minimal.

Guidelines
1. The following will be discouraged through education and may be physically modified or removed if they occur:
    a. Signing, except at trail junctions and wilderness boundaries
    b. Rock campfire rings

Standards
1. Administrative and permitted camps (base or spike camps) are occasionally allowed, except in RNAs.
2. Eliminate or prevent permanent structures (except heritage resources and trail structures for resource protection, e.g. water bars, turnpikes, and puncheons).
3. Directional trail signs are allowed.

IRA's

Regulatory Framework

2009 Beaverhead-Deerlodge Forest Plan
The Beaverhead-Deerlodge Forest Plan (BDFP) established forest-wide multiple use goals, objectives, and management area direction. The analysis of Inventoried Roadless Areas documented in Appendix C of the FEIS for the Plan, inventoried and evaluated areas with Wilderness potential using a methodology consistent with Forest Service policy direction. Please see Appendix C of the FEIS for the Forest Plan for additional detail on the methodology used for this evaluation. As a result of this Forest-wide analysis, some roadless areas were recommended for inclusion in the National Wilderness Preservation System and others were not. No Forest-wide or Management Area standards specific to Inventoried Roadless Areas or areas evaluated for Wilderness potential that were not recommended for designation as Wilderness were prescribed in the 2009 Forest Plan. The Forest Plan does however prescribe more general management direction which overlaps with IRAs. This management direction takes the form of place-based management area Goals, objectives, or Standards, recreation allocations, and specific standards for resources across the Forest. Forest Plan standards exist to ensure that specific management direction is followed. Four Inventoried Roadless Areas, in various departments, overlap the project area.

Management for Inventoried Roadless Areas is governed under the Beaverhead Deerlodge National Forest 2009 Revised Forest Plan. Beginning on Chapter 3 page 29 and ending on page 33 the specific goals, objectives and standards for the separate areas are listed. Specifically the Goals, Objectives and standards for managing recreation per allocations incorporate the following:

Designated Wilderness
Provide primitive and semi-primitive non-motorized settings, and offer opportunities for foot, stock, ski, snowshoe travel, dispersed camping, and other activities allowed in Wilderness.

Recommended Wilderness
Provide semi-primitive non-motorized settings and offer opportunities for foot, stock, ski, snowshoe travel, dispersed camping, and other activities. Recommended Wilderness: Areas allocated as recommended Wilderness are managed to protect or improve their Wilderness character and to protect the area's potential for inclusion in the NWPS as described in Section 2(c) of the Wilderness Act.

Summer Non-Motorized Allocations
Provide semi-primitive non-motorized recreation settings, and offer opportunities for mountain biking, horse and stock travel, hiking, dispersed camping, and other activities.

Summer Motorized Backcountry Allocations
Provide semi-primitive motorized recreation settings, and offer opportunities for varied types of travel and recreational activities.

Summer Roaded Allocation
Provide roaded natural and rural recreation settings, and offer a wide variety of opportunities for dispersed and developed recreational activities.

Winter Non-Motorized Allocations
Provide primitive and semi-primitive non-motorized recreation settings in these areas, and offer opportunities for ski touring, snowshoeing, and hiking, and other non-motorized activities.

Winter Motorized Allocations
Provide roaded and semi-primitive motorized recreation settings in these areas, and offer opportunities for a variety of motorized and non-motorized travel and activities. The majority of these allocations provide opportunities for travel by snowmobile.

Inventoried Roadless Areas 2003 Assessment
The December 2003 Inventoried Roadless Area Capability Assessment (USDA Forest Service 2003) graded five main elements to help determine Wilderness potential that are reflected in the Forest Plan's Appendix C summary. Ratings range from: High = 10, Moderate =5, Low = 1. Included in the ratings are six yes or no questions assessing the availability for an area to be considered for Wilderness. The six yes or no questions are: 1) Is the area vitally needed for increased water protection or storage? 2) Would Wilderness management seriously restrict important wildlife management? 3) Does the area have high strategic mineral development or potential? 4) Are there unique or outstanding natural phenomenon that requires public access and development is inconsistent with Wilderness designation? 5) Is the land needed to clearly document resource demands such as timber, minerals, or recreation sites including winter sports? 6) Are there existing contractual or other significant obligations on the area not in concert with Wilderness designation?

Table 3 below displays the summary evaluations for the December 2003 Inventoried Roadless Area Capability Assessment (USDA Forest Service 2003). The evaluation graded five main elements to help determine Wilderness potential that are reflected in the Forest Plan's Appendix C summary. Ratings range from: High = 10, Moderate =5, Low = 1. Included in the ratings are six yes or no questions assessing the availability for an area to be considered for Wilderness and is answered as a yes or no.

Table 3: Summary evaluations for the December 2003 Inventoried Roadless Area Capability Assessment

IRA	Environment	Recreation Opportunities	Special Features	Manageability	Availability
Anderson Mountain	7.5	5.2	2.5	5.8	No
North Big Hole 1-001A	3	1	2.2	5.5	No
North Big Hole 1-001B	3.6	4.2	3	5.3	No

Table 3: Summary evaluations for the December 2003 Inventoried Roadless Area Capability Assessment

IRA	Environment	Recreation Opportunities	Special Features	Manageability	Availability
North Big Hole 1-001C	4.33	4.2	4.4	6	No
North Big Hole A1-001	6.67	6	5.7	6.6	No
North Big Hole B1-001	9.1	7	6.2	9.1	No
North Big Hole C1-001	6	5.2	2.1	3.8	No
North Big Hole D1-001	1.6	1	2.6	2.3	No
West Big Hole 1-943-A	4.3	3.14	3.4	3.1	No
West Big Hole 1-943-B	7.4	9	6.6	5.8	No
West Big Hole A1-943	8.3	7	3	5.8	No
West Big Hole B1-943	3.3	3.4	3.8	1.67	No
West Big Hole C1-943	5.17	5	3.8	2.3	NO
Saginaw Creek	6.2	6	1.8	3.17	No

Table 4 below discloses the 2009 Forest Plan results of the evaluation of Areas with Wilderness Potential.

Table 4: 2009 Forest Plan Revision Results of Evaluation of Areas with Wilderness Potential

IRA	Capability	Availability	Need	Suitability
Anderson Mountain, BDNF 1-942	Moderate	Moderate	High	Moderate
North Big Hole 1-001A	Moderate	Moderate	Moderate	Moderate
North Big Hole 1-001B	Low	High	Moderate	Low
North Big Hole 1-001C	Moderate	High	Moderate	Moderate
North Big Hole 1-001D	Moderate	Moderate	High	High

Table 4: 2009 Forest Plan Revision Results of Evaluation of Areas with Wilderness Potential

IRA	Capability	Availability	Need	Suitability
North Big Hole 1-001E	High	High	High	High
North Big Hole 1-001F	Moderate	High	Moderate	Moderate
North Big Hole 1-001G	Low	High	Moderate	Low
North Big Hole 1-001H	Low	Moderate	Moderate	Low
Saginaw Creek 1-004	Low	High	Moderate	Low
West Big Hole, BDNF 1-943	High	High	High	High
West Big Hole, BDNF 1-943A	Low	Moderate	High	Low
West Big Hole, BDNF 1-943B	Moderate	High	High	Moderate
West Big Hole, BDNF 1-943C	Moderate	Moderate	High	Moderate
West Big Hole, BDNF 1-943D	Low	Moderate	High	Low
West Big Hole, BNDF 1-943E	Low	Moderate	High	Low

North Big Hole Roadless Area - lies within the Anaconda Range, and borders the southern edge of the Anaconda-Pintler Wilderness Area in Beaverhead County, Montana. Area 1-001 is divided into seven parts to improve the inventory. The area is contiguous with Bitterroot National Forest Roadless Area 3-001. Access is available from roads along the western and southern edges in Johnson, Mussigbrod, Pintler, Mudd, LaMarche, and Seymour creeks. Elevations range from 6,300 to 8,800 feet. These moderately sloped foothills are glaciated with rugged peaks, high rock cirque basins, and deep glacial troughs. Well defined terminal glacial moraines fan out at the mouths of valleys. Vegetation is mainly conifer forests common in southwestern Montana, with wet meadows and aspen patches. Soils are generally sandy loams derived from granite (2009 Beaverhead Deerlodge National Forest Plan Corrected FEEIS Appendix C 112).

Anderson Mountain Roadless Area - is located on the Montana side of the Bitterroot Mountain Range in Beaverhead County contiguous to the Salmon-Challis National Forest Roadless Area 13-942 in Idaho. Access is available from Montana State Highway 43, the Foothills and Ruby roads. There is road and trail access from the Salmon National Forest in Idaho. Elevations range from 6,300 to more than 8,000 feet. The terrain includes deep V-shaped valleys in rolling forested hills which rise to steep rugged peaks near the southern end

of the Continental Divide. Whitebark and limber pine grow on the ridges near the timberline. The rest of the area is predominantly lodgepole pine forests with Douglas-fir and sagebrush parks present on south facing slopes. Soils are moderately deep loams and sandy loams (2009 Beaverhead Deerlodge National Forest Plan Corrected FEEIS Appendix C 7).

West Big Hole Roadless Area - is located in the Bitterroot Mountains in Beaverhead County, Montana and is contiguous to the Salmon-Challis National Forest Roadless Area 13-943. Access is available from the east along the Twin Lakes, Miner Lake, Swamp Creek roads, Road 918, and numerous roads within the lower part of the roadless area. Elevations range from about 7000 feet in the foothills to more than 10,627 at Homer Young's Peak. More than 30 percent of the area is above the tree line with little or no vegetation. Mid-elevation slopes are covered with conifers; lodgepole pine and Douglas-fir are the most common, with subalpine fir and Engelmann spruce occupying cool moist sites. Sagebrush parks and grassland meadows are also included. The area is one of the highest water producers on the forest, and water quality is very high. Several alpine lakes are present in basins just below the divide. Most of the lower elevation lakes are man-made. Soils on the ridges are deep loams and fine sandy loams from metamorphic rock, mainly quartzite. Soils on the glacial moraines are very stony, sandy loams (2009 Beaverhead Deerlodge National Forest Plan Corrected FEEIS Appendix C 170).

Saginaw Creek Roadless Area - is located in the Beaverhead Mountains in Beaverhead County, Montana. Access is available from Forest Road 181 along the western edge. Elevations range from about 6200 feet in the foothills to 9200 feet at Black Mountain summit. Selway Mountain, at 8900 feet, is the only other prominent landform. Terrain near the peaks is rugged and steep. The rest of the area has more gentle rolling slopes. Grass and sagebrush occupy the lower elevations, and rise to lodgepole pine and Douglas-fir forests in the upper elevations. Soils are rocky and sandy loams; with clays present in the lowest elevations (2009 Beaverhead Deerlodge National Forest Plan Corrected FEEIS Appendix C 129).

Analysis

Recreation

Methodology

Spatial Scale

The spatial analysis boundary for the analysis of direct, indirect, and cumulative effects includes the project area, including any grazed Bureau of Land Management (BLM), State, or private lands contained within the project area boundary. This boundary was selected because there would be no direct, indirect, or cumulative effects to the recreation resource outside of this boundary as a result of authorizing livestock grazing activities within the project area.

Temporal Scale

The temporal boundaries for the analysis include both short-term, and long-term grazing effects to the recreation resource. Short-term grazing effects to recreation are generally one year or less, and include annual effects to recreation through livestock grazing.

Long tern effects of grazing on recreation occur over a period of time. For the purpose of this analysis, this period will be from two to ten years. The rational for using this time period is that ten years is typically the term of Forest Service Term Grazing Permits (Forest Service Handbook 2209.13) and approximately the term of Allotment Management Plans before they are reviewed for needed changes.

Resource Indicators to be Analyzed and Units of Measure

The indicators of effects to the recreation resource are the Forest Plan allocations as defined in the plan goals starting page 29 and ending on page 30. The recreation standards for the recreation allocations will function as the unit of measure for disclosing the effects of grazing on the recreation resource. The Big Hole Landscape maps displaying the recreation allocation areas start on page 64 and end on page 85 of the Forest Plan.

Table 5: Recreation Indicators and Units of Measure

Indicator	Unit of Measure
Designated Wilderness	See Wilderness Section below.
Recommended Wilderness	Standard 1: Permanent road construction is not allowed in summer non-motorized allocations or in areas evaluated for wilderness potential. Standard 10: Manage recommended Wilderness for primitive or semi-primitive non-motorized settings and protect Wilderness character. Standard 13: Wheeled or motorized vehicles designed for the primary purpose of transporting people, except for wheel chairs, are prohibited in recommended Wilderness except for permitted or administrative uses.

Table 5: Recreation Indicators and Units of Measure

Indicator	Unit of Measure
Summer Non-Motorized	Standard 1: Permanent road construction is not allowed in summer non-motorized allocations or in areas evaluated for wilderness potential. Standard 2: Motorized vehicles are not allowed in summer or winter non-motorized allocations except for permitted or administrative use. Standard 7: Manage summer non-motorized allocations for either a primitive or semi-primitive non-motorized setting from May 16 thru December 1
Summer Motorized Backcountry	Standard 3: Restrict year-round, wheeled motorized travel to designated routes or areas. Standard 9: Manage summer backcountry allocations for a semi-primitive motorized setting from May 16 thru December 1.
Summer Roaded	Standard 3: Restrict year-round, wheeled motorized travel to designated routes or areas.
Winter Non-Motorized	Standard 2: Motorized vehicles are not allowed in summer or winter non-motorized allocations except for permitted or administrative use. Standard 8: Manage winter non-motorized allocations for a primitive or semi-primitive non-motorized setting from December 2 thru May 15
Winter Motorized	No Standard exists stating the dates for the Forest Service to manage Winter Motorized areas for any particular recreation opportunity type.

Analysis Methods and Assumptions

Analysis of the recreation resource was conducted by the use of Geographic Information Systems mapping. The Beaverhead Deer National Forest Plan recreation allocations for both summer and winter (recreation indicators) are overlayed with the grazing allotments and pastures. The various alternatives will disclose the change of recreation allocations (indicators) in a percentage as defined by the Beaverhead Deerlodge National Forest Plan standards for recreation (units of measure).

Wilderness

Methodology

Spatial Scale

For the purposes of this analysis the spatial boundaries will be limited to the Anaconda Pintler Wilderness and the intersection of the grazing allotment boundaries for Mudd and Pintler Creeks. In Appendix A2 the map Wilderness RW Allots displays the location of the allotment and Wilderness boundaries and their intersections.

Temporal Scale

The temporal boundaries for the analysis include both short-term, and long-term grazing effects to the recreation resource. Short-term grazing effects to recreation are generally one year or less, and include annual effects to recreation through livestock grazing.
Long-term effects of grazing on recreation occur over a period of time. For the purposes of this analysis, this period will be from two to 10 years. The rationale for using this time period is that ten years is typically the term of Forest Service Term Grazing Permits (Forest Service Handbook 2209.13), and approximately the term of Allotment Management Plans before they are reviewed for needed changes.

Resource Indicators to be Analyzed and Units of Measure

The Wilderness Act of 1964 doesn't define wilderness character and there is no discussion about its meaning in the legislative history of this act (Scott 2002). The Forest Service national framework for monitoring wilderness character (Landres and others 2005) concluded that wilderness character is ideally described as the unique combination of a) natural environments that are relatively free from modern human manipulation and impacts, b) opportunities for personal experiences in environments that are relatively free from the encumbrances and signs of modern society, and c) symbolic meanings of humility, restraint, and interdependence in how individuals and society view their relationship to nature.

Using the Definition of Wilderness, Section 2(c) from the Wilderness Act of 1964, the Forest Service national framework (Landres and others 2005) and Technical Guide (Landres and others, in press) identify four qualities of wilderness that make the idealized description of wilderness character relevant, tangible, and practical to forest planning, management, and monitoring. These four qualities can be applied to the stewardship of all National Forest System wildernesses—regardless of size, location, or other unique place-specific attributes—because they are based on the legal definition of wilderness and every wilderness law includes specific language that ties it to this definition (Hendee and Dawson 2002, Landres 2003).

The four Wilderness character qualities to be analyzed as units of measure to the grazing effects to the Anaconda Pintler Wilderness are:

Untrammeled quality - The Wilderness Act, Section 2(c) states that wilderness is "hereby recognized as an area where the earth and its community of life are untrammeled by man." The word "untrammeled" is rarely used in ordinary

conversation, but Howard Zahniser, the primary author of the Wilderness Act, used untrammeled as a key word in the definition of wilderness.

Natural quality - One of the major themes running throughout the 1964 Wilderness Act is that wilderness should be free from the effects of "an increasing population, accompanied by expanding settlement and growing mechanization" and that the "earth and its community of life…is protected and managed so as to preserve its natural conditions" (Sections 2(a) and 2(c), respectively). Historically, wilderness is strongly associated with protecting and preserving ecological systems from the impacts of modern people (Sutter 2004).

Undeveloped quality - Wilderness is defined in Section 2(c) of the 1964 Wilderness Act as "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation," with "the imprint of man's work substantially unnoticeable." The basic idea that wilderness is undeveloped runs through every definition of wilderness. For example, Aldo Leopold (1921) envisioned wilderness as "a continuous stretch of country preserved in its natural state, open to lawful hunting and fishing, devoid of roads, artificial trails, cottages, or other works of man." Hubert Humphrey (1957), an original sponsor of the Wilderness Act, clarified his definition of wilderness as "the native condition of the area, undeveloped… untouched by the hand of man or his mechanical products."

Solitude or primitive and unconfined quality - The Wilderness Act states in Section 2(c) that wilderness has "outstanding opportunities for solitude or a primitive and unconfined type of recreation." The intended meaning of this wording by the framers of the Wilderness Act isn't recorded in the legislative history of the Act and it has caused much discussion and debate among wilderness managers and scholars (Hendee and Dawson 2002). However, early wilderness writings of Aldo Leopold, Robert Marshall, Howard Zahniser, and others paint a rich picture of the type of experience envisioned in wilderness environments (see Landres and others 2005 for examples). These writings strongly enforce the vital role of solitude in places that are primitive and unconfined as central to the idea of wilderness.

Analysis Methods and Assumptions

The purpose of this analysis is to disclose potential effects to Wilderness character through the four Wilderness qualities in areas that qualify for such analysis and determine if, or to what extent proposed alternatives might affect the character of the Anaconda Pintler Wilderness. Grazing effects will be described and analyzed for only domestic cattle grazing. The grazing of animals for recreational purposes, like those used by visitors for pack and saddle use will not be discussed. This analysis focuses on the potential effects of project activities on Wilderness characteristics as defined in the Forest Service Handbook (FSH) 1909.12 (72.1) and evaluated here.

The effects analysis only applies to Mudd Creek and Pintlar as they are the only allotments that have wilderness. Table 6 below summarizes the direct and indirect effects to the wilderness characters by alternative by allotment.

Remnants of previous grazing activity can alter natural conditions and diminish wilderness character. Over time the wilderness character would be returned to a point where the casual observer likely would not notice evidence of previous grazing activity.

In Table 6 below the "+" symbol represents an improvement to the features analyzed and described previously in the units of measure section. A "0" is a neutral symbol to the evaluation of the feature analyzed. The "-"symbol represents a loss of the feature analyzed.

Table 6: Change in Wilderness Character by Alternative by Allotment

Alternative	Wilderness Characters			
	Untrammeled	**Natural**	**Undeveloped**	**Solitude or Primitive and Unconfined**
Mudd Creek Allotment				
No Action	+	+	0	+
Current Grazing Management	0	0	0	0
Proposed Action	0	0	0	0
Alternative 4	0	0	0	0
Pintlar Creek Allotment				
No Action	+	+	+	+
Current Grazing Management	0	-	0	0
Proposed Action	0	-	0	0
Alternative 4	+	+	-	0

Under the No Action, by not having any cattle grazing occur in the Mudd Creek allotment the Andaconda Pintler Wilderness will not be effected by the burden of man and its desires to harness the forage for livestock production. Natural processes will likewise not be encumbered by the pressure of cattle grazing. Since no structures or other developed features occur within the Mudd Creek allotment within the Andaconda Pintler Wilderness then no change is expected from the current undeveloped character. Since no cattle are grazing under this alternative one would be ensured to have only encounters with native wildlife and other visitors thus increasing the solitude.

For Pintlar Creek the current grazing by livestock is primarily found in the Pintler Meadows where Beaver Creek and Pintler Creek meet and under this alternative no grazing will take place. By not having any cattle grazing occur in the Pintler Creek allotment the Anaconda Pintler Wilderness will not be effected by the burden of man and its desires to harness the wilderness forage for livestock production. Natural processes will likewise not be encumbered by the pressure of cattle grazing. The range fences and other range features occuring within the Pintler Creek allotment within the Anaconda Pintler Wilderness can be removed and improve the current undeveloped character. Since no cattle are grazing under

this alternative one would be ensured to have only encounters with native wildlife and other visitors thus increasing the feelings of solitude.

The incidental use of having any cattle grazing occur in the Mudd Creek allotment under the Current Grazing Management, the Anaconda Pintler Wilderness will be effected by the burden of man and its desires to harness the forage for livestock production. Natural processes will likewise be encumbered by the pressure of cattle grazing. Since no structures or other developed features occur within the Mudd Creek allotment at the intersection with the Anaconda Pintler Wilderness then no change is expected from the current undeveloped character. Cattle are grazing under this alternative and a reasonable person would have to navigate these beasts as well as native wildlife and other visitors thus limiting the solitude felt in the beginning of the Wilderness environment.

For the Pintlar Creek Allotment under the Current Grazing Management alternative, one will see grazing by livestock primarily found in the Pintler Meadows where Beaver Creek and Pintler Creek meet. By having cattle grazing occur in the Pintler Creek allotment the Anaconda Pintler Wilderness will be affected by the burden of man and its desires to harness the wilderness forage for livestock production. The production of cattle within the Wilderness is found to have no effect on the forage utilization and thus a determination of neutral for the untrammeled character by the livestock. Natural processes will be encumbered by the pressure of cattle grazing because it is found that Pintler Creek within Pintler Meadows is not found to be currently functioning and will have a negative determination of the natural character. The range fences and other range features occuring within the Pintler Creek allotment within the Anaconda Pintler Wilderness will exist in the current native condition and not change the current character. Since cattle are grazing under this alternative one would be ensured to have the potential to have encounters with domestic livestock, native wildlife and other visitors thus maintaining current feelings of solitude.

Under the Proposed Action the effects to the wilderness character in the Mudd Creek Allotment will be similar to the Current Grazing Management Alternative.

Under the Proposed Action the Pintlar Creek Allotment will see grazing by livestock primarily found in the Pintler Meadows where Beaver Creek and Pintler Creek meet. By having cattle grazing occur in the Pintler Creek allotment the Anaconda Pintler Wilderness will be affected by the burden of man and its desires to harness the wilderness forage for livestock production. The production of cattle within the Wilderness is found to have no effect on the forage utilization and thus a determination of neutral for the untrammeled character by the livestock. Natural processes will be encumbered by the pressure of cattle grazing because it is found that Pintler Creek within Pintler Meadows is not found to be currently functioning and will have a negative determination of the natural character. The range fences and other range features occuring within the Pintler Creek allotment within the Anaconda Pintler Wilderness will exist in the current native condition and not change the current undeveloped character. Since cattle are grazing under this alternative one would be ensured to have the potential to have encounters with domestic livestock, native wildlife and other visitors thus maintaining current feelings of solitude.

Under Alternative 4, the Mudd Creek Allotment effects will be similar to those under the Current Grazing Management alternative.

Under Alternative 4, the Pintlar Creek Allotment will not see grazing by livestock for ten years primarily found in the Pintler Meadows where Beaver Creek and Pintler Creek meet. By having a ten year cattle grazing reprieve occur in the Pintler Creek allotment the Anaconda Pintler Wilderness will not be effected by the burden of man and its desires to harness the wilderness forage for livestock production. A ten year pause in grazing is a positive rating for the untrammeled character. For ten years natural processes will not be encumbered by the pressure of cattle grazing and allow the currently non-functioning segment of Pintler Creek to heal improving the natural character. The range fences and other range features occuring within the Pintler Creek allotment within the Anaconda Pintler Wilderness will increase under this alternative. With this increased development effecting undeveloped character negatively. Since no cattle are grazing under this alternative for ten years one would not be expecting to have as much encounters with domestic livestock, but the same amount with native wildlife and other visitors thus maintaining current feelings of solitude. Fences would still exist and the need to close gates for livestock control would remain as well.

Tables 7 and 8 display the past, present, and reasonably foreseeable future actions which will intersect the Mudd Creek allotment and Anaconda Pintler Wilderness. The positive column provides the determination of an improvement to the wilderness character by action/event and the negative column provides a determination of not being in favor of improving the wilderness character of the action/event.

Table 7: No Action and Current Grazing Management Alternatives Cumulative Effects by Allotment

Activity/Event	Past		Present		Reasonably Foreseeable Future		Positive		Negative	
	No Action	Current Grazing Mgemnt	No Action	Current Grazing Mgemnt	No Action	Current Grazing Mgemnt	No Action	Current Grazing Mgemnt	No Action	Current Grazing Mgemnt
Mudd Creek Allotment										
Irrigation diversion	X	X	X	X	X	X			X	X
Noxious weed control	X	X	X	X	X	X	X	X		
Prescribed burning	X		X		X		X			
Sagebrush manipulation (burning, spraying)	X	X							X	X
Wildland Fire Suppression	X	X	X	X	X	X			X	X
Water Impoundments	X	X	X	X			X	X	X	X
Non-native fish stocking	X	X	X	X	X	X			X	X
WCT restoration projects							X	X		
Beetle related tree mortality			X	X	X	X	X	X		
Dispersed Recreation	X	X	X	X	X	X			X	X
Trails	X	X	X	X	X	X			X	X
Climatic Events	X	X							X	X
Pintlar Creek Allotment										
Irrigation diversion	X	X			X	X			X	X
Noxious weed control	X	X	X	X	X	X	X	X		
Prescribed burning	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sagebrush manipulation (burning, spraying)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wildland Fire Suppression	X	X	X	X	X	X			X	X
Water Impoundments	X	X	X	X			X	X	X	X

Table 7: No Action and Current Grazing Management Alternatives Cumulative Effects by Allotment

Activity/Event	Past		Present		Reasonably Foreseeable Future		Positive		Negative	
	No Action	Current Grazing Mgemnt	No Action	Current Grazing Mgemnt	No Action	Current Grazing Mgemnt	No Action	Current Grazing Mgemnt	No Action	Current Grazing Mgemnt
Non-native fish stocking	X	X	X	X					X	X
WCT restoration projects						X	X	X		
Beetle related tree mortality			X	X	X	X	X	X		
Range Improvements			X	X	X	X	X	X		
Dispersed Recreation	X	X	X	X	X	X			X	X
Trails	X	X	X	X	X	X			X	X
Climatic Events	X	X			X	X			X	X

Table 8: Proposed Action and Alternative 4 Cumulative Effects by Allotment

Activity/ Event	Past		Present		Reasonably Foreseeable Future		Positive		Negative	
	Proposed Action	Alt. 4	Proposed Action	Alt.4	Proposed Action	Alt. 4	Proposed Action	Alt. 4	Proposed Action	Alt. 4
Mudd Creek Allotment										
Irrigation diversion	X	X	X	X	X	X			X	X
Noxious weed control	X	X	X	X	X	X	X	X		
Prescribed burning	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 8: Proposed Action and Alternative 4 Cumulative Effects by Allotment

Activity/ Event	Past		Present		Reasonably Foreseeable Future		Positive		Negative	
	Proposed Action	Alt. 4	Proposed Action	Alt.4	Proposed Action	Alt. 4	Proposed Action	Alt. 4	Proposed Action	Alt. 4
Sagebrush manipulation (burning, spraying)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wildland Fire Suppression	X	X	X	X	X	X			X	X
Water Impoundments	X	X	X	X			X	X	X	X
Non-native fish stocking	X	X	X	X	X	X			X	X
WCT restoration projects							X	X		
Beetle related tree mortality			X	X	X	X	X	X		
Range Improvements				X		X		X		
Dispersed Recreation	X	X	X	X	X	X			X	X
Trails	X	X	X	X	X	X			X	X
Climatic Events	X	X							X	X
Pintlar Creek Allotment										
Irrigation diversion	X	X			X	X			X	X
Noxious weed control	X	X	X	X	X	X	X	X		

Table 8: Proposed Action and Alternative 4 Cumulative Effects by Allotment

Activity/ Event	Past		Present		Reasonably Foreseeable Future		Positive		Negative	
	Proposed Action	Alt. 4	Proposed Action	Alt.4	Proposed Action	Alt. 4	Proposed Action	Alt. 4	Proposed Action	Alt. 4
Prescribed burning	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sagebrush manipulation (burning, spraying)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wildland Fire Suppression	X	X	X	X	X	X			X	X
Water Impoundments	X	X	X	X			X	X	X	X
Non-native fish stocking	X	X	X	X					X	X
WCT restoration projects					X	X	X	X		
Beetle related tree mortality			X	X	X	X	X	X		
Range Improvements			X	X	X	X	X	X		
Dispersed Recreation	X	X	X	X	X	X			X	X
Trails	X	X	X	X	X	X			X	X
Climatic Events	X	X			X	X			X	X

IRA's

Methodology

Spatial Scale

The Inventoried Roadless Area inventories were compiled in 2004 and updated in 2006. The maps were updated at the scale of 1:24000 and input into GIS. They exist as a single GIS data layer in the BDNF Corporate Database. The updates were completed in 2006 and were based on public comment and internal review (2009 Beaverhead Deerlodge National Forest Plan Corrected FEEIS Appendix C 6). By querying this data base it is found four Inventoried Roadless Areas are within the project area. The North and West Big Hole, Saginaw, and Anderson Mountain IRAs with their subsets overlap some portion of the project area. See Appendix A2 for maps of the IRA's. These maps also display the summer recreation allocation, allotment boundary with pasture divisions.

Temporal Scale

The temporal boundaries for the analysis include both short-term, and long-term grazing effects to the recreation resource. Short-term grazing effects to recreation are generally one year or less, and include annual effects to recreation through livestock grazing. Long-term effects of grazing on inventoried roadless areas occur over a period of time. For the purposes of this analysis, this period will be from two to 10 years. The rationale for using this time period is that ten years is typically the term of Forest Service Term Grazing Permits (Forest Service Handbook 2209.13), and approximately the term of Allotment Management Plans before they are reviewed for needed changes.

Resource Indicators to be Analyzed and Units of Measure

1. **Natural**. Determine whether the area's ecological systems are substantially free from the effects of modern civilization and generally appear to have been affected primarily by forces of nature. Consider such factors as:
    a. The presence of non-native species that alter the composition of natural plant and animal communities (such as non-native plants, animals, fish, livestock, invertebrates, and pathogens).
    b. Developments that degrade the free-flowing condition of rivers and streams (such as dams or other water diversions and impoundments).
    c. The presence of light pollution that degrades night sky quality and night sky quality related values.
    d. The presence of pollutants that degrade water quality; and
    e. The health of ecosystems, plant communities, and plant species that are rare or at risk.
2. **Undeveloped**. Determine the degree to which the area is without permanent improvements or human habitation. A measure of undeveloped is the level of human

occupation and modification of the area including evidence of structures, construction, habitations, or other forms of human presence, use, and occupation.

3. **Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation**. Determine an area's capability of providing solitude or primitive and unconfined types of recreation. This includes providing a wide range of experiential opportunities such as: physical and mental challenge, adventure and self-reliance, feelings of solitude, isolation, self-awareness, and inspiration.

   Solitude is the opportunity to experience isolation from sights, sounds, and the presence of others from the developments and evidence of humans. To determine opportunities for solitude, look at the size of the area, presence of screening, distance from impacts, and degree of permanent intrusions.

   The opportunity to experience isolation from the evidence of humans, to feel a part of nature, to have a vastness of scale, and a degree of challenge and risk while using outdoor skills are measures of primitive and unconfined recreation. Primitive-type recreation activities include hiking, backpacking, horseback riding, fishing, hunting, floating, kayaking, cross-country skiing, camping, and enjoying nature.

4. **Special Features and Values**. Determine the area's capability to provide other values such as those with ecologic, geologic, scientific, educational, scenic, historical, or cultural significance. Examples include unique fish and wildlife species, unique plants or plant communities, connectivity, potential or existing research natural areas, outstanding landscape features, and significant cultural resource sites. Identify and describe any such values and their contribution to Wilderness character.

5. **Manageability**. In determining capability, consider the ability to manage an area as Wilderness as required by the Wilderness Act. Section 2(c) of the Wilderness Act defines Wilderness as an area that ". . . (3) has at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unimpaired condition. . ..". The Forest Service's ability to manage an area as an enduring resource of Wilderness, untrammeled by humans, retaining its primeval character, and to protect and manage its natural character are all factors to consider. Consider such factors as size, shape, and juxtaposition to external influences.

   Evaluate how boundaries affect manageability of an area. In the most desirable situations:

   a. Boundary locations avoid conflict with existing or potential public uses outside the boundary that might result in demands to allow nonconforming structures and activities in the Wilderness.

   b. It is possible to readily and accurately describe, establish, and recognize boundaries on the ground.

   c. Boundaries, where possible, conform with terrain or other features that constitute a barrier to prohibited use.

   d. Boundaries provide adequate opportunity for access and traveler transfer facilities.

Analysis Methods and Assumptions

The purpose of this analysis is to disclose potential effects to Wilderness attributes in areas that qualify for such analysis and determine if, or to what extent proposed alternatives might affect future consideration for Wilderness recommendation. This analysis focuses on the potential effects of project activities on Wilderness characteristics as defined in the Forest Service Handbook (FSH) 1909.12 (72.1). Wilderness characteristics, as defined at FSH 1909.12 (72.1) and evaluated here.

Direct/Indirect Effects

For all the allotments, the no grazing alternative and alternative four will produce an improvement for the natural and undeveloped character for the allotment. For the other alternatives and characteristics none of the proposed activities will change the natural, undeveloped, outstanding opportunities, special features or manageability for the allotments and their pastures. See table 12, pgs.156-158, under Comparison of Alternatives for allotment specific details.

Cumulative Effects

Table 9 below lists the past, present and reasonably foreseeable future actions and natural events that are most likely to currently or in the future affect the allotments for the five wilderness attributes and a rating of their influence.

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Seymour						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	substantial		x
Climatic Events	x			moderate		x
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x
Fishtrap						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	moderate		x
Climatic Events	x			moderate		x
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x
Mudd Creek Allotment						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	substantial		x
Climatic Events	x			moderate		x
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x
Pintlar Creek Allotment						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	moderate		x
Climatic Events	x			moderate		x
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x
Mussigbrod Allotment						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	moderate		x
Climatic Events	x			moderate		x
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x
Ruby Creek Allotment						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	moderate		x
Climatic Events	x			moderate		x
Mining	x	x	x	substantial		x
Disease		x	x	substantial		x
Dry Creek Allotment						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	moderate		x
Climatic Events	x			moderate		x
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x
Twin Lakes Allotment						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	moderate		x
Climatic Events	x			moderate		x
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x
Monument Allotment						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Travel Management						
Roads and Trails	x	x	x	moderate		x
Climatic Events	x			moderate		x
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x
Pioneer Allotment						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	moderate		x
Climatic Events	x			moderate		x

Table 9: Summary of the cumulative Effects by Allotment

Activity/Event	Past	Present	Reasonably Foreseeable Future	Currently Measurable Effect	Positive	Negative
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x
Saginaw Allotment						
Livestock Grazing	x	x	x	minor		x
Irrigation diversion	x	x	x	minor - mod		x
Noxious weed control	x	x	x	minor - none	x	
Prescribed burning	x	x	x	minor - none	x	
Sagebrush manipulation (burning, spraying)	x			minor		x
Wildland Fire Suppression	x	x	x	minor		x
Timber Management –All Harvest Types	x	x	x	minor	x	x
Hazard Tree Removal – Developed sites and roadsides	x	x	x	minor		x
Pre-commercial thinning				no effect		
Public Firewood cutting				no effect		
Water Impoundments	x	x		minor	x	x
Non-native fish stocking	x	x	x	minor		x
WCT restoration projects				no effect	x	
Beetle related tree mortality		x	x	minor -none	x	
Range improvements		x	x	minor	x	
Dispersed Recreation	x	x	x	moderate		x
Travel Management						
Roads and Trails	x	x	x	moderate		x
Climatic Events	x			moderate		x
Mining	x	x	x	moderate		x
Disease		x	x	substantial		x

For the Seymour and Fishtrap allotments, the spread of disease through the ecosystem through introduction of noxious weeds and aquatic invasive species provides the most negative element for the cumulative effects and thus has the greatest potential to alter the natural, undeveloped, outstanding opportunities and special features Wilderness attributes. Without making changes to the motorized access for both the summer and winter use the manageability for the area will not be affected.

For Mudd Creek, Pintlar Creek, Mussigbrod, Dry Creek, Twin Lakes, Monument, and Saginaw allotments, the spread of disease through the ecosystem through introduction of noxious weeds and aquatic invasive species provides the most negative element for the cumulative effects to the Mussigbroad allotment and thus has the greatest potential to alter the natural, undeveloped, outstanding opportunities and special features Wilderness attributes. The motorized trails located within the inventoried roadless areas would be an area that would provide more improvement to the natural, undeveloped, outstanding opportunities, and special features attributes. Without making changes to the motorized access for both the summer and winter use the manageability for the area will not be affected.

For the Ruby Creek Allotment, the spread of disease through the ecosystem through introduction of noxious weeds and aquatic invasive species provides the most negative element for the cumulative effects to the Ruby allotment and thus has the greatest potential to alter the natural, undeveloped, outstanding opportunities and special features Wilderness attributes. The motorized trails located within the inventoried roadless areas would be an area that would provide more improvement to the natural, undeveloped, outstanding opportunities, and special features attributes. Without making changes to the motorized access for both the summer and winter use the manageability for the area will not be affected. Effects from the past mining activities within the Ruby allotment have impact to the natural and undeveloped wilderness elements and provide a substantial negative determination to these elements.

For the Pioneer Allotment, the spread of disease through the ecosystem through introduction of noxious weeds and aquatic invasive species provides the most negative element for the cumulative effects to the Pioneer allotment and thus has the greatest potential to alter the natural, undeveloped, outstanding opportunities and special features Wilderness attributes. The motorized trails located within the inventoried roadless areas would be an area that would provide more improvement to the natural, undeveloped, outstanding opportunities, and special features attributes. The higher opportunity to have native westslope cuttrought trout reintroduction in the Pioneer allotment will provide a positive outcome for the natural wilderness element. Without making changes to the motorized access for both the summer and winter use the manageability for the area will not be affected.

Comparison of Alternatives

Recreation

Based on the indicators and standards of effects to recreation resources there will be no direct or indirect effect past, present, or cumulatively for all alternatives in all allotments. This conclusion is based on the fact the grazing of cattle and the various actions presented in all alternatives will not change the use of an area for motorized or non-motorized recreational pursuits in both the summer and winter periods. As an example for the Seymour allotment in the Ten Mile, Seymour and Sullivan Pastures the recreation allocations of road-based, backcountry, and summer non-motorized, and winter non-motorized will remain constant and unchanged under all alternatives.

In addition to the recreation allocations none of the alternatives authorizes the use of cattle to graze in any developed recreation site. Thus all allotments and alternatives will be constant and have no direct or indirect effect past, present, or cumulatively for the grazing of cattle within a developed recreation site

Table 10: Comparison of Effects by Alternatives for all allotments

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Recommended Wilderness: Standard 1, Standard 10, Standard 13	Standards 1, 10 and 13 will remain, not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 1, 10 and 13 will remain, not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 1, 10 and 13 will remain, not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 1, 10 and 13 will remain, not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits

Comparison of Alternatives
***Recreation*, Wilderness, and IRA's**

Table 10: Comparison of Effects by Alternatives for all allotments

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Summer Non-Motorized: Standard 1, Standard 2, Standard 7	Standards 1, 2 and 7 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 1, 2 and 7 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 1, 2 and 7 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 1, 2 and 7 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits
Summer Motorized Backcountry: Standard 3, Standard 9.	Standards 3 and 9 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 3 and 9 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 3 and 9 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 3 and 9 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits

Comparison of Alternatives
***Recreation*, Wilderness, and IRA's**

Table 10: Comparison of Effects by Alternatives for all allotments

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Summer Roaded: Standard 3	Standard 3 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standard 3 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standard 3 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standard 3 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits
Winter Non-Motorized: Standard 2, Standard 8	Standards 2 and 8 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 2 and 8 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 2 and 8 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits	Standards 2 and 8 will not be effected by this alternative since nothing in the alternative changes the motorized opportunities for recreational pursuits

Table 10: Comparison of Effects by Alternatives for all allotments

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Winter Motorized	No Standard exists stating the dates for the Forest Service to manage Winter Motorized areas for any particular recreation opportunity type.	No Standard exists stating the dates for the Forest Service to manage Winter Motorized areas for any particular recreation opportunity type.	No Standard exists stating the dates for the Forest Service to manage Winter Motorized areas for any particular recreation opportunity type.	No Standard exists stating the dates for the Forest Service to manage Winter Motorized areas for any particular recreation opportunity type.

Wilderness

Table 11: Comparison of Effects by Alternative by Allotment to Changes in the Four Wilderness Characters

Alternative	Mudd Creek Allotment Changes to Wilderness Character			Pintlar Creek Allotment Changes to Wilderness Character		
	Positive Change	No Change	Negative Change	Positive Change	No Change	Negative Change
No Action	3	1		4		
Current Grazing Management		4			3	1
Proposed Action		4			3	1
Alternative 4		4		2	1	1

Based on the table above the No Action alternative will have the most positive effect on the wilderness character for both allotments. The Mudd Creek Allotment would not have any negative effects.The Pintlar Allotment under the Current Grazing Management and the Proposed Action would have the same amount of negative effects. Under Alternative 4 there would be a slightly more positive effect to the wilderness character.

IRA's

Table 12: Change in Wilderness Character by Alternative by Allotment

Alternative	Wilderness Characters				
	Natural	Undeveloped	Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation.	Special Features and Values	Manageability
Seymour Allotment					
No Action	+	+	0	0	0
Current Grazing Management	0	0	0	0	0
Proposed Action	0	0	0	0	0
Alternative 4	+	+	0	0	0
Fishtrap Allotment					
No Action	+	+	0	0	0

Table 12: Change in Wilderness Character by Alternative by Allotment

Alternative	Wilderness Characters				
	Natural	**Undeveloped**	**Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation**.	**Special Features and Values**	**Manageability**
Current Grazing Management	*0*	*0*	*0*	*0*	*0*
Proposed Action	*0*	*0*	*0*	*0*	*0*
Alternative 4	*+*	*+*	*0*	*0*	*0*
Mudd Creek Allotment					
No Action	*+*	*+*	*0*	*0*	*0*
Current Grazing Management	*0*	*0*	*0*	*0*	*0*
Proposed Action	*0*	*0*	*0*	*0*	*0*
Alternative 4	*+*	*+*	*0*	*0*	*0*
Pintlar Creek Allotment					
No Action	*+*	*+*	*0*	*0*	*0*
Current Grazing Management	*0*	*0*	*0*	*0*	*0*
Proposed Action	*0*	*0*	*0*	*0*	*0*
Alternative 4	*+*	*+*	*0*	*0*	*0*
Mussigbrod Allotment					
No Action	*+*	*+*	*0*	*0*	*0*
Current Grazing Management	*0*	*0*	*0*	*0*	*0*
Proposed Action	*0*	*0*	*0*	*0*	*0*
Alternative 4	*+*	*+*	*0*	*0*	*0*
Ruby Creek Allotment					
No Action	*+*	*+*	*0*	*0*	*0*
Current Grazing Management	*0*	*0*	*0*	*0*	*0*
Proposed Action	*0*	*0*	*0*	*0*	*0*
Alternative 4	*+*	*+*	*0*	*0*	*0*
Dry Creek Allotment					
No Action	*+*	*+*	*0*	*0*	*0*
Current Grazing Management	*0*	*0*	*0*	*0*	*0*
Proposed Action	*0*	*0*	*0*	*0*	*0*
Alternative 4	*+*	*+*	*0*	*0*	*0*

Table 12: Change in Wilderness Character by Alternative by Allotment

Alternative	Wilderness Characters				
	Natural	**Undeveloped**	**Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation**.	**Special Features and Values**	**Manageability**
Twin Lakes Allotment					
No Action	+	+	0	0	0
Current Grazing Management	0	0	0	0	0
Proposed Action	0	0	0	0	0
Alternative 4	+	+	0	0	0
Monument Allotment					
No Action	+	+	0	0	0
Current Grazing Management	0	0	0	0	0
Proposed Action	0	0	0	0	0
Alternative 4	+	+	0	0	0
Pioneer Allotment					
No Action	+	+	0	0	0
Current Grazing Management	0	0	0	0	0
Proposed Action	0	0	0	0	0
Alternative 4	+	+	0	0	0
Saginaw Allotment					
No Action	+	+	0	0	0
Current Grazing Management	0	0	0	0	0
Proposed Action	0	0	0	0	0
Alternative 4	+	+	0	0	0

The "+" symbol represents an improvement to the features analyzed and described previously in the units of measure section. A "0" is a neutral symbol to the evaluation of the feature analyzed. The "-"symbol represents a loss of the feature analyzed. Aquatics, hydrology, range, botany, social economic, wildlife, soils, scenery, and heritage reports assisted in the determination presented.

For all the allotments, the no grazing alternative and alternative four will produce an improvement for the natural and undeveloped character for the allotment. For the other alternatives and characteristics none of the proposed activities will change the natural, undeveloped, outstanding opportunities, special features or manageability for the allotments and their pastures.

Scenery

Existing Condition

Federal Law and Policy Direction

The National Environmental Policy Act (1969) (NEPA) sets forth a national policy for the environment that provides for the enhancement of environmental quality. The Act directs agencies to develop practicable methodologies for scenery management of "aesthetically and culturally pleasing surroundings." It also requires a "systematic and interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts into planning and decision-making which may have an impact on man's environment." This evaluation will consider the environmental impacts of the proposed action as well as several alternatives; therefore meeting the National Environmental Policy Act.

The National Forest Management Act (1976) (NFMA) directs that the preservation of aesthetic values be analyzed at all planning levels. Part 219.21 requires visual resources to be inventoried and evaluated as an integral part of evaluating alternatives in the forest planning process, addressing both the landscape's visual attractiveness and the public's visual expectation. By implementing and following the direction in the Forest Plan for scenic resources, the project will be in compliance with this Act for scenic resources.

NEPA and NFMA direction is formalized in Forest Service policy regarding scenic resources. Forest Service Manual (FSM) section 2380.3 requires the agency to "inventory, evaluate, manage, and where necessary, restore scenery as a fully integrated part of the ecosystems of the National Forest System lands through the land and resource management and planning process. Scenery must be treated equally with other resources." Further, FSM section 2380.31 requires the use of the basic concepts, elements, principles, and variables defined in Agriculture Handbook #701, *Landscape Aesthetics: A Handbook for Scenery Management* (USDA 1995). More detailed information regarding this direction follows.

The National Forest Scenery Management System (SMS) is the process used for planning and design of the visual elements of multiple use land management. This system was implemented in 1996, superseding the Visual Management System described in Agriculture Handbook Number 462.

The SMS identifies several components which are used together to define the value of scenery. These include: Landscape Character, Scenic Attractiveness, Visibility, and Scenic Integrity. These are described in more detail in the following paragraphs.

Landscape Character is defined as "an overall visual and cultural impression of landscape attributes – the physical appearance and cultural context of a landscape that gives it an identity and 'sense of place'" (USDA 1995, p. 1-2).

Scenic Attractiveness is the "primary indicator of the intrinsic scenic beauty of a landscape and of the positive responses it evokes in people. It helps determine landscapes that are important for scenic beauty, based on commonly held perceptions of the beauty of landform, vegetation pattern, composition, surface water characteristics, and land use patterns and cultural features" (USDA 1995, p. 1-14).

Scenic Attractiveness is measured as Class A (Distinctive), B (Typical), or C (Indistinctive). Class A includes areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide unusual, unique, or outstanding scenic quality *within the landscape character*. Class B (Typical) contains areas in which the natural and cultural features combine to create ordinary or common scenic quality, and Class C (Indistinctive) contains those areas where natural and cultural features (or the lack thereof) combine to provide low scenic quality. The frame of reference for scenic attractiveness is the landscape character description above (USDA 1995, p. 1-16).

Landscape Visibility categorizes the importance of scenic resources to Forest visitors by assigning *Concern Levels* to various routes and sites across the forest. Concern Level 1 routes and sites are those that are nationally or regionally important locations associated with recreation and tourism use, where there is a high interest in scenic resources (USDA 1995). The Forest Plan identifies specific Concern Level 1 and 2 routes and sites for the forest. These are identified in Appendix A of the Forest Plan.

Concern Level 2 routes and sites are those that are locally important and are associated with recreation, and where there is a high to moderate interest in scenic resources. These are also identified in Appendix A of the Forest Plan. All routes and sites would be considered Concern Level 3, which receive low use and where users have a moderate to low interest in scenic resources.

Viewing distance is also a component of visibility. Foreground (FG) viewing distance is 0 to ½ mile from the observer. Middleground (MG) viewing distance is considered to be ½ mile to 4 miles from the observer, and Background (BG) viewing distance is 4 miles and farther from the observer.

Landscape Character, Scenic Attractiveness, and Landscape Visibility are utilized to describe the landscape potential and establish a baseline from which to measure scenic integrity.

Scenic Integrity is the key descriptor for existing and desired conditions, defined as "a measure of the degree to which a landscape is visually perceived to be 'complete'. Scenic Integrity Levels describe the existing condition of the scenic resource. Scenic integrity can describe an historic state, an existing state, or a short- or long-term goal. Scenic Integrity Objectives (SIOs) describe the objectives for management, or the desired future conditions. The highest Scenic Integrity ratings are given to those landscapes that have little or no deviation from the character valued by constituents for its aesthetic appeal (USDA, 1995).

Utilization of the SMS meets the requirements set forth in the FSM and FSH.

Forest Plan Direction

The Beaverhead-Deerlodge National Forest Land and Resource Management Plan (Forest Plan) establishes goals, objectives and standards that describe the desired condition for scenic resources (FP 2009, p. 33).

The project area is located within portions of the following management areas (MA): Fishtrap-Mount Haggin, Anaconda-Pintler Wilderness, Anaconda-Pintler Recommended Wilderness Area, Pintler Face, Tie-Johnson, Anderson Mountain, Ruby, West Big Hole, West Big Hole Flats, and Selway-Saginaw.

The goal for scenic resources is to reflect ecosystem diversity, enhance recreation settings, and contribute to the quality of life of local residents and communities. The objectives for scenic resources include mapping forestwide SIOs within one year of adoption of the plan, and identifying and rehabilitating areas that do not meet SIOs.

Standard 2 identifies a minimum SIO of *Moderate* for non-motorized and summer backcountry allocations. Based on MA maps, this *Moderate* SIO is applicable to portions of Fishtrap, Mudd Creek, Pintler Creek, Mussigbrod, Ruby Creek, Dry Creek, Twin Lakes, Monument, Pioneer, and Saginaw allotments. As stated in Standard 2, the SIO may be higher, depending on whether the effects of the project are visible from pertinent Concern Level 1 and 2 viewing platforms identified in the Landscape Visibility section above (see Scenic Integrity Level Matrix below).

Standard 3 for scenic resources pertains to projects in foreground areas of scenic byways, national scenic trails or wild and scenic rivers, and identifies an SIO of at least High for this viewing distance (FP, p. 33). This will apply to those areas visible from the Continental Divide National Scenic Trail (CDNST).

Table 1: Scenery Integrity Level Matrix

Scenic Attractiveness	*Landscape Visibility*				
	Middle or Foreground of Concern Level 1	*Background of Concern Level 1*	*Middle or Foreground of Concern Level 2*	*Background of Concern Level 2*	*All Other Areas*
A - Distinctive	*High*	*High*	*Moderate*	*Moderate*	*Low SIO, or determine a higher SIO if it supports summer ROS*
B - Typical	*High*	*Moderate*	*Moderate*	*Low*	
C -Indistinctive	*Moderate*	*Moderate*	*Moderate*	*Low*	

In summary, effects of project activities in MAs that have a minimum SIO of Very High or High will need to meet this SIO from any viewing platform. Other minimum SIOs will need to be met from the surrounding area and identified CL 1 and 2 viewing platforms, unless, based on viewing distance, the SIO is higher (see paragraphs immediately below).

Considering this direction, portions of the project visible from any of the CL 1 viewing platforms identified in the Landscape Visibility section below (State Highway 278, State

Highway 43, Continental Divide National Scenic Trail, Lewis and Clark National Historic Trail, Nez Perce National Historic Trail, Deerlodge County Highway 274, Big Hole River, Forest Trail 103 [May Creek National Recreation Trail], Seymour Lake Campground, Pintler Campground, Mussigbrod Campground, North Van Houten Campground, South Van Houten Campground, Big Hole National Battlefield, May Creek Campground, Twin Lakes Campground, Miner Lake Campground, and all towns along Highways 43 and 278) must meet an SIO of *High* in the fore- and middleground viewing distances, and *Moderate* in background viewing distances.

Additionally, portions of the project visible from any of the CL 2 viewing platforms identified in the Landscape Visibility section below (FR 185, FR 573.2, Beaverhead Co. Lower North Fork Road, FR 943 and county connecting roads, FR 624, FR 944 and 945, Foothills Road, Chief Joseph Ski Trail System, FR 183 and 183A and connecting Beaverhead Co. road, and FR 182, [Miner Lake road and connecting Beaverhead Co. road]) must meet an SIO of *Moderate* in the fore- and middleground viewing distances, and *Moderate* or *Low* in the background viewing distance (depending on MA or recreation allocation direction). (See Figure 1 below for the map of Concern Level 1 and 2 and Table 3 for the extent of the concerns for this project.

Note: In Table 2 below, FG = Foreground viewing distance; MG = Middleground viewing distance; BG = Background viewing distance

Table 2: Scenic Integrity Objective by Allotment

Allotment	**Scenic Integrity Objective**
Seymour	Fishtrap-Mount Haggin MA: Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG* Scenic Attractiveness Class C: From CL 1 viewing platforms – *Moderate in FG/MG/BG* Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Fishtrap	Fishtrap-Mount Haggin MA: Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG* Scenic Attractiveness Class C: From CL 1 viewing platforms – *Moderate in FG/MG/BG* Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Mudd Creek	Within Anaconda-Pintler Wilderness MA: *Very High* Fishtrap – Mount Haggin MA: Scenic Attractiveness Class B – From CL 1 viewing platforms: *High in FG/MG, Moderate in BG* Scenic Attractiveness Class C – From CL 1 viewing platforms: *Moderate in FG/MG/BG*

Table 2: Scenic Integrity Objective by Allotment

Allotment	**Scenic Integrity Objective**
	Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Pintlar Creek	Within Anaconda-Pintler Wilderness MA: *Very High* Fishtrap-Mount Haggin and Pintler Face MAs: Scenic Attractiveness Class A – From CL 1 viewing platforms: *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Moderate in BG* Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Scenic Attractiveness Class C: From CL 1 viewing platforms – *Moderate in FG/MG/BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Mussigbrod	Within Anaconda-Pintler Wilderness MA: *Very High* Pintler Face and Tie-Johnson MAs: Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Ruby Creek	Within Anderson Mountain and West Big Hole MAs: *High* Ruby MA: Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Scenic Attractiveness Class C: From CL 1 viewing platforms – *Moderate in FG/MG/BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Dry Creek	Within West Big Hole MA: *High* West Big Hole Flats MA: Scenic Attractiveness Class A – From CL 1 viewing platforms: *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Moderate in BG* Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Scenic Attractiveness Class C: From CL 1 viewing platforms – *Moderate in FG/MG/BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG*

Table 2: Scenic Integrity Objective by Allotment

Allotment	**Scenic Integrity Objective**
	Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Twin Lakes	Within West Big Hole MA: *High* West Big Hole Flats MA: Scenic Attractiveness Class A – From CL 1 viewing platforms: *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Moderate in BG* Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Scenic Attractiveness Class C: From CL 1 viewing platforms – *Moderate in FG/MG/BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Monument	Within West Big Hole MA: *High* West Big Hole Flats MA: Scenic Attractiveness Class A – From CL 1 viewing platforms: *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Moderate in BG* Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Scenic Attractiveness Class C: From CL 1 viewing platforms – *Moderate in FG/MG/BG;* From CL 2 viewing platforms – *Moderate in FG/MG, Low in BG* Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Pioneer	Within West Big Hole MA: *High* West Big Hole Flats MA: Scenic Attractiveness Class A – From CL 1 viewing platforms: *High in FG/MG, Moderate in BG* Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG* Scenic Attractiveness Class C: From CL 1 viewing platforms – *Moderate in FG/MG/BG* Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*
Saginaw	West Big Hole Flats and Selway-Saginaw MAs: Scenic Attractiveness Class A – From CL 1 viewing platforms: *High in FG/MG, Moderate in BG* Scenic Attractiveness Class B: From CL 1 viewing platforms – *High in FG/MG, Moderate in BG* Scenic Attractiveness Class C: From CL 1 viewing platforms –

Table 2: Scenic Integrity Objective by Allotment	
Allotment	**Scenic Integrity Objective**
	Moderate in FG/MG/BG Within Summer Nonmotorized and Backcountry Allocations: *Moderate* All other areas: *Low*

Figure 1: Concern Level 1 and 2 Routes and Sites

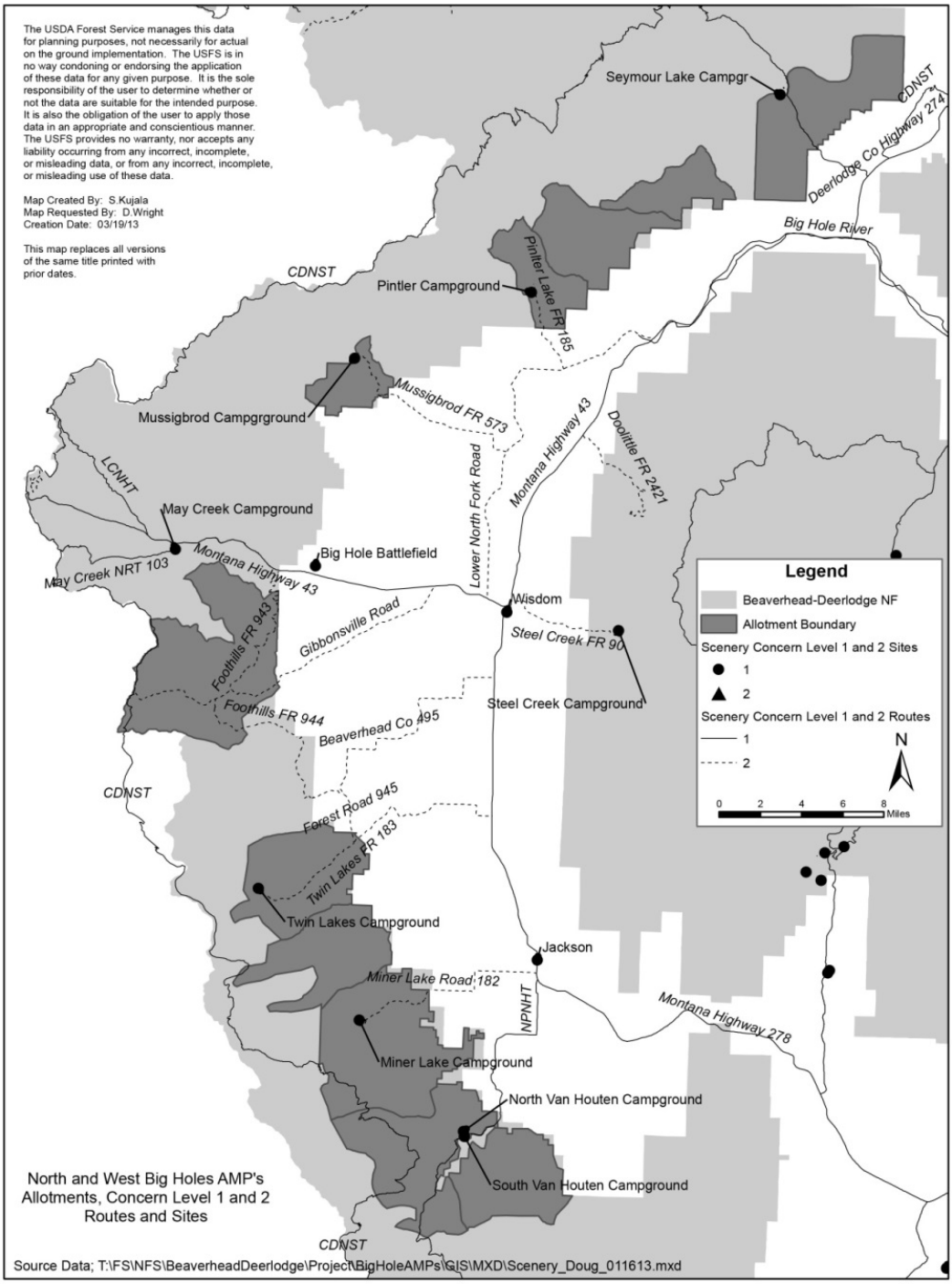


Table 3 Concern Level 1 and 2 routes and sites by landscape

Big Hole Landscape		
	Route or Site	**Extent of Concern**
Concern Level 1	State Highway 278	Dillon to Wisdom, including Jackson
	State Highway 43	Interstate 15 to Chief Joseph Pass
	Continental Divide National Scenic Trail	I-15 Divide Junction to Goldstone Pass
	Deerlodge County Highway 274	Highway 43 to Highway 1
	Big Hole River	Highway 43 bridge (T1N, R14W, Sec. 26) to Wise River
	Lewis and Clark National Historic Trail	Gibbons Pass to Badger Pass
	Nez Perce National Historic Trail	Gibbons Pass to Bannock Pass
	Forest Trail 103, May Creek National Recreation Trail	Highway 43 to the Continental Divide
	Seymour Lake Campground	
	Pintler Campground	
	Mussigbrod Campground	
	North Van Houten Campground	
	South Van Houten Campground	
	Big Hole National Battlefield	
	May Creek Campground	
	Twin Lakes Campground	
	Miner Lake Campground	
	All towns along Highways 43 and 278	
Concern Level 2	**Route or Site**	**Extent of Concern**
	FR 185	Highway 43 to Pintler Campground
	FR 573.2	North Fork Road to Mussigbrod Campground
	Beaverhead Co. Lower North Fork Road	Entire length north of Highway 43
	FR 943 and county connecting roads	Highway 43 to FR 624
	FR 624	Highway 43 to Big Hole Pass
	FR 944 and 945, Foothills Road	Highway 278 to Forest Road 624
	Chief Joseph Ski Trail System	All trails, Gordon Reese Cabin, and parking
	FR 183 and 183A, and connecting Beaverhead Co. road	Highway 278 to Twin Lakes Campground
	FR 182, Miner Lake road and connecting Beaverhead Co. road	Highway 278 to Miner Lake Trailhead

Table 4: Scenic Integrity Objective Definitions

Scenic Integrity Objective (SMS descriptor)	Definition
Very High (Unaltered)	Generally provides for ecological change only.
High (Appears Unaltered)	Human activities are not visually evident. Activities may only repeat attributes of form, line, color, and texture found in the existing attributes, qualities or traits of a landscape that give it an image and make it identifiable or unique.
Moderate (Slightly Altered)	Human activities must remain visually subordinate to the attributes of the existing landscape character. They may repeat form, line, color or texture common to these characters but changes in quality, size, number, intensity, etc. must remain visually subordinate to the attributes, qualities, or traits of a landscape that give it an image and make it identifiable or unique.
Low (Moderately Altered)	Human activities of vegetative and landform alterations may dominate the original, natural landscape character but should appear as natural occurrences when viewed at background distances.

BLM Dillon Field Office Resource Management Plan Direction

The Dillon Resource Management Plan (Dillon RMP), approved February 2006, establishes direction for management of visual resources on lands administered by the USDI Bureau of Land Management, Dillon Field Office.

BLM lands managed by the Dillon Field Office which are co-managed for grazing purposes with the Beaverhead-Deerlodge National Forest associated with the project area are designated as Visual Resource Management Class 3.

> *"The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes caused by management activities may be evident but should not detract from the existing landscape" (Dillon RMP, p. 65)*

BLM Butte Field Office Resource Management Plan Direction

The Butte Resource Management Plan (Butte RMP), approved April 2009, establishes direction for management of visual resources on lands administered by the USDI Bureau of Land Management, Butte Field Office.

BLM lands managed by the Butte Field Office which are co-managed for grazing purposes with the Beaverhead-Deerlodge National Forest associated with the project area are designated as Visual Resource Management Class 3.

> *"The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes caused by management activities may be evident but should not detract from the existing landscape" (Butte RMP, p. 65)*

Direction for Lands Administered by State of Montana Fish, Wildlife, and Parks (MTFWP)

Direction for lands administered by the State of Montana Fish, Wildlife, and Parks (MTFWP) consists of the Mount Haggin Interim Management Plan, completed in 1980. This plan contains no specific direction regarding visual quality or scenic resources, but does address recreation use, and recognizes that the area "offer(s) [opportunities for] people who are interested in all types of outdoor recreation activities in a high quality natural environment" (p. 1). Scenery contributes to the quality of the natural environment

Below the existing condition of each allotment will be described in terms of the following factors: Landscape Character, Scenic Attractiveness, Visibility, and Existing Scenic Integrity. See the *Regulatory Framework* section above for more information on these factors.

Seymour

A. Landscape Character

This allotment (including BLM, and MTFWP managed lands) and the surrounding area are characterized by broad valley bottom which rises as it approaches the forest boundary and evenly-textured tree cover, broken in many locations by natural parks and openings created by past timber harvest. Rising above treeline, dramatic rock form and steep topography dominate the head of many of the drainages. As alluded to above, the lower elevations of these mountains are marked with evidence of long-standing cultural and historic uses, including hunting and gathering activities, and later timber harvest and mining activities. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to Deep Creek and eventually to the Big Hole River east toward Wise River.

Remnants of past uses are still visible, primarily in the form of old ranch buildings and residences.
This allotment and the surrounding area is currently being used for livestock grazing, and is developed with improvements necessary to allow for this use: fencing (including allotment and pasture boundaries, exclosures, etc.), water developments (troughs, ponds, etc.), pipelines, and transportation system, including roads. These allotments include private, BLM, and state lands, as well as National Forest System lands.

Adjacent private lands, in addition to some of the improvements described above, are developed with residences, multiple outbuildings, and ranching and farming improvements such as corrals and fencing.

Together, private land uses and the allotments and the associated improvements public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness
Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists of areas of Class B (Typical) scenic attractiveness and Class C (Indistinctive).

C. Landscape Visibility
This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST) and the Deerlodge County Highway 274, as well as from the surrounding area.

D. Existing Scenic Integrity
Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered, or in some cases, moderately altered. The existing scenic integrity ranges from High to Low, depending on viewing distance. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are visible, but generally remain subordinate to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

Fishtrap

A. Landscape Character
This allotment and the surrounding area are characterized by rounded foothills adjacent to the steeper Anaconda Range. The edges of the allotment are open parks, and several parks are found throughout the allotment and in the surrounding area. These give way to evenly-

textured tree cover, broken in many locations by past timber harvest. Rising above treeline, dramatic rock form and steep topography dominate the head of many of the drainages. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to the Big Hole River east toward Wise River.

Remnants of past uses are still visible, primarily in the form of old ranch buildings and residences.

Adjacent private lands, in addition to some of the improvements described above, are developed with residences, multiple outbuildings, and ranching and farming improvements such as corrals and fencing.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness

Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists of areas of Class B (Typical) scenic attractiveness and Class C (Indistinctive).

C. Landscape Visibility

This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST), Montana Highway 43, and Big Hole River (all CL 1 viewing platforms), as well as from the surrounding area.

D. Existing Scenic Integrity

Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified viewing platforms and the surrounding area, the scenic integrity is natural-appearing with effects of past activities visible, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered, or in some cases, moderately altered. The existing scenic integrity ranges from High to Low, depending on viewing distance. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are visible, but generally remain subordinate to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

Mudd Creek

A. Landscape Character

This allotment and the surrounding area are characterized by rounded foothills adjacent to the steeper Pintler Mountains. The edges of the allotment are open parks, and several parks are found throughout the allotment and in the surrounding area. These give way to evenly-textured tree cover, broken in many locations by past timber harvest. Rising above treeline, dramatic rock form and steep topography dominate the head of many of the drainages. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to the Big Hole River east toward Wise River.

Remnants of past uses are still visible, primarily in the form of old ranch buildings and residences.

Adjacent private lands, in addition to some of the improvements described above, are developed with residences, multiple outbuildings, and ranching and farming improvements such as corrals and fencing.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness

Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists of areas of Class B (Typical) scenic attractiveness and Class C (Indistinctive).

C. Landscape Visibility

This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST), Montana Highway 43, and Big Hole River (all CL 1 viewing platforms), as well as from the surrounding area.

D. Existing Scenic Integrity

Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered, or in some cases, moderately altered. The existing scenic integrity ranges from High to Low, depending on viewing distance. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are visible, but generally remain subordinate to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

Pintlar Creek

A. Landscape Character

This allotment and the surrounding area are characterized by rounded foothills adjacent to the steeper Anaconda Range. The edges of the allotment are open parks, and several parks are found throughout the allotment and in the surrounding area. These give way to evenly-textured tree cover, broken in many locations by past timber harvest. Rising above treeline, dramatic rock form and steep topography dominate the head of many of the drainages. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to the Big Hole River east toward Wise River.

Remnants of past uses are still visible, primarily in the form of old ranch buildings and residences.

Adjacent private lands, in addition to some of the improvements described above, are developed with residences, multiple outbuildings, and ranching and farming improvements such as corrals and fencing.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness

Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists of Class B (Typical) with some areas of Class A (Distinctive) and Class C (Indistinctive) scenic attractiveness.

C. Landscape Visibility

This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST), Montana Highway 43, Big Hole River, and Pintler Campground (all CL 1 viewing platforms). The allotment and the surrounding area are also visible from Forest Road 185 and Lower North Fork Road, CL 2 viewing platforms, as well as from the surrounding area.

D. Existing Scenic Integrity

Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered, or in some cases, moderately altered. The existing scenic integrity ranges from High to Low, depending on viewing distance. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are visible, but generally remain subordinate

to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening. Within the Anaconda-Pintler Wilderness Area, the scenic integrity is higher, due to fewer deviations from the desired landscape character.

Mussigbrod

A. Landscape Character

This allotment (including BLM managed lands) and the surrounding area are characterized by rounded foothills adjacent to the steeper Anaconda Range. The edges of the allotment are open parks, and several parks are found throughout the allotment and in the surrounding area. These give way to evenly-textured tree cover, broken in some locations by past timber harvest. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to the Big Hole River east toward Wise River.

Remnants of past uses are still visible, primarily in the form of old ranch buildings and residences. Fire has also played a role in the recent past – this was the location of several fires, including the Mussigbrod fire, in the early 2000s.

Adjacent private lands, in addition to some of the improvements described above, are developed with residences, multiple outbuildings, and ranching and farming improvements such as corrals and fencing.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness

Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists of Class B (Typical) scenic attractiveness.

C. Landscape Visibility

This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST), Montana Highway 43, Big Hole River, and Mussigbrod Campground (all CL 1 viewing platforms). The allotment and surrounding area is also visible from FR 573 and Lower North Fork Road, CL 2 viewing platforms, as well as from the surrounding area.

D. Existing Scenic Integrity

Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are regenerating to the degree that they are less obvious in the landscape. In

foreground views, effects of past activities are more obvious but appear only slightly altered, or in some cases, moderately altered. The existing scenic integrity ranges from High to Low, depending on viewing distance. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are visible, but generally remain subordinate to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

The effects of large scale fire in the recent past have affected the scenic integrity, with the burned areas of standing dead contrasting with the finely textured forested areas and open parks. This contrast is especially evident in the foreground and middleground viewing distances.

Ruby Creek

A. Landscape Character

This allotment and the surrounding area are characterized by gentle hilly topography and broad creek bottoms reaching from the edge of the Big Hole valley to the Continental Divide. Vegetation consists of finely textured forest cover rising above the Big Hole drainage and the pastoral river bottom, to more riparian vegetation types reaching up individual drainages. Some large parks exist outside of these drainages. The lower elevations of these mountains are marked with evidence of long-standing cultural and historic uses, including hunting and gathering activities, and later timber harvest and mining activities. Roads have been constructed in this area. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to the Big Hole River.

Remnants of past uses are still visible, primarily in the form of old ranch buildings and residences.

This allotment and the surrounding area is currently being used for livestock grazing, and is developed with improvements necessary to allow for this use: fencing (including allotment and pasture boundaries, exclosures, etc.), water developments (troughs, ponds, etc.), pipelines, and transportation system, including roads.

Adjacent private lands, in addition to some of the improvements described above, are developed with residences, multiple outbuildings, and ranching and farming improvements such as corrals and fencing.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness

Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists of areas of Class B (Typical) scenic attractiveness and very limited areas of Class C (Indistinctive).

C. Landscape Visibility

This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST), Montana Highway 43, Lewis and Clark National Historic Trail (LCNHT), May Creek National Recreation Trail (106), Town of Wisdom, Montana Highway 278, May Creek Campground, and Big Hole Battlefield (all CL 1 viewing platforms). Concern Level 2 viewing platforms include Chief Joseph Cross-country ski trails, Beaverhead County Road 495, and Forest Roads 524, 943, 944, and 945. The allotment and surrounding area are visible as well as from the surrounding area.

D. Existing Scenic Integrity

Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified CL 1 and 2 viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered, or in some cases, moderately altered. The existing scenic integrity ranges from High to Low, depending on viewing distance. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are visible, but generally remain subordinate to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

Dry Creek

A. Landscape Character

This allotment (including BLM managed lands) and the surrounding area are characterized by gentle hilly topography and broad creek bottoms reaching from the edge of the Big Hole valley to the Continental Divide. Vegetation consists of finely textured forest cover rising above the Big Hole drainage and the pastoral river bottom, to more riparian vegetation types reaching up individual drainages. Rising above treeline, dramatic rock form and steep topography dominate the head of many of the drainages. The lower elevations of these mountains are marked with evidence of long-standing cultural and historic uses, including hunting and gathering activities, and later timber harvest and mining activities. Roads have been constructed in this area. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to the Big Hole River.

Remnants of past uses are still visible, primarily in the form of old ranch buildings and residences.

This allotment and the surrounding area is currently being used for livestock grazing, and is developed with improvements necessary to allow for this use: fencing (including allotment and pasture boundaries, exclosures, etc.), water developments (troughs, ponds, etc.), pipelines, and transportation system, including roads.

Adjacent private lands, in addition to some of the improvements described above, are developed with residences, multiple outbuildings, and ranching and farming improvements such as corrals and fencing.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness
Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists primarily of Class B (Typical) scenic attractiveness, with some Class A (Distinctive) and Class C (Indistinctive).

C. Landscape Visibility
This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST), Montana Highway 278, Twin Lakes Campground, Town of Jackson, Nez Perce National Historic Trail (NPNHT) (all CL 1 viewing platforms). The allotment and the surrounding area are also visible from CL 2 viewing platforms Forest Road 183, 944, 945, and Beaverhead County Road 495. It is also visible from the surrounding area.

D. Existing Scenic Integrity
Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified CL 1 and 2 viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered, or in some cases, moderately altered. The existing scenic integrity ranges from High to Low, depending on viewing distance. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are visible, but generally remain subordinate to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

Twin Lakes

A. Landscape Character
This allotment and the surrounding area are characterized by gentle hilly topography and broad creek bottoms reaching from the edge of the Big Hole valley to the Continental Divide. Vegetation consists of finely textured forest cover rising above the Big Hole drainage and the pastoral river bottom, to more riparian vegetation types reaching up individual drainages. Rising above treeline, dramatic rock form and steep topography dominate the head of many of the drainages. Lower elevations are marked with evidence of long-standing cultural and historic uses, including hunting and gathering activities, and later timber harvest and mining activities. Roads have been constructed in this area. Forest cover is dominated by lodgepole

pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to the Big Hole River.

This allotment and the surrounding area is currently being used for livestock grazing, and is developed with improvements necessary to allow for this use: fencing (including allotment and pasture boundaries, exclosures, etc.), water developments (troughs, ponds, etc.), pipelines, and transportation system, including roads.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness
Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists primarily of both Class A (Distinctive) and Class B (Typical) scenic attractiveness, with some limited Class C (Indistinctive).

C. Landscape Visibility
This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST) and Montana Highway 278 (both CL 1 viewing platforms), FR 182, 183, and 945 (CL 2 platforms), as well as from the surrounding area.

D. Existing Scenic Integrity
Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered, or in some cases, moderately altered. The existing scenic integrity ranges from High to Low, depending on viewing distance. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are visible, but generally remain subordinate to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

Monument

A. Landscape Character
This allotment and the surrounding area are characterized by gentle hilly topography and broad creek bottoms reaching from the edge of the Big Hole valley to the Continental Divide. Vegetation consists of finely textured forest cover rising above the Big Hole drainage and the pastoral river bottom, to more riparian vegetation types reaching up individual drainages. Rising above treeline, dramatic rock form and steep topography dominate the head of many of the drainages. The lower elevations of these mountains are marked with evidence of long-

standing cultural and historic uses, including hunting and gathering activities, and later timber harvest and mining activities. Roads have been constructed in this area. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to the Big Hole River.

Remnants of past uses are still visible primarily in the form of old ranch buildings and residences.

This allotment and the surrounding area is currently being used for livestock grazing, and is developed with improvements necessary to allow for this use: fencing (including allotment and pasture boundaries, exclosures, etc.), water developments (troughs, ponds, etc.), pipelines, and transportation system, including roads.

Adjacent private lands, in addition to some of the improvements described above, are developed with residences, multiple outbuildings, and ranching and farming improvements such as corrals and fencing.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness

Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists primarily of Class B (Typical) scenic attractiveness, with some Class A (Distinctive) and Class C (Indistinctive).

C. Landscape Visibility

This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST), Nez Perce National Historic Trail (NPNHT), Miner Lake Campground, Montana Highway 278, Town of Jackson (all CL 1 viewing platforms), Forest Road 182 (CL 2 platform), as well as from the surrounding area.

D. Existing Scenic Integrity

Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible to a limited degree, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are limited, and are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered. The existing scenic integrity ranges from High to Low, depending on viewing distance and degree of deviation. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are somewhat visible, and where visible are generally subordinate to the landscape character. In middle- and

background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

Pioneer

A. Landscape Character

This allotment and the surrounding area are characterized by gentle hilly topography and broad creek bottoms reaching from the edge of the Big Hole valley to the Continental Divide. Vegetation consists of finely textured forest cover rising above the Big Hole drainage and the pastoral river bottom, to more riparian vegetation types reaching up individual drainages. Rising above treeline, dramatic rock form and steep topography dominate the head of many of the drainages. The lower elevations of these mountains are marked with evidence of long-standing cultural and historic uses, including hunting and gathering activities, and later timber harvest and mining activities. Roads have been constructed in this area. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms. Multiple drainages drop from the mountains to the Big Hole River.

Remnants of past uses are still visible, primarily in the form of old ranch buildings and residences.

This allotment and the surrounding area is currently being used for livestock grazing, and is developed with improvements necessary to allow for this use: fencing (including allotment and pasture boundaries, exclosures, etc.), water developments (troughs, ponds, etc.), pipelines, and transportation system, including roads.

Adjacent private lands, in addition to some of the improvements described above, are developed with residences, multiple outbuildings, and ranching and farming improvements such as corrals and fencing.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness

Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists primarily of Class B (Typical) scenic attractiveness, with some Class A (Distinctive) and Class C (Indistinctive).

C. Landscape Visibility

This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST), Nez Perce National Historic Trail (NPNHT), North Van Houten Campground, South Van Houten Campground, Town of Jackson, and Montana Highway 278 (all CL 1 viewing platforms), as well as from the surrounding area.

D. Existing Scenic Integrity

Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible to a limited degree, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are limited, and are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered. The existing scenic integrity ranges from High to Low, depending on viewing distance and degree of deviation. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are somewhat visible, and where visible are generally subordinate to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

Saginaw

A. Landscape Character

This allotment and the surrounding area are characterized by gentle hilly topography and broad creek bottoms reaching from the edge of the Big Hole valley to the Continental Divide. Vegetation consists of finely textured forest cover rising above the Big Hole drainage and the pastoral river bottom, to more riparian vegetation types reaching up individual drainages. This area is marked with evidence of long-standing cultural and historic uses, including hunting and gathering activities, and later timber harvest and mining activities. Roads have been constructed in this area and timber removed in the recent past. Forest cover is dominated by lodgepole pine and Douglas fir, with Englemann spruce and other riparian vegetation in the draws and creek bottoms.

This allotment and the surrounding area is currently being used for livestock grazing, and is developed with improvements necessary to allow for this use: fencing (including allotment and pasture boundaries, exclosures, etc.), water developments (troughs, ponds, etc.), pipelines, and transportation system, including roads.

Together, private land uses and the allotments and the associated improvements on public lands represent a centuries-long cultural use which contributes to the area's sense of place and position in history.

B. Scenic Attractiveness

Upon review of the Scenic Attractiveness mapping completed as part of the revision of the Forest Plan, this allotment and the surrounding area consists of areas of Class B (Typical) scenic attractiveness.

C. Landscape Visibility

This allotment and the surrounding area are visible from the Continental Divide National Scenic Trail (CDNST), Nez Perce National Historic Trail (NPNHT), North Van Houten

Campground, South Van Houten Campground, Town of Jackson, and Montana Highway 278 (all CL 1 viewing platforms), as well as from the surrounding area.

D. Existing Scenic Integrity

Depending on visibility and viewing distance, the "degree of intactness and wholeness of the landscape character" varies. From the identified viewing platforms and the surrounding area, the scenic integrity is natural appearing with effects of past activities visible, such as road construction, timber harvest, and ranching. Roads have either become an accepted feature in the landscape or becoming obscured (grown-in) over time with little to no use. Past timber harvests are regenerating to the degree that they are less obvious in the landscape. In foreground views, effects of past activities are more obvious but appear only slightly altered, or in some cases, moderately altered. The existing scenic integrity ranges from High to Low, depending on viewing distance. In general, from the surrounding area and in foreground views, the effects of past and on-going activities are visible, but generally remain subordinate to the landscape character. In middle- and background views, effects of management activities are often reduced by distance and vegetation and topographic screening.

Analysis

Methodology

Spatial Scale

The spatial analysis area for direct and indirect effects for scenic resources is the individual allotment boundaries as identified on the project maps. This scale was chosen since effects from the proposed action on scenic resources would only be occurring within the allotment boundaries. The cumulative effects analysis area is considered to be all areas visible from the surrounding area (including the Concern Level 1 and 2 viewing platforms) identified in the Appendix A of the Forest Plan. This boundary was selected because effects of past, present, and reasonably foreseeable future activities can often be viewed simultaneously or sequentially with the anticipated effects of the various alternatives of the proposed project.

Temporal Scale

The temporal boundaries for the analysis include both short-term and long-term effects of grazing operations to scenic resources. Short-term effects of grazing operations to scenic resources are generally one year or less.

Long-term effects of grazing operations on scenic resources may occur when there is repeated annual removal of vegetative growth over a period of time. Other effects to scenic resources may include the construction or installation of infrastructure such as water tanks, pipelines, fences, and other operational components. For the purposes of this analysis, this period will be up to 10 years, as this timeframe allows for recovery of rangeland vegetation from effects of grazing and from construction of improvements, reducing visibility of impacts to scenic resources. In addition, the effects of many built features (such as fences) may be reduced or minimized in this timeframe.

Resource Indicators to be Analyzed and Units of Measure

The resource indicator to be used to measure effects to scenic resources is Scenic Integrity. Scenic Integrity will be measured qualitatively in terms of Scenic Integrity Levels (SILs). SILs range from Unacceptably Low to Very High, and are a description of the "degree of intactness and wholeness of the Landscape Character" (USDA 1995, pg. 7), in relation to the both the existing and desired scenic integrity. Furthermore, the use of scenic integrity as an indicator of change facilitates comparison with the Scenic Integrity Objectives (SIOs) identified as standards in the Forest Plan to determine compliance of the project.

Table 5: Scenic Resources Indicators and Units of Measure

Resource Indicator	Unit of Measure
Scenic Integrity	Scenic Integrity Level

Analysis Methods and Assumptions

The visual landscape management system referenced in the *Regulatory Framework* section – Agriculture Handbook #701, *Landscape Aesthetics: A Handbook for Scenery Management* (USDA 1995) – was used to evaluate the alternatives. Also known as the Scenery Management System (SMS), this handbook represents the best available science for achieving high-quality scenery as an outcome of National Forest management practices.

Information on the existing condition of the scenic resources has been developed from personal knowledge of the area and was specifically collected through a series of site visits primarily during summer 2013. Allotments were visited in order to more clearly comprehend the existing visual condition before, during, and after the season of grazing use. CL 1 and 2 routes identified in the Forest Plan were driven, including those routes offering background views of the project area. Photographs were taken from a variety of points along these routes to determine seen areas for use in the analysis phase of the project. CL 1 and 2 sites were also visited for the same purpose. Forest Plan direction was used to develop project-level SIOs based on viewing distance, concern for scenery, and scenic attractiveness using GIS viewshed analysis techniques, refined through site visits and personal knowledge of the area. These were compared with the forestwide SIO map, which is used as a coarse layer for general project planning. The potential impacts to scenic resources of each alternative were determined based on the site visits to the CL 1 and 2 sites and routes within the project area, review of photos of the project area, and review of similar projects.

The table 6 below represents the past, present, and reasonably foreseeable future actions that have the potential to affect the scenic resources.

Table 6: Past, Present, and Reasonably Foreseeable Future Actions Affecting the Scenic Resource

Activity	Decade/Year	Past	Present	Reasonably Foreseeable Future
NFS lands within the allotment boundaries				
Sagebrush manipulation (burning, spraying)		x		
Prescribed Fire		x	x	x
Wildland Fire Suppression		x	x	x
Timber Management – All Harvest types	1960-2012	x		x
Hazard Tree Removal – Developed sites and roadsides	2009-2012	x	x	x
Public Firewood cutting		x		
Water Impoundments		x	x	
Road and Trail Maintenance		x	x	x
Road Construction		x		
Insect and Disease outbreak (bark beetle, Spruce Bud worm, etc.)		x	x	x
Conifer encroachment treatment		x		

Table 6: Past, Present, and Reasonably Foreseeable Future Actions Affecting the Scenic Resource

Activity	Decade/Year	Past	Present	Reasonably Foreseeable Future
Range Improvements (fences, water tanks, spring development, etc.)		x	x	x
Dispersed Recreation		x	x	x
Natural disturbances (Flooding and Mass Wasting)		x	x	x
Mining		x	x	
BLM lands within the allotment boundaries				
Prescribed burning		x		
Range Improvements		x	x	x
Fire Suppression		x	x	x
Road Maintenance		x	x	x
Road Construction		x		
Timber Sales		x		x
State lands (Fish, Wildlife , and Parks) within the allotment boundaries				
Range Improvements		x	**x**	**x**
Road Maintenance		x	**x**	**x**
Fire Suppression		x	**x**	**x**
Timber Sale		x		**x**
Private lands within the allotment boundaries				
Range Improvements		x	x	
Road Maintenance		x	**x**	**x**
Road Construction		x	**x**	
Fire Suppression		x	**x**	**x**

Based on Table 6 above, activities that have the greatest effect on scenic resources include those which disturb existing vegetation pattern, such as timber harvest, hazard tree removal, pre-commercial thinning, sagebrush manipulation, conifer encroachment treatments, prescribed burning treatments, and fire suppression. In addition, activities that result in ground disturbance can affect scenic resources. These activities include road construction and maintenance, facility construction (i.e. campgrounds). Mining is also included in these types of activities, as can range improvements (although ground disturbance is limited). Finally, other activities that result in effects to scenic resources include facility construction and maintenance (i.e. campgrounds, recreation sites), road and trail maintenance. These activities will be considered in the cumulative effects analysis of each alternative for each allotment.

It should be noted that many of the past and ongoing activities may be considered part of the existing condition. The effects of some of these activities, such as historic mining operations (which may include old, possibly historic, structures, old machinery, and other relics) can make a positive contribution to scenic resources and are valued by many users as such. Structures associated with older ranching operations (fences, buildings, etc.) have the potential to have the same effect. Not all effects of past and ongoing activities have beneficial impacts to scenery, i.e. roads, trails, wildland fire, etc., but are seen by users and viewers as an accepted part of the forest landscape.

Seymour No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Seymour Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.
Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects.

Seymour Proposed Action Alternative

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank

disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) and the current BLM VRM class will not change from the grazing activity. Effects of activities on lands administered by MTFWP will not be evident.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. Under this alternative, a western toad exclosure is proposed in the allotment, within a Road based recreation allocation. This exclosure will not be visible from the identified CL 1 viewing platforms, and will therefore not affect scenic integrity from these viewing platforms. The SIO of High from the CL 1 viewing platforms will be met. It will be visible from the surrounding area, but will remain subordinate to the overall viewshed. From this viewing platform, the effects of this exclosure will meet an SIL of Moderate. This is exceeds the SIO of Low.

Cumulative Effects: Any cumulative effects would result from the combination of actions proposed under this alternative and the effects of past, present, and reasonably foreseeable future activities.

The proposed toad exclosure fence will not be visible from either of the CL 1 viewing platforms; therefore there are no cumulative effects as viewed from these viewing platforms. From the surrounding area, the exclosure fence will likely be visible simultaneously with past, present, and reasonably foreseeable future actions such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments. When seen simultaneously from the surrounding area, the exclosure will represent a minor deviation, and have only a minimal contribution to cumulative effects. The cumulative effect will meet the SIO of Low from the surrounding area.

Seymour Alternative 4

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) and the current BLM VRM class will not change from the grazing activity. Effects of activities on lands administered by MTFWP will not be evident.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. Under this alternative, a western toad exclosure is proposed in the allotment,

within a Road based recreation allocation. This exclosure will not be visible from the identified CL 1 viewing platforms, and will therefore not affect scenic integrity from these viewing platforms. The SIO of High from the CL 1 viewing platforms will be met. It will be visible from the surrounding area, but will remain subordinate to the overall viewshed. From this viewing platform, the effects of this exclosure will meet an SIL of Moderate. This is exceeds the SIO of Low.

Cumulative Effects: Any cumulative effects would result from the combination of actions proposed under this alternative and the effects of past, present, and reasonably foreseeable future activities.

The proposed toad exclosure fence will not be visible from either of the CL 1 viewing platforms; therefore there are no cumulative effects as viewed from these viewing platforms. From the surrounding area, the exclosure fence will likely be visible simultaneously with past, present, and reasonably foreseeable future actions such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments. When seen simultaneously from the surrounding area, the fencing will at most represent a minor deviation, and have only a minimum contribution to cumulative effects. The cumulative effect will meet the SIO of Low from the surrounding area.

Fishtrap

Fishtrap No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are

limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Fishtrap Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects.

Fishtrap Proposed Action Alternative

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Fishtrap Alternative 4

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes

to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Mudd Creek

Mudd Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Mudd Creek Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects.

Mudd Creek Proposed Action Alternative

Mitigation/Design Features: Water developments will use non-reflective and earth-tone color materials in construction and installation. Darker earth-tone fiberglass tanks are recommended. This will reduce color contrast with the surrounding environment.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. Under this alternative, a water development (including tank, spring, and piping) is proposed in the allotment, within a Road based recreation allocation. This improvement will not be visible from the identified CL 1 viewing platforms, and will therefore not affect scenic integrity from these viewing platforms. The SIO of High from the CL 1 viewing platforms will be met. It will be visible from the surrounding area, but with mitigation in place, will remain subordinate to the overall viewshed. From this viewing platform, the effects of this water development will meet an SIL of Moderate. This is exceeds the SIO of Low.

Cumulative Effects: Any cumulative effects would result from the combination of actions proposed under this alternative and the effects of past, present, and reasonably foreseeable future activities.

The proposed water development will not be visible from either of the CL 1 viewing platforms; therefore there are no cumulative effects as viewed from these viewing platforms. From the surrounding area, the water development will likely be visible simultaneously with past, present, and reasonably foreseeable future actions including timber management. When seen simultaneously from the surrounding area, the water development will represent a minor deviation, and have only a minimal contribution to cumulative effects. The cumulative effect will meet the SIO of Low from the surrounding area.

Mudd Creek Alternative 4

Mitigation/Design Feature: Water developments will use non-reflective and earth-tone color materials in construction and installation. Darker earth-tone fiberglass tanks are recommended. This will reduce color contrast with the surrounding environment.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. Under this alternative, a water development (including tank, spring, piping, and fencing) is proposed in the allotment, within a Road based recreation allocation. This improvement will not be visible from the identified CL 1 viewing platforms, and will therefore not affect scenic integrity from these viewing platforms. The SIO of High from the CL 1 viewing platforms will be met. It will be visible from the surrounding area, but with mitigation in place, will remain subordinate to the overall viewshed. From this viewing platform, the effects of this water development will meet an SIL of Moderate. This is exceeds the SIO of Low.

Cumulative Effects:
Any cumulative effects would result from the combination of actions proposed under this alternative and the effects of past, present, and reasonably foreseeable future activities.

The proposed water development will not be visible from either of the CL 1 viewing platforms; therefore there are no cumulative effects as viewed from these viewing platforms. From the surrounding area, the water development will likely be visible simultaneously with past, present, and reasonably foreseeable future actions including timber management. When seen simultaneously from the surrounding area, the water development will represent a minor deviation, and have only a minimal contribution to cumulative effects. The cumulative effect will meet the SIO of Low from the surrounding area.

Pintlar Creek

Pintlar Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Pintlar Creek Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects.

Pintlar Creek Proposed Action Alternative

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the

limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Pintlar Creek Alternative 4

Mitigation/Design Features: Avoid creating openings or damaging trees to remain when removing trees for fencing. This will help to minimize visible changes to the remaining stand.

Scatter limbs and tops so as not to be evident as slash. Distributing this material throughout the area will reduce the overall visual effect of the activity.

Cover stumps of cut trees with dirt/duff to reduce color contrasts with the surrounding area.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements and dead tree cutting have the potential to affect scenic resources in the short and long term. Under this alternative, worm fencing is proposed in the allotment, within the Anaconda Pintler Wilderness MA. The trees for this worm fencing may be cut within the wilderness area. The effects of tree cutting will include stumps remaining, with tops and limbs removed and left as they are not used in the fence material. The fence will persist, but the effect of this constructed improvement is minimized by the use of wood as the primary material; it is anticipated that as the fence ages, it will have a positive effect on scenic resources. Cutting and planting of willows will be visible from the surrounding area in the short term. The fence and the effects of tree cutting will be visible only from the immediate surrounding area; it is not anticipated that the effects will be visible from the CDNST. In the short term, from the surrounding area, the effects of this dead tree cutting and

fencing, as well as cutting and planting of willows will meet an SIL of Moderate or High. The SIO of Very High (provides for ecological change only; minute deviations, if any, allowed) for this MA will be met in the long term with the mitigation applied.

Cumulative Effects: Any cumulative effects would result from the combination of actions proposed under this alternative and the effects of past, present, and reasonably foreseeable future activities.

The fencing and tree cutting will likely be visible simultaneously with past, present, and reasonably foreseeable future actions including timber management. When visible, this will be a minor deviation from the surrounding area, and other activities would likely be visible primarily in background viewing distances. When seen simultaneously with these effects from the surrounding area, the effects of fencing and tree cutting will represent a minor deviation, at most, and have only a minimal contribution to cumulative effects. These effects will be lessened over time as fencing materials weather and material not used in the construction of the fence break down. In the long term, the cumulative effect will meet the SIO of Very High from the surrounding area.

Mussigbrod

Mussigbrod No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Mussigbrod Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects.

Mussigbrod Proposed Action Alternative

Mitigation/Design Features: Water developments will use non-reflective and earth-tone color materials in construction and installation. Darker earth-tone fiberglass tanks are recommended. This will reduce color contrast with the surrounding environment.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) and the current BLM VRM class will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. Under this alternative, a water tank, spring, piping, and fencing is proposed in the allotment, within a Backcountry summer recreation allocation. These improvements will not be visible from the identified CL 1 and 2 viewing platforms, and will therefore not affect scenic integrity from these viewing platforms. Cutting and planting of willows, and use of log worm fencing in the conversion of the temporary fence to a permanent exclosure fence will also not be visible from the identified CL 1 and 2 viewing platforms. The SIO of High (foreground and middleground viewing distances) and Moderate (background viewing distance) from the CL 1 viewing platforms will be met. The SIO of Moderate (foreground and middleground viewing distances) and Low (background viewing distance) from the CL 2 viewing platforms will also be met. It will be visible from the surrounding area, but with mitigation in place, will remain subordinate to the overall viewshed. From this viewing platform, the effects of these activities and design features/mitigation measures will meet the SIO of Moderate. The installation of grade control structures as described in the design features/mitigation measures will also not be visible from the CL 1 and 2 viewing platforms, and the SIOs from these platforms will be met. It will be visible from the surrounding area, and the effects of installation using heavy equipment in the form of ground disturbance and placement of boulders and logs in a somewhat natural manner will likely dominate the landscape character. Using native materials from near the site will reduce these effects in the short and long term, and revegetation of the area will reduce the visible effect as well. Effects

may continue to be obvious for some time, but will remain subordinate to the landscape character, thereby meeting the SIO of Moderate in the long term.

Cumulative Effects: Any cumulative effects would result from the combination of actions proposed under this alternative and the effects of past, present, and reasonably foreseeable future activities.

The proposed water development will not be visible from the CL 1 and 2 viewing platforms; therefore there are no cumulative effects as viewed from these viewing platforms. From the surrounding area, the water development and fencing will likely be visible simultaneously with past, present, and reasonably foreseeable future actions including wildland fire and timber management. When seen simultaneously from the surrounding area, the water development and fencing improvements will represent a minor deviation, and have only a minimal contribution to cumulative effects. The cumulative effect will meet the SIO of Moderate from the surrounding area.

Mussigbrod Alternative 4

Mitigation/Design Features: Water developments will use non-reflective and earth-tone color materials in construction and installation. Darker earth-tone fiberglass tanks are recommended. This will reduce color contrast with the surrounding environment.

Select trees to be cut such that the effects of removal and removal of limbs and tops will not be visible from identified CL 1 and 2 viewing platforms.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) and the current BLM VRM class will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. Under this alternative, a water tank, spring, piping, and fencing is proposed in the allotment, within a Backcountry summer recreation allocation. Dead tree cutting for fencing is also proposed under this alternative. Effects of dead tree cutting (i.e., stumps, slash, etc.) could be visible depending on the location and arrangement of the trees cut. With the proposed mitigations in place, the effects will not be visible from the identified CL 1 and 2 viewing platforms, and will therefore not affect scenic integrity from these viewing platforms. The SIO of High (foreground and middleground viewing distances) and Moderate (background viewing distance) from the CL 1 viewing platforms will be met. The SIO of

Moderate (foreground and middleground viewing distances) and Low (background viewing distance) from the CL 2 viewing platforms will also be met. It will be visible from the surrounding area, but with mitigation in place, will remain subordinate to the overall viewshed. From this viewing platform, the effects of this water development, fencing, and dead tree cutting will meet the SIO of Moderate.

Cumulative Effects: Any cumulative effects would result from the combination of actions proposed under this alternative and the effects of past, present, and reasonably foreseeable future activities.

The proposed water development, fencing, and dead tree cutting will not be visible from the CL 1 and 2 viewing platforms; therefore there are no cumulative effects as viewed from these viewing platforms. From the surrounding area, the water development, fencing, and dead tree cutting will likely be visible simultaneously with past, present, and reasonably foreseeable future actions including wildland fire and timber management. When seen simultaneously from the surrounding area, the water development, fencing, and dead tree cutting will at most represent a minor deviation, and have only a minimal contribution to cumulative effects. The cumulative effect will meet the SIO of Moderate from the surrounding area.

Ruby Creek

Ruby Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely

maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Ruby Creek Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects.

Ruby Creek Proposed Action Alternative

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. Under this alternative, three hardened crossings are proposed in the allotment, within a Backcountry summer recreation allocation. These improvements may be visible from the CDNST (CL 1) and Forest Road 624 (CL 2). The crossings may include ground disturbance and removal of existing vegetation, manipulation of the streambank, as well as placement of gravel or other aggregate surfacing material on the streambank. This will likely result in color and texture contrasts associated with removal of vegetation and operation of machinery, as well as the surfacing material in comparison to the surrounding vegetation. It is anticipated that this will meet an SIL of Moderate in the middleground viewing distance, and low in the foreground viewing distance, in the short term. It is anticipated that the effects of this action will be reduced over time as vegetation recovers, both in operation areas as well as in the crossing. In the long term, the SIO of High (middleground viewing distance) and Moderate (background viewing distance) from the CDNST will be met. The SIO of Moderate (foreground and middleground viewing distances) from FR 624 will also be met in the long term. It will be visible from the surrounding area, will meet an SIL of Low in the short term, and the SIO of Moderate, in the long term.

Cumulative Effects: Any cumulative effects would result from the combination of actions proposed under this alternative and the effects of past, present, and reasonably foreseeable future activities.

The proposed hardened crossings will be visible from the identified CL 1 and 2 viewing platforms and will likely be visible simultaneously with past, present, and reasonably foreseeable future actions including timber management. The effects of these past timber harvests are minimal as considerable regeneration has occurred. When seen simultaneously from the surrounding area, the hardened crossings may begin to dominate the viewshed, especially in the short term. In the long term, the effects will represent a minor deviation, and have only a minimal contribution to cumulative effects. Combined with the limited effects of past, present, and future activities, the cumulative effect will meet the SIO of Moderate from the surrounding area in the long term.

Ruby Creek Alternative 4

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. Under this alternative, three hardened crossings and fencing are proposed in the allotment, within a Backcountry summer recreation allocation. The crossings may be visible from the CDNST (CL 1) and Forest Road 624 (CL 2). The crossings may include ground disturbance and removal of existing vegetation, manipulation of the streambank, as well as placement of gravel or other aggregate surfacing material on the streambanks. This will likely result in color and texture contrasts associated with removal of vegetation and operation of machinery, as well as the surfacing material in comparison to the surrounding vegetation. It is anticipated that this will meet an SIL of Moderate in the middleground viewing distance, and low in the foreground viewing distance, in the short term. It is anticipated that the effects of this action will be reduced over time as vegetation recovers, both in operation areas as well as in the crossing. In the long term, the SIO of High (middleground viewing distance) and Moderate (background viewing distance) from the CDNST will be met. The SIO of Moderate (foreground and middleground viewing distances) from FR 624 will also be met in the long term. It will be visible from the surrounding area, will meet an SIL of Low in the short term, and the SIO of Moderate, in the long term.

The fence is not visible from any of the identified CL 1 and 2 viewing platforms. It will be visible from the surrounding area, and will remain subordinate to the landscape character, thereby meeting the SIO of Moderate from this view.

Cumulative Effects: Any cumulative effects would result from the combination of actions proposed under this alternative and the effects of past, present, and reasonably foreseeable future activities.

The proposed fence will not contribute to cumulative effects. The proposed hardened crossings will be visible from the identified CL 1 and 2 viewing platforms and will likely be visible simultaneously with past, present, and reasonably foreseeable future actions including timber management. The effects of these past timber harvests are minimal as considerable regeneration has occurred. When seen simultaneously from the surrounding area, the hardened crossings may begin to dominate the viewshed, especially in the short term. In the long term, the effects will represent a minor deviation, and have only a minimal contribution to cumulative effects.

Combined with the limited effects of past, present, and future activities, the cumulative effect will meet the SIO of Moderate from the surrounding area in the long term.

Dry Creek

Dry Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Dry Creek Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects.

Dry Creek Proposed Action Alternative

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) and the current BLM VRM class will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Dry Creek Alternative 4

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected

that existing Scenic Integrity Levels (SILs) and the current BLM VRM class will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Twin Lakes

Twin Lakes No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Twin Lakes Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects.

Twin Lakes Proposed Action Alternative

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Twin Lakes Alternative 4

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Monument

Monument No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Monument Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects.

Monument Proposed Action Alternative

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Monument Alternative 4

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Pioneer

Pioneer No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.
Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Pioneer Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects

Pioneer Proposed Action Alternative

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage

utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Pioneer Alternative 4

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Saginaw

Saginaw No Action (No Grazing) Alternative

Direct/Indirect Effects: If this alternative were selected, no direct effects would occur. However, existing infrastructure (including fencing, water tanks, etc.) would not be maintained, replaced, or removed. Unused improvements and lack of maintenance may contribute to the idea of lack of caring on the part of the agency. This likely would only apply

to improvements such as fencing and water developments visible in the foreground viewing distance.

Also, discontinuing the activity on NFS lands may reduce the visibility of this activity that has been a large part of the cultural history and visual landscape in southwest Montana.

Cumulative Effects: Any cumulative effects would result from the combination of doing nothing and the effects of past, present, and reasonably foreseeable future activities.

As facilities deteriorate, it is possible that the effects of this deterioration would be visible simultaneously with the effects of the actions identified in the table above. Of these actions, vegetative manipulations such as timber management, hazard tree removal, and to a limited extent, public firewood cutting, and conifer encroachment treatments have the potential to make this deterioration more visible by opening viewing corridors within the foreground viewing distance where the deteriorating facilities would be most visible. Actions such as insect and disease outbreak could speed the deterioration of facilities as trees die and fall on fences and other improvements. In any case, because the effects of this alternative are limited, cumulative effects to scenic resources would also be limited, and would likely maintain the existing SIL of Moderate to High, where effects are visible but subordinate to the overall viewshed or not visible at all.

Saginaw Current Grazing Alternative

Direct/Indirect Effects: Selection of this alternative would result in no changes to the existing condition, and would result in no additional direct/indirect effects to scenic resources.

Cumulative Effects: There are no direct/indirect effects under this alternative; therefore there are no cumulative effects

Saginaw Proposed Action Alternative

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Saginaw Alternative 4

Mitigation/Design Features: None.

Direct/Indirect Effects: Unlike manipulations in other vegetation types (i.e. timber harvest, fuels reduction, etc.), visual changes in grassland vegetation due to grazing on BDNF rangeland settings are generally not evident to the casual forest visitor. These activities include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current year's growth of palatable grasses, forbs, and shrubs. This is in part due to the limits set by the Forest Plan and implemented by managers and permittees to manage utilization and maintain stubble height. This minimizes perceptible color and texture changes to the vegetation, and contrast with the soil color. Furthermore, limits on stream bank disturbance in riparian areas minimize the visual impact of the grazing activity. It is expected that existing Scenic Integrity Levels (SILs) will not change from the grazing activity.

In contrast, constructed improvements have the potential to affect scenic resources in the short and long term. No additional improvements are proposed under this alternative. No effect to scenic resources.

Cumulative Effects: The direct/indirect effects are not generally evident to the casual forest visitor. As a result, cumulative effects associated with past, present, and reasonably foreseeable future activities are also generally not evident.

Comparison of Alternatives

Table 7: Summary of Effects by Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Summary of Effects for Seymour Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	Will maintain existing SILs and VRM class and meet or exceed SIOs	Will maintain existing SILs and VRM class and meet or exceed SIOs
Summary of Effects for Fishtrap Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	No change to existing SILs	No change to existing SILs
Summary of Effects for Mudd Creek Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	Will maintain existing SILs and meet or exceed SIOs	Will maintain existing SILs and meet or exceed SIOs
Summary of Effects for Pintlar Creek Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	No change to existing SILs.	Will maintain existing SILs and meet SIOs
Summary of Effects for Mussigbrod Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	No change to existing SILs.	Will maintain existing SILs and meet SIOs
Summary of Effects for Ruby Creek Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	No change to existing SILs.	Will maintain existing SILs and meet SIOs
Summary of Effects for Dry Creek Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	No change to existing SILs	No change to existing SILs
Summary of Effects for Twin Lakes Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	No change to existing SILs	No change to existing SILs
Summary of Effects for Monument Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	No change to existing SILs	No change to existing SILs
Summary of Effects for Pioneer Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	No change to existing SILs	No change to existing SILs
Summary of Effects for Saginaw Allotment				
Scenic Integrity – Scenic Integrity Levels	Loss of cultural activity. No change to existing SILs	No change to existing SILs	No change to existing SILs	No change to existing SILs

Range and Invasive Plants

Existing Condition

Regulatory Framework

Table 1*: Applicable Laws, Regulations, and Policy*

Authority Level (Federal, State, County, Forest, Regional)	***Law, Regulation, Policy***	***How Applicable to This Project***
Federal	*National Environmental Policy Act (1969)*	*Requires Federal agencies to consider the environmental impact of proposed actions, including the identification of adverse environmental effects that cannot be avoided should the proposal be implemented. This act is applicable to this project because actions being proposed, including livestock grazing, would result in direct, indirect, and cumulative effects to the environment.*
Federal	*National Forest Management Act (1976)*	*Requires that project level decisions which authorize the use of specific National Forest System lands for a particular purpose, like livestock grazing, must be consistent with the broad programmatic direction established in a Land and Resource Management Plan. This act is applicable to this project because the decision to authorize livestock grazing activities would need to be consistent with livestock grazing standards, and other applicable direction, found in the 2009 Beaverhead-Deerlodge Land and Resource Management Plan.*
Federal	*The Granger-Thayer Act (1950)*	*Provides for the issuance of term grazing permits for up to 10 years. It also provides for the use of grazing receipts for range improvement work. This act is applicable to this project because, following selection of any action alternative, new term grazing permits would be issued to include direction from the decision.*

Table 1*: Applicable Laws, Regulations, and Policy*		
Authority Level (Federal, State, County, Forest, Regional)	***Law, Regulation, Policy***	***How Applicable to This Project***
Federal	*The Multiple-Use Sustained-Yield Act (1960)*	*Provides that national forests are established and administered for several purposes, including livestock grazing. This act also authorizes the Secretary of Agriculture to develop the surface renewable resources of national forests for multiple uses and sustained yield of the services and products to be obtained from these lands, without impairment of the productivity of the land. This act is applicable to this project because the decision to authorize livestock grazing activities would need to ensure that grazing is an appropriate multiple use of the project area, and that grazing could occur on a sustained yield basis without impairing the productivity of the land.*
Federal	*The Forest and Rangeland Renewable Planning act (1974)*	*Directs the Secretary of Agriculture to develop a process for the revision of national forest land and resource management plans, including the identification of the suitability of lands for resource management. This act is applicable to this project because the 2009 Beaverhead-Deerlodge LRMP identified lands that were capable and suitable for livestock grazing. A purpose of the project is to validate the LRMP capability and suitability determinations through a site-specific analysis.*
Federal	*The Federal Land Policy and Management Act (1976)*	*States that public lands will be managed in a manner that will provide food and habitat for fish, wildlife, and domestic animals. This act is applicable to the project because the direct, indirect, and cumulative effects of livestock grazing could impact habitat for fish and wildlife.*

Table 1*: Applicable Laws, Regulations, and Policy*		
Authority Level (Federal, State, County, Forest, Regional)	***Law, Regulation, Policy***	***How Applicable to This Project***
Federal	*The Public Rangelands Improvement Act (1978)*	*Recognizes the need to correct unsatisfactory conditions on public rangelands by increasing funding for maintenance and management of these lands. This act is applicable to this project because site-specific analyses have identified the need to correct project area rangelands that are currently in less than desirable condition.*
Federal	*Forest Service Manual 2200 and Forest Service Handbook 2209.13 (Policy)*	*Directs rangeland management, livestock grazing, and grazing permit administration on National Forest System lands. This policy is applicable to the project because actions being proposed include the authorization of livestock grazing activities on National Forest System lands within the project area.*
Federal	*Beaverhead-Deerlodge Land and Resource Management Plan, or Forest Plan (2009) (Law)*	*Directs management activities on National Forest System Lands within the Beaverhead-Deerlodge National Forest boundaries. This law is applicable to this project because actions being proposed, including livestock grazing, need to be consistent with direction contained in the LRMP.*

See Appendix D for applicable Forest Plan standards and consistency.

Within the North and West Big Hole (NWBH) AMP project area, livestock grazing has probably occurred since the late 1800's when the upper Big Hole River area was first settled. National Forest System grazing records prior to about 1938 are largely unavailable, but based on information found in the Wise River and Wisdom Ranger District files the majority of early use on project area grazing allotments was by cattle and horses. However, sheep grazing had occurred on many of these allotments as well prior to about 1970. Eventually these sheep allotments were converted to cattle, and in some cases allotments were merged with adjacent cattle allotments to form the present day allotment boundaries. All eleven of the NWBH allotments are now summer cattle allotments, with one allotment, Ruby Creek, receiving use by both cattle and horses. Grazing occurs on a variety of vegetation types ranging from drier lower elevation sagebrush-grasslands to riparian areas including upper elevation wet mountain meadows.

Vegetation Introduction

The current composition and structure of vegetation in the NWBH AMP project area is a product of past and ongoing natural disturbances and processes, and human-influenced disturbances and land management practices. Examples of natural disturbances and processes include climate variability (i.e., drought), watershed processes (i.e., flooding, mass wasting, avalanches), fire events, insect population dynamics, and plant diseases. In contrast to natural disturbances, examples of human-influenced disturbances and land management practices include things such as timber harvest, mining, prescribed fire, fire suppression, and livestock grazing.

General vegetation types within the NWBH AMP project area is summarized in Table 2 below. This vegetation information was generated and summarized using the Forest Service's Region 1 existing vegetation mapping program, or R1-VMap. A more detailed description of vegetation in the project area is presented in the allotment specific existing condition that follows.

Table 2: Existing Project Area Mapped Vegetation.

General Cover Description	Total Acres	Percent of Total Project Area Vegetation Acres
Conifer (pine, fir, spruce)	138,166	88
Aspen	51	<1
Mesic Shrubland (riparian willow-sedge/grass)	5,634	4
Xeric Shrubland (sagebrush-grassland)	6,319	4
Wet Grassland (riparian sedge/grass meadow)	1,577	1
Grassland (single stem or bunchgrass)	5,165	3
Total Project Area Vegetation Acres = 156,912		

Rangeland Vegetation

The NWBH project area contains approximately 12,525 acres of rangelands determined to be suitable for livestock use (see *Methodology for Determining Suitable Allotment Acres*). These rangelands mostly consist of the following general vegetation cover types:

- Grasslands and Wet (riparian) Grasslands
- Xeric and Mesic (riparian) Shrublands

In addition to these rangeland vegetation types, there are approximately 444 acres of early seral forested vegetation types that are considered to be suitable for grazing, and are currently being utilized by livestock. These early seral forested areas were created by past timber harvest in project area conifer stands, and are typically referred to as transitory rangeland, meaning they are in transition from being suitable to not being suitable for livestock use due to a loss of forage production and/or access to forage.

Within the general rangeland vegetation types, there are distinct plant communities, or habitat types (h.t.), where vegetation is comprised of one or more dominant plants that characterize

the plant community. For example, xeric shrublands within the project area are predominantly sagebrush-grasslands. Major habitat types include mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*)/Idaho fescue (*Festuca idahoensis*), and mountain big sagebrush/bluebunch wheatgrass (*Pseudoroegneria spicata*). Other habitat types present include rangelands with a predominantly grassland aspect. Examples of these grasslands include Idaho fescue/slender wheatgrass (*Elymus trachycaulus*), and other unclassified mixed perennial grasslands.

The mesic shrublands are predominantly riparian sites comprised of willow (*Salix* spp.)/sedge (*Carex* spp.) plant communities. Major habitat types include Geyer willow (*Salix geyeriana*)/beaked sedge (*Carex utriculata*), yellow willow (*S. lutea*)/beaked sedge, and Drummond willow (*S. Drummondiana*)/beaked sedge. However, riparian (wet) grasslands also make up an appreciable portion of riparian vegetation within the project area, including tufted hairgrass (*Deschampsia cespitosa*)/sedge (*Carex* spp.) plant communities and other riparian grassland plant communities dominated by one or more species such as beaked sedge, tufted hairgrass, and water sedge (*Carex aquatilis*).

The eleven NWBH allotments cumulatively contain 12,525 suitable National Forest acres that consist of primary, secondary, and transitory range. A majority of the primary and secondary range is comprised of rangeland vegetation types, which are the important forage producing areas. Primary range is that part of the suitable livestock range that livestock naturally prefer, or will use first, as it is readily accessible and has available water within close (1/4 mile) proximity. Secondary range is often grazed after the primary range has been fully utilized. Secondary range may be further from water and on steeper slopes compared to primary range. Transitory range characterizes forage made available from timber harvest operations from the 1960's to the present. Approximately 7,772 acres of transitory range is found in the project area. Following timber cutting operations, these harvest areas transitioned from a forested vegetation type to a predominantly grass/forb vegetation community. Today much of this transitory range in the project area contains conifer regeneration that is greater than 30 years old, and is slowly losing its grass/forb component as conifer cover increases. Some of this acreage (444 acres) is still considered suitable as conifer canopy cover is less than 60%, and is producing greater than 200 pounds of forage per acre. Other transitory range has understory vegetation comprised primarily of pinegrass (*Calamagrostis rubescens),* which livestock generally don't graze.

Table 3: Existing Condition National Forest Suitable Acres for Project Area.

Classification/Description	Acres Deducted	Running Totals
Net NFS Acres in Project Area Allotments		21,910
Deductions for other than Capable	0	21,910
Deductions for other than Suitable	0	21,910
Existing conifer canopy cover greater than 60%, and timber harvest units older than 1994	9,126	12,784
Additional slopes greater than 40%	113	12,671
MA Prescription does not provide for grazing	0	12,671
Excluded Recreation sites	16	12,655
Administrative Sties excluded from grazing	0	12,655

Table 3: Existing Condition National Forest Suitable Acres for Project Area.		
Classification/Description	Acres Deducted	Running Totals
Minerals production sites	0	12,655
Fenced Cultural/Special Management Areas	0	12,655
Permanent exclosures within Capable Rangeland	130	12,525
Special use sites excluded from grazing	0	12,525
Road/Rail ROW – excluded from grazing	0	12,525
TES habitat permanently excluded from grazing	0	12,525
Acres determined to be economically infeasible for grazing	0	12,525
Other areas identified by IDT to be excluded from grazing	0	12,525
Total Suitable NFS Acres (cattle and horse) for Current Management alternative		**12,525**

Invasive Plants

Invasive plants include noxious weeds and other nonnative plants that have been introduced into an environment in which they did not evolve and thus usually have no natural enemies to limit their reproduction and spread; and produce a significant change in terms of plant species composition, structure, or ecosystem function. Noxious weeds are those plant species designated as noxious by the Secretary of Agriculture or by the responsible State official (see *Appendix B3* for current Montana noxious weed list). Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being native or new to or not common to the United States or parts thereof.

Noxious Weeds

The Wise River and Wisdom Ranger Districts have inventoried and mapped noxious weeds within the NWBH projec area since the 1980's. The inventories for these districts were last updated in 2007 and 2000, respectively, and consisted primarily of survey and mapping of noxious weeds along Forest roads and trails by district personnel. Other survey and mapping efforts were completed on areas away from roads and trails where weeds were known to be present. Data collected during these inventories included the species, size and density of each infestation, and a Global Positioning System (GPS) location. Existing populations of noxious weeds consist mostly of small, low-density infestations along National Forest System roads and motorized trails, and generally occur within about 50 feet of either side of the road or trail prism (see *Appendix A3, North and West Weeds Maps*). Most of these infestations are less than or equal to 0.6 acres in size, and total approximately 43 acres within the analysis area. Other populations within the project area consist of area infestations that range in size from 0.7 to 154 acres. These area infestations are fewer in number, but total approximately 765 acres. Spotted knapweed (*Centaurea stoebe*), a Montana state listed noxious species, is the predominant noxious weed species present within the analysis area. Other Montana-listed noxious weed species present are at very low to low infestation levels, and include Canada thistle (*Cirsium arvense*), houndstongue (*Cynoglossum officinale*), leafy spurge (*Euphorbia*

esula), St. Johnswort (*Hypericum perforatum*), common tansy (*Tanacetum vulgare*), and oxeye daisy (*Chrysanthemum leucanthemum*). Table 4 below displays noxious weed presence, and approximate infested area, by grazing allotment.

Table 4: Noxious weed presence by grazing allotment

Allotment	Noxious Weeds Present	Total Infested Area	Remarks
Seymour	Spotted knapweed, Canada thistle, houndstongue, and leafy spurge	152 acres	Inventoried infestations consist of predominantly small spotted knapweed infestations along roads and trails. There are small, isolated populations of other species.
Fishtrap	Spotted knapweed, and Canada thistle	23 acres	Inventoried infestations are mostly small spotted knapweed infestations along roads and trails.
Mudd Creek	Spotted knapweed, houndstongue, and Canada thistle	10 acres	Inventoried infestations are mostly small spotted knapweed infestations along roads and trails. There are small, isolated populations of other species.
Pintlar Creek	Spotted knapweed	10 acres	Inventoried infestations are mostly small spotted knapweed infestations along roads and trails, and at dispersed campground sites.
Mussigbrod	Spotted knapweed, houndstongue, and Canada thistle	53 acres	Inventoried populations are mostly area type infestations of spotted knapweed that range in size from 1.4 to 36 acres, and have likely become established because of past timber harvest operations. There are small to medium sized populations of other species.
Ruby Creek	Spotted knapweed, Canada thistle, common tansy, St. Johnswort, and oxeye daisy	433 acres	Inventoried infestations are predominantly small and large area infestations of spotted knapweed that range in size from 0.8 to 154 acres. Most larger infestations are likely a result of past timber harvest operations. There are small, widely scattered populations of other species.

Table 4: Noxious weed presence by grazing allotment			
Allotment	Noxious Weeds Present	Total Infested Area	Remarks
Dry Creek	Spotted knapweed, Canada thistle, St. Johnswort, common tansy, and oxeye daisy	26 acres	Inventoried infestations are mostly small, low density area infestations of spotted knapweed along roads and trails. There are small, widely scattered populations of other species.
Twin Lakes	Canada thistle and spotted knapweed	72 acres	Inventoried infestations are predominantly medium sized area infestations of Canada thistle and other nonnative thistle species. There are small, scattered infestations of spotted knapweed.
Monument	Spotted knapweed	8 acres	Inventoried infestations are mostly small, widely scattered populations.
Pioneer	Spotted knapweed and Canada thistle	4 acres	Inventoried populations are mostly small, widely scattered populations of spotted knapweed.
Saginaw	Canada thistle and spotted knapweed	17 acres	Inventoried infestations are mostly small to medium sized infestations of Canada thistle and other nonnative thistle species.
Total infested area within the project area = 808 acres			

On state, private and Bureau of Land Management (BLM) lands immediately adjacent to the project area there are known populations of noxious weeds; however, the actual extent of these infestations is largely unknown. Most populations appear to consist of scattered plants, or small patch-type infestations, along major travel routes into the project area (*personal observation by Kevin Greenwood*).

Existing noxious weed infestations inside and outside of the project area are currently being treated with herbicides on an annual basis by Forest Service and County noxious weed control crews, and will continue to be treated into the foreseeable future until populations are eradicated, or effectively controlled so that expansion of these populations are minimized. Between 2002 and 2011 average gross (i.e., managed) acres treated each year have totaled approximately 800 acres on the Wise River and Wisdom Ranger Districts. The Forest Service's weed control program is operating under the 2002 Beaverhead-Deerlodge National Forest Noxious Weed Control Environmental Impact Statement and Record of Decision (USDA, 2002).

Nonnative Invasive Plants

Within the NWBH AMP project area there are also widely scattered populations of nonnative invasive species of concern, including but not limited to bull thistle (*Cirsium vulgare*), musk thistle (*Carduus nutans*), common mullein (*Verbascum thapsus*), black henbane (*Hyoscyamus niger*), and cheatgrass (*Bromus tectorum*). Although these species are not currently listed as "noxious" by the state of Montana, they may be listed by individual counties such as Beaverhead County and Deer Lodge County. These plants have not been identified by the Wise River or Wisdom Ranger District for inventory or treatment; therefore, they have received mostly incidental treatment as weed control crews encounter them during annual control work on State-listed noxious weeds. However, control of cheatgrass has not occurred within the project area.

Cheatgrass, a Category 3 species, is listed by the Montana Department of Agriculture as a regulated plant. This means the Department recognizes the plants potential to cause negative impacts, and recommends education and prevention as a means of slowing the plant's spread. This plant is found within the project area at low densities, and is mostly confined to disturbed areas along roads. It is also found in small patch type infestations on some drier south and southwest facing sagebrush-grassland slopes (*personal observation by Kevin Greenwood*). Currently, cheatgrass has not been identified for inventory or treatment within the project area.

Threatened, Endangered and Sensitive Plants

No Federally listed threatened or endangered plant species are known to occur on the Beaverhead-Deerlodge National Forest (BDNF); therefore there are no federally listed plants in the project area. The BDNF manages a sensitive plants species list designated by the Regional Forester. Currently, there are 40 sensitive plant species listed as either known, suspected, or with potential to occur on the BDNF. Within the project area, all of the allotments were found to have sensitive plants. The following six species of sensitive plants were found within the project area: Hall's rush, hiker's gentian, Lemhi penstemon, primrose monkey-flower, wavy moonwort, and whitebark pine. Of the six sensitive plant species present within the allotments, all appear to be reproducing successfully and withstanding grazing effects. For more details, see the *Sensitive Plant* section of the DEIS.

The following information provides an allotment-specific description of existing conditions pertaining to allotment management, range suitability, and vegetation. In regards to allotment vegetation, a rangeland health assessment was conducted for each allotment using the four rangeland health indicators previously described (see Tables 42-47, pgs. 270-272 in the DEIS for a summary of these assessments on each allotment), and an invasive plant risk assessment was completed for each allotment as well.

Seymour Allotment

Allotment Management Summary: The Seymour allotment is currently being managed under a cooperative grazing agreement between the Forest Service and Montana Department

of Fish, Wildlife & Parks (MTFWP), and a coordinated management agreement for BLM lands contained within the allotment boundary. Under these agreements, livestock are managed under a 9-pasture rest-rotation grazing strategy where NFS, BLM, and State lands are grazed concurrently (see *Appendix A1*, of DEIS for Seymour allotment map). The current grazing system includes two active Forest Service pastures, one unallocated Forest Service pasture, and six MTFWP pastures (see *Table 5* below for the rotation schedule as displayed in the current agreement) within the Mount Haggin Wildlife Management Area (WMA). There are currently 323 cow/calf pairs authorized to graze NFS lands for an approximate total of 1,410 head months (HMs) of use between June 16 and October 5. However, under the current agreement a majority of this use (about 80%) occurs on MTFWP lands, and current use of NFS lands typically does not exceed about 297 HMs annually. In addition, there is a 75 head FS permit that is currently unallocated, and is associated with the Forest Service's Tenmile pasture. Based on previous allotment inspections, NFS lands typically receive light to light-moderate forage utilization (i.e., 20-40% utilization of palatable forage) on suitable upland and riparian areas. Over the last 10 years (2003-2012), the Seymour allotment has been grazed in compliance with Forest Plan grazing standards seven out of the 10 years (see *Appendix* B3, for a compliance summary on all allotments). End of season compliance was unknown for the other three years due to early snow cover, or lack of range personnel to conduct monitoring.

Table 5: Seymour Allotment and MTFWP Pasture Rotation Schedule.

PASTURE	YEAR		
	2011 2014 2017 2020	2012 2015 2018	2013 2016 2019
Seymour (FS) and Seymour Cr. (MTFWP) Sullivan (FS) and Sullivan Cr. (MTFWP)	EARLY 6/16 – 8/15	LATE 8/15 – 10/5	REST
*Tenmile Cr. (MTFWP) and Salt Ridge (MTFWP)	LATE 8/15 – 10/5	REST	EARLY 6/16 – 8/15
Moose Creek (MTFWP) and Mule Ranch (MTFWP)	REST	EARLY 6/16 – 8/15	LATE 8/15 – 10/5

*The Forest Service's Tenmile pasture has been in a rest status since 2008, and has not been part of the cooperative management agreement grazing schedules since that time.

The cooperative agreement has been in place since about 2002, and was renewed for another 10 years in 2011. Prior to implementation of cooperative grazing management, NFS lands were managed according to direction provided in an allotment management plan dated March of 1985. This plan addressed NFS lands only, and permitted up to about 1,239 HM's of use on these lands. From 1985 to the present, there has been a loss of suitable grazing lands due to transitory range areas (i.e., old timber harvest units) becoming too forested for use by cattle (see *Suitable Allotment Acres* below). This is thought to have led to increasing grazing pressure on primary and secondary range areas within the allotment. In about 2001, discussions between the Forest Service and MTFWP occurred to develop a cooperative grazing agreement for agency managed lands. Implementation of the agreement in 2002 has helped provide additional grazing capacity, improve grazing distribution, address livestock trespass issues, and provide for better management of resources.

Because the existing Seymour AMP is outdated, the allotment has been identified by the Forest Service as needing a revised allotment management plan to be consistent with the cooperative grazing agreement, and to comply with Section 504 of the 1995 Rescissions Act that directs the Forest Service to establish and adhere to a schedule for the completion of NEPA analysis for all National Forest System grazing allotments where such analysis was needed.

Suitable Allotment Acres: The Seymour Allotment consists of approximately 17,973 total acres, including about 17,347 acres of NFS land, 240 acres of BLM land, 14 acres of State land, and 372 acres of private land. Although these other lands within the allotment boundary, and on adjacent cooperatively grazed lands within the Mt. Haggin WMA, provide forage for livestock, they were not analyzed in this exercise because the capability and suitability of these lands are not known. Of total NFS allotment acres, approximately 6,797 acres are considered capable for livestock grazing. After verifying GIS polygons with aerial imagery and on-the-ground knowledge, 4,804 acres are too steep, forested, or otherwise not suitable for livestock use. Suitable range identified consists of 1,993 National Forest acres. Suitable vegetation types within the Seymour allotment include open grasslands, sagebrush/grasslands, early seral conifer stands, and riparian areas. Approximately 420 of the 1,993 total suitable acres are transitory range considered as suitable for this analysis. Suitability for livestock grazing is delineated on the Seymour Allotment suitability map (see *Appendix A-3*).

Total NFS Acres	17,347
Capable NFS Acres	6,796
Conifer Cover Greater Than 60%	38
Timber Harvest Units Older Than 1994	4,765
Greater Than 40% Slope	0
Existing Exclosures	0
Total Allotment Suitable NFS Acres	1,993

Allotment Vegetation: Within the boundary of the Seymour Allotment there is a mix of vegetation types throughout all elevation zones. The minimum elevation is 6,080 feet, and the maximum is 7,920 feet. The topography is mostly gently sloping, with steeper slopes occurring within the upper elevation zones. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 60 inches in the upper elevation zones. Allotment vegetation is characterized by a dominant conifer cover type, with appreciable inclusions of mixed grasslands and mesic shrublands. Conifer vegetation types in this allotment had received extensive timber harvest activity between the 1960's and 1990's, ranging from single-tree selection cut to stand clearcut. These past activities total about 9,481 acres. In addition, there were approximately 709 acres harvested, or partially harvested, along about 20 miles of road in 2012 and 2013 as part of a roadside hazard tree removal project. A summary of existing vegetation cover types is presented in Table 6 below:

Table 6: Seymour Allotment existing vegetation cover types.		
Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	14,391	80
Engelmann Spruce	358	2
Sub-alpine Fir	5	<1
Douglas Fir	650	4
Aspen	16	<1
Willow-sedge/grass	655	4
Sedge/grass meadow (wet)	45	<1
Sagebrush-grassland	293	2
Mixed Grassland	1,460	8
Other Vegetation	94	<1
Total Allotment Vegetation Acres = 17,967		

Rangeland Vegetation: Major upland habitat types that occur within the allotment include three types: mountain big sagebrush/Idaho fescue, Idaho fescue/slender wheatgrass, and unclassified mixed grassland plant communities that are comprised of a mix of forage species such as Idaho fescue, timber oatgrass (*Danthonia intermedia*), prairie junegrass (*Koeleria macrantha*), Columbia needlegrass (*Achnatherum nelsonii*), alpine timothy (*Phleum alpinum*), and tufted hairgrass. A major riparian type found within the allotment is the Geyer willow/beaked sedge habitat type. Other riparian habitat types likely exist, but they were not sampled and identified as part of this project.

According to Mueggler and Stewart (1980), and Hansen et al. (1995) publications, under climax vegetation conditions these plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 7: Idaho fescue/slender wheatgrass habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Slender wheatgrass – 11 Timber oatgrass – 15 Idaho fescue – 36 Prairie junegrass – 4 Western needlegrass - 7	Not provided
Shrub Cover (canopy cover)	<1	0 - 2
Ground Cover	95	87 - >99
Noxious Weeds	Not recorded	Not recorded

Table 8: Geyer willow/beaked sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Geyer willow – 8 Booth willow – 6 Beaked sedge – 7 Water sedge – 3 Tufted hairgrass – 3 Bluejoint reedgrass - 2	0 – 12 0 – 12 0 – 12 0 – 9 0 – 3 0 - 3
Shrub Cover (canopy cover)	195 (all shrubs) 90 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of two upland long-term transects were reread in 2011. These transects are located in grassland habitat types, and were last read in 1978 and 1979. In addition, baseline riparian vegetation data was collected on Slaughterhouse Creek in 2008 (see *Project File* for a summary of rangeland health indicator data collected on these upland and riparian transects). An assessment of the four rangeland health indicators for the Seymour allotment is as follows:

Species Composition
In a review of upland long-term monitoring transect data for grassland types on this allotment, it showed that some important grass species were likely below desired amounts. Specific examples include Idaho fescue, alpine timothy, and slender wheatgrass. These plants are considered decreaser species (i.e., decrease in composition over time with heavy grazing pressure), and their composition in these grassland communities appears to have been reduced when compared to 1978 and 1979 data. However, on one transect (C2-T2) slender wheatgrass had increased in composition from 0 to 2 percent.

Based on riparian monitoring data collected in 2008, a review of plant species composition indicated that this riparian site had both high cover and frequency of native sedges and grasses; however, the composition of some important sedge and grass species (e.g., water sedge and tufted hairgrass) appeared to be below desired amounts for this habitat type. The composition of important shrubs such as Geyer willow and Booth willow (*Salix boothii*), are close to amounts expected for this type.

Shrub Cover
No shrubs were recorded in upland grasslands, which can be expected for these types of sites. There were no long-term monitoring transects located within sagebrush-grasslands; therefore, information on shrub cover for this habitat type is not available for the Seymour allotment.

Total shrub canopy cover for dominant willows (Geyer willow and Booth willow) was recorded to be 58 percent. This is considered to be somewhat below desired amounts for this habitat type, but is within range of variability recorded in research data.

Ground Cover

Ground cover averaged about 98 percent for the two upland transect sites, which left approximately 2 percent being bare ground. The amount of bare ground recorded on these sites is lower than the average recorded for similar grassland plant communities in a climax vegetation condition, and is within the expected range of bare ground for these habitat types (see *Tables 7 and 8 above*).

On the sampled riparian habitat type, ground cover averaged about 88 percent, which left approximately12 percent as being bare ground. This amount of bare ground is thought to be somewhat above desired amounts. Although ground cover data for riparian habitats is either lacking or missing in research publications, expected bare ground amounts for this riparian habitat type (e.g., Geyer willow/beaked sedge) should most likely be less than 10 percent.

Noxious Weeds

No noxious weeds, or other invasive plants of concern, were recorded in the upland transects, or were observed in close proximity to transect locations. Within the riparian transect, no noxious weeds were recorded. However, Canada thistle, a state-listed noxious weed, was observed within the stream reach for this transect.

Rangeland Health Indicator Assessment Conclusion: On upland sites, there were major to important changes recorded in the composition of important desirable grass species on both transects. Desirable forage species such as Idaho fescue and the various upland sedge species had decreased in composition by as much as 9 percent and 55 percent, respectively. Conversely, there were appreciable increases in grasses such as timber oatgrass (average of 17%) and prairie junegrass (average of 8%). Other important changes included a major decrease (greater than 20%) in forb cover on transect C2-T2. Although the reason for this decrease is not very clear, an increase in grass cover on this same transect would suggest an improving trend. The amount of ground cover has remained fairly constant on one transect, but there was an important increase from 85 percent to 100 percent recorded on transect C2-T2 in 2011. Although the composition of plant species is currently skewed towards "increaser" grasses (i.e., those that increase over time with moderate to heavy grazing pressure), overall, these grassland sites are considered to be meeting desired rangeland health objectives, and are functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds.

For the Slaughterhouse Creek riparian site, a good composition of important shrubs and graminoids (grasses and sedges) was recorded, which suggests the vegetation is in a desirable condition. The amount of ground cover is considered to be slightly below desired rangeland health conditions for this habitat type. The reason for reduced ground cover on this site is not clear since livestock grazing impacts (past or present) were not observed or recorded at the time of sampling. It is possible that climatic variation (i.e., drought), and inherent lower site productivity may be the cause on this particular site. However, overall, this site is thought to be functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds. This assessment conclusion can be reasonably extrapolated to include other similar riparian sites that occur at lower elevations within the Seymour allotment (*personal observation by Kevin Greenwood*).

Invasive Plant Assessment and Conclusion: There are approximately 152 acres of inventoried noxious weed infestations within the Seymour allotment. Due to the presence and size of these infestations, rangeland plant communities within the allotment are considered to be at a moderate risk to invasion by weeds due to the potential expansion of these existing weed populations. However, the amount of ground cover recorded during Forest Service evaluations is consistent with amounts you would expect to find in upland plant communities that are in a late seral or climax vegetation condition. For this reason, these sites are thought to functioning in manner that would resist but not prevent invasion by invasive plants. In regards to the riparian site, the amount of ground cover recorded suggests that this plant community may be at an increased risk to invasion, especially when noxious weeds already occur in close proximity.

Fishtrap Allotment

Allotment Management Summary: The Fishtrap allotment is currently being managed under a 2-pasture deferred rotation grazing strategy where each pasture is grazed for about 45 days for a total of 460 HMs. Existing authorized livestock numbers and season of use are 152 cow/calf pairs for an approximate 90 day season of use between June 16 and September 15. Based on previous allotment inspections, this allotment typically receives light-moderate to moderate forage utilization on suitable upland and riparian grazing areas. From 2003 to 2012, the Fishtrap allotment has been grazed in compliance with Forest Plan grazing standards seven out of the 10 years. End of season compliance was unknown on three years due to early snow cover preventing inspection of the range resource, or lack of personnel to conduct monitoring prior to snow covering the ground.

Because the existing Fishtrap AMP is outdated, the allotment has been identified by the Forest Service as needing a revised allotment management plan to comply with Section 504 of the 1995 Rescissions Act that directs the Forest Service to establish and adhere to a schedule for the completion of NEPA analysis for all National Forest System grazing allotments where such analysis was needed.

Suitable Allotment Acres: The Fishtrap Allotment consists of approximately 6,389 total acres, of which all are NFS lands. Of this total, approximately 1,041 acres are considered capable for livestock grazing. After verifying GIS polygons with aerial imagery and on-the-ground knowledge, 512 acres are too forested, or otherwise not suitable for livestock use. Suitable vegetation types within the Fishtrap Allotment include open grasslands, sagebrush/grasslands, and riparian areas. Suitable range identified consists of 529 acres. Suitability for livestock grazing is delineated on the Fishtrap Allotment suitability map (see *Appendix A3* of the DEIS).

Total NFS Acres	6,389
Capable NFS Acres	1,041
Conifer Cover Greater Than 60%	6
Timber Harvest Units Older Than 1994	506
Greater Than 40% Slope	0
Existing Exclosures	0
Total Allotment Suitable NFS Acres	529

Allotment Vegetation: Within the boundary of the Fishtrap Allotment there is a mix of vegetation types throughout all elevation zones. The minimum elevation is 6,120 feet, and the maximum is 7,160 feet. The topography is mostly gently sloping, with steeper slopes occurring within the upper elevation zones. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 34 inches in the upper elevation zones. Allotment vegetation is characterized by a dominant conifer cover type, with appreciable inclusions of mixed grasslands, xeric shrublands, and mesic shrublands. Conifer vegetation types in this allotment had received moderate timber harvest activity between the 1970's and 1990's, consisting mostly of stand clearcuts. These past activities total about 1,455 acres. In addition, there were approximately 255 acres harvested, or partially harvested, along about seven miles of road in 2012 as part of a roadside hazard tree removal project. A summary of existing vegetation cover types is presented in Table 9 below:

Table 9: Fishtrap Allotment existing vegetation cover types.

Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	4,801	75
Engelmann Spruce	126	2
Douglas Fir	679	11
Aspen	14	<1
Willow-sedge/grass	339	5
Sedge/grass meadow (wet)	35	<1
Sagebrush-grassland	216	3
Mixed Grassland	166	3
Other Vegetation	6	<1
Total Allotment Vegetation Acres = 6,382		

Rangeland Vegetation: Major rangeland habitat types that occur within the allotment include two upland types: Mountain big sagebrush/Idaho fescue, and unclassified mixed grassland plant communities that are comprised of a mix of forage species such as Idaho fescue, timber oatgrass, prairie junegrass, Columbia needlegrass, and upland sedge species (*Carex* spp.). Although riparian vegetation was not sampled as part of this project, a major riparian type found within the allotment is the Geyer willow/beaked sedge habitat type (*personal observation by Kevin Greenwood*). Other riparian habitat types likely exist, but they were not sampled and identified.

According to Mueggler and Stewart (1980), under climax vegetation conditions sagebrush-grassland plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 10: Mountain big sagebrush/Idaho fescue habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Mountain big sagebrush - 18 Idaho fescue – 39 Bluebunch wheatgrass – 5 Thickspike wheatgrass – 2 Prairie junegrass – 4	Not provided
Shrub Cover (canopy cover)	21	5 - 44
Ground Cover	97	91 - >99
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of two upland long-term transects were reread in 2010 and 2012. One transect is located in a mixed grassland habitat type, and the other is located in sagebrush-grassland habitat. These transects were last read in 1979 (see *Project File* for a summary of rangeland health indicator data collected on these upland transects). In addition, a permanent riparian photo point (RPP) transect was revisited on Swamp Creek in 2011. The photos were last taken in 1999. An assessment of the four rangeland health indicators for the Fishtrap allotment is as follows:

Species Composition
In a review of upland long-term monitoring transect data for grassland and sagebrush-grassland types on this allotment, it was determined that the composition of important shrubs and grasses are thought to be within parameters expected for these plant communities. However, on the sagebrush-grassland site, a key forage species, Idaho fescue, is thought to be somewhat below desired composition amounts (22% versus 39%), but had increased by 6 percent when compared to 1979 data.

Species composition data was not collected on riparian sites within the Fishtrap allotment; however, based on a review and comparison of RPP transect photos from 1995, 1999 and 2011, the most obvious vegetation changes were an appreciable increase in willow cover, most notably in the floodplain zone, and an apparent increase in desirable sedges and grasses.

Shrub Cover
No shrubs were recorded on the upland grassland site, which can be expected for these plant community types. On the sagebrush-grassland site, the amount of sagebrush cover recorded (8%) is below the average presented in Table 10 above, but is within the range of variability of total shrub cover expected for this habitat type.

Riparian shrub cover data was not collected for the Fishtrap allotment. However, in a comparison between 1999 and 2011 RPP transect photos, it was determined that an appreciable increase in willow cover had occurred, but is likely below desired amounts for this site.

Ground Cover

Ground cover averaged about 96 percent for the two upland transect sites, which left approximately 4 percent being bare ground. The amount of ground cover recorded on the sagebrush-grassland site (91%) is lower than the average recorded for similar sagebrush-grassland plant communities in a climax vegetation condition, but is within the expected range of variability for this habitat type (see *Table* 10 above).

Riparian ground cover data was not collected on the Fishtrap allotment; however, on the Swamp Creek RPP transect there was an apparent increase in desirable grasses and sedges. Other noticeable changes included increased stream bank stability, narrowing and deepening of the stream channel, and reduced bare ground, which would suggest that ground cover is likely increasing.

Noxious Weeds

No noxious weeds, or other invasive plants of concern, were recorded in the upland transects. However, spotted knapweed was observed within close proximity of the sagebrush-grassland transect site. At the Swamp Creek RPP transect site, no noxious weeds were observed within the stream reach for this transect.

Rangeland Health Indicator Assessment Conclusion: Based on upland long-term monitoring transect data for sagebrush-grassland and mixed grassland habitat types on this allotment, there were a few important changes detected when compared to 1979 data. In regards to the composition of important plant species on sampled upland sites, on the sagebrush-grassland transect (C2-T1) the composition of less desirable forage species such as prairie junegrass had decreased by 14 percent, and desirable grasses such as bluebunch wheatgrass and Idaho fescue increased by 7 percent and 6 percent, respectively. On the grassland transect (C1-T1) there was an appreciable increase of 16 percent in timber oatgrass composition. Other important changes on this transect included a major decrease (36%) in forb composition. Although the reason for this decrease is not very clear, a corresponding increase in desirable grass cover on this same transect would suggest improving conditions. Shrub canopy cover had increased from 0 percent to 8 percent on the sagebrush site. On this same transect, there was also an important increase in ground cover from 82 percent to 91 percent. Ground cover has remained fairly constant on the grassland transect, but had increased from 96 percent to 100 percent in 2010. These grassland and sagebrush-grassland sites are considered to be meeting desired rangeland health objectives for species composition, shrub cover, ground cover, and are functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds.

The RPP site on Swamp Creek is considered to be trending towards desired rangeland health conditions for species composition, shrub and ground cover, and is currently functioning in a manner that resists invasion by noxious weeds. This RPP site is considered representative of similar smaller riparian systems within the allotment, but is not representative of larger systems such as the West Fork and East Fork of Fishtrap Creek (*personal observation by Kevin Greenwood*).

Invasive Plant Assessment and Conclusion: There are approximately 23 acres of inventoried noxious weed infestations within the Fishtrap allotment. Due to the presence of spotted knapweed infestations, rangeland plant communities within the allotment are thought to be at moderate risk to invasion by weeds due to the potential expansion of these existing weed populations. However, the amount of ground cover recorded during Forest Service evaluations is mostly consistent with amounts you would expect to find in upland plant communities that are in a late seral or climax vegetation condition. For this reason, these sites are thought to functioning in manner that would resist but not prevent invasion by noxious weeds. In regards to the Swamp Creek riparian site, the apparent increase in desirable plants, shrub cover, and ground cover suggests that this plant community may be increasing its resistance to invasion by noxious weeds.

Mudd Creek Allotment

Allotment Management Summary: The Mudd Creek allotment is currently being managed under a mostly season-long, single pasture grazing system. Partial grazing deferment occurs on the allotment utilizing herding practices. For example, livestock are typically placed on one end of the allotment, and are allowed to graze, or are herded, towards the opposite end during the grazing season. The rotation is typically reversed every other year. Suitable grazing areas towards the middle of the allotment can experience season-long use if cattle are not actively herded to keep them out of these areas early in the season. Existing authorized livestock numbers and season of use are 137 cow/calf pairs for an approximate 90 day season of use between June 16 and September 15. This totals about 414 HMs of use on an annual basis. Based on previous allotment inspections, this allotment generally receives light to moderate forage utilization on suitable upland areas, and mostly moderate utilization on suitable riparian sites. For the years 2003 through 2012, the Mudd Creek allotment has been grazed in compliance with Forest Plan grazing standards nine out of the 10 years; however, throughout this period compliance has been marginal on many areas of the allotment due to season-long grazing use.

The Mudd Creek allotment was identified in the 1995 Beaverhead National Forest Grazing Lawsuit Settlement Agreement, which directs the Forest Service to complete a NEPA environmental analysis and decision for the authorization of livestock grazing and associated resource protection measures on allotments identified in the agreement's allotment planning schedule.

Suitable Allotment Acres: The Mudd Creek Allotment consists of approximately 11,619 total acres, including about 11,465 of NFS land, and 154 acres of private land that is fenced separately from NFS acres. Because these private lands are fenced out from NFS lands, suitable range was not analyzed for private lands within the allotment boundary in this exercise. Approximately 1,284 acres are considered capable for livestock grazing. From these capable acres, after verifying GIS polygons with aerial imagery and on-the-ground knowledge, 545 acres were considered too forested, within grazing exclosures, or otherwise not suitable for livestock use. Suitable range identified from this exercise consists of 739 acres. Suitable vegetation types within the Mudd Creek Allotment include open grassland,

sagebrush-grasslands, and riparian areas. Suitability for livestock grazing is delineated on the Mudd Creek Allotment suitability map (see *Appendix A3* of the DEIS).

Total NFS Acres	11,465
Capable NFS Acres	1,284
Conifer Cover Greater Than 60%	81
Timber Harvest Units Older Than 1994	453
Greater Than 40% Slope	0
Existing Exclosures	11
Total Allotment Suitable NFS Acres	739

Allotment Vegetation: Within the boundary of the Mudd Creek Allotment there is a mix of vegetation types throughout all elevation zones; however, a majority of the allotment is covered by conifer cover types at all elevations. The minimum elevation is 6,120 feet, and the maximum is 8,400 feet. The topography is mostly gently sloping, with steeper slopes occurring within the upper elevation zones. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 60 inches in the upper elevation zones. Allotment vegetation is characterized by a dominant conifer cover type, with appreciable inclusions of mixed grasslands, xeric shrublands, and mesic shrublands. Conifer vegetation types in this allotment had received moderate timber harvest activity between the 1970's and 1990's, consisting predominantly of stand clearcuts. Other harvest types consisted of group selection, sanitation, seed-tree preparatory, and shelterwood establishment cutting. These past activities total about 1,836 acres. In addition, there were approximately 360 acres harvested, or partially harvested, along about 10 miles of road in 2012 as part of a roadside hazard tree removal project. A summary of existing vegetation cover types is presented in Table 11 below:

Table 11: Mudd Creek Allotment existing vegetation cover types.

Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	8,550	74
Whitebark Pine	22	<1
Engelmann Spruce	308	3
Subalpine Fir	427	3
Douglas Fir	1,118	10
Aspen	6	<1
Willow-sedge/grass	179	2
Sedge/grass meadow (wet)	113	1
Sagebrush-grassland	500	4
Mixed Grassland	352	3
Other Vegetation	24	<1
Total Allotment Vegetation Acres = 11,599		

Rangeland Vegetation: Major rangeland habitat types that occur within the allotment include two upland types: Mountain big sagebrush/Idaho fescue, and unclassified mixed grassland plant communities that are comprised of a mix of forage species such as Idaho fescue, timber

oatgrass, one-spike oatgrass (*Danthonia unispicata*), and prairie junegrass. Although riparian vegetation was not sampled as part of this project, a major riparian type found within the allotment is the Geyer willow/beaked sedge habitat type (*personal observation by Kevin Greenwood*). Other riparian habitat types likely exist, but they were not sampled and identified.

According to Mueggler and Stewart (1980), under climax vegetation conditions sagebrush-grassland plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 12: Mountain big sagebrush/Idaho fescue habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Mountain big sagebrush - 18 Idaho fescue – 39 Bluebunch wheatgrass – 5 Thickspike wheatgrass – 2 Prairie junegrass – 4	Not provided
Shrub Cover (canopy cover)	21	5 - 44
Ground Cover	97	91 - >99
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of three long-term transects were reread in 2011 and 2012. Two are located within sagebrush-grassland habitat types, and one is located on an unclassified grassland type. These transects were last read in 1976 and 1986 (see *Project File* for a summary of rangeland health indicator data collected on these upland transects). In addition, a permanent riparian photo point (RPP) transect was revisited on Mudd Creek in 2011. The photos were last taken in 1999. An assessment of the four rangeland health indicators for the Mudd Creek allotment is as follows:

Species Composition

In a review of upland long-term monitoring transect data for grassland and sagebrush-grassland types on this allotment, it was determined that the composition of important shrub and grass species on these rangelands were found to be present in quantities expected for these plant communities.

Species composition data was not collected on riparian sites within the Mudd Creek allotment; however, in a review and comparison of riparian photos from 1996 and 2011, the most obvious change detected was a major increase in willow canopy cover. Willow cover was estimated to average about 33 percent in 1996. In 2011, this cover was estimated to have increased by at least 20 percent (*personal observation by Kevin Greenwood*). Other important changes in plant species composition were not detected.

Shrub Cover
No shrubs were recorded on the upland grassland site, which is expected for these types of sites. On the sagebrush-grassland transect site, the average amount of sagebrush cover recorded was 19 percent, which is very close to the average presented in Table 12 above.

Riparian shrub cover data was not collected for the Mudd Creek allotment. However, in a comparison between 1999 and 2011 RPP transect photos, there appeared to be a major increase in willow cover.

Ground Cover
Upon review of transect data for sagebrush-grassland and grassland types on this allotment, it was determined that ground cover averaged about 88 percent, which left approximately 12 percent being bare ground. The amount of ground cover recorded on the sagebrush-grassland sites (average of 83%) is considerably lower than the average recorded for similar sagebrush-grassland plant communities in a climax vegetation condition, and is outside the expected range of variability for this habitat type (see *Table 12 above*).

Riparian ground cover data was not collected on the Mudd Creek allotment; however, in 2011 there appeared to be an appreciable reduction in bare soil associated with streambank disturbance and livestock trailing impacts, which was estimated to average about 20 percent in 1996.

Noxious Weeds
No noxious weeds, or other invasive plants of concern, were recorded in the upland transects. However, spotted knapweed was observed within close proximity of one of the sagebrush-grassland transect sites. At the Mudd Creek RPP transect site, no noxious weeds were observed within the stream reach for this photo plot.

Rangeland Health Indicator Assessment Conclusion: On upland sites, there were a couple of important changes detected in the composition of important grass and shrub species. On one sagebrush-grassland transect (C2-T1), Idaho fescue had decreased in composition by 19 percent (46% to 27%), and sagebrush composition had increased by 33 percent, which could partially explain the reduction in grass cover. On another sagebrush-grassland transect (VP-6-9), bluebunch wheatgrass had declined from 11 percent to 0 percent in 2011, but slender wheatgrass composition had increased from 0 percent to 5 percent on this same transect. Although the reasons for these changes are not very clear, this particular site typically receives moderate to moderately heavy forage utilization on an annual basis, and it is thought that this level of use combined with mostly season-long grazing has contributed to some declines in desirable grass cover. Another explanation could include misidentification of bluebunch wheatgrass in 1976. On the grassland site (C1-T1), there was a major increase (6% to 31%) in Idaho fescue composition, a desirable forage species, and an appreciable decrease (29% to 16%) in forb composition, which suggests an improving trend. Overall, the composition of important grasses, and sagebrush canopy cover, appear to be consistent with amounts expected for these rangelands, but the reason for disappearance of bluebunch wheatgrass on one transect is unclear. The amount of ground cover on upland sites has remained relatively constant since these transects were last read, but, overall, are thought to be

below desired conditions. In regards to noxious weeds, these upland sites may be at increased risk to invasion due to higher than expected amounts of bare ground.

In regards to riparian habitats, the increase in willow cover and reduction of bare ground at the RPP site would suggest that this riparian habitat may be trending towards more desirable conditions related to species composition and shrub cover, and is currently thought to be functioning in a manner that protects the soil from erosive events and invasion by noxious weeds. However, extrapolation of this assessment conclusion to other similar riparian sites within the Mudd Creek allotment boundary would be difficult due to a lack of riparian vegetation sampling data, and variability of riparian sites.

Invasive Plant Assessment and Conclusion: There are approximately 10 acres of inventoried noxious weed infestations within the Mudd Creek allotment. Due to the presence of spotted knapweed infestations within close proximity of upland rangeland plant communities, these rangeland sites are thought to be at a moderate risk to invasion. This is especially true for the site that has lower than desirable ground cover. Ground cover on the other sampled sites is mostly consistent with amounts you would expect to find in upland plant communities that are in a late seral or climax vegetation condition, and are thought to functioning in manner that would resist but not prevent invasion by noxious weeds. In regards to the Mudd Creek riparian site, the apparent increase in willow and ground cover suggests that this plant community may be increasing its resistance to invasion by noxious weeds.

Pintlar Creek Allotment

Allotment Management Summary: The Pintlar Creek allotment is currently being managed under a mostly season-long, single pasture grazing system. However, partial grazing deferment is occurring on portions of the allotment through the use of herding practices, a drift fence, and deferred livestock entry dates. In addition, there is a special grazing area, or riparian pasture, on a tributary of York Gulch that is fenced out from the rest of the allotment. This area consists of about 58 acres. Although this fence was constructed to exclude livestock, this area currently receives a special grazing emphasis where periodic grazing (approximately once every 3 years) is prescribed to stimulate new plant growth by reducing the buildup of decadent vegetative material. The use in this special grazing area is estimated to average between 10 and 20 HMs when grazed.

Existing authorized livestock numbers and season of use are 250 cow/calf pairs for an approximate 53 day season of use between June 16 and September 30. The use averages about 440 HMs on an annual basis. Based on previous allotment inspections, this allotment typically receives moderate to moderately heavy forage utilization on suitable upland areas, and mostly light moderate use on suitable riparian areas. Annual heavy use typically occurs on some smaller riparian sites within the northeastern portion of the allotment. Over the last 10 years (2003-2012) the Pintlar Creek allotment has been grazed in compliance nine out of the 10; however, end of season compliance has been very marginal on many upland sites over the years due to mostly season-long grazing use.

The Pintlar Creek allotment was identified in the 1995 Beaverhead National Forest Grazing Lawsuit Settlement Agreement, which directs the Forest Service to complete a NEPA

environmental analysis and decision for the authorization of livestock grazing and associated resource protection measures on allotments identified in the agreement's allotment planning schedule.

Suitable Allotment Acres: The Pintlar Creek Allotment consists of approximately 7,452 total acres, of which all is National Forest land. Approximately 1,308 acres are considered capable for livestock grazing. From these capable acres, after verifying GIS polygons with aerial imagery and on-the-ground knowledge, 327 acres were considered too forested, within grazing exclosures, or otherwise not suitable for cattle use. Suitable range identified from this exercise consists of 981 National Forest acres. Suitable vegetation types within the Pintlar Creek Allotment include open grasslands, sagebrush/grasslands, and riparian areas. Suitability for livestock grazing is delineated on the Pintlar Creek Allotment suitability map (see *Appendix A3* of the DEIS).

Total NFS Acres	7,452
Capable NFS Acres	1,307
Conifer Cover Greater Than 60%	9
Timber Harvest Units Older Than 1994	243
Greater Than 40% Slope	0
Existing Exclosures	74
Total Allotment Suitable NFS Acres	981

Allotment Vegetation: Within the boundary of the Pintlar Creek Allotment there is a mix of vegetation types throughout all elevation zones; however, a majority of the allotment is covered by conifer cover types from the mid to higher elevations. The minimum elevation is 6,120 feet, and the maximum is 8,080 feet. The topography is mostly gently sloping, with steeper slopes occurring within the upper elevation zones. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 60 inches in the upper elevation zones. Allotment vegetation is characterized by a dominant conifer cover type, with appreciable inclusions of grasslands, xeric shrublands, and mesic shrublands. Conifer vegetation types in this allotment had received moderate timber harvest activity between the 1980's and 1990's, consisting predominantly of stand clearcuts and sanitation (salvage) treatments. Other harvest types consisted of seed-tree removal, shelterwood preparatory, single-tree, and special cuts. These past activities total about 1,021 acres. In addition, there were approximately 128 acres harvested, or partially harvested, along about four miles of road in 2012 as part of a roadside hazard tree removal project. A summary of existing vegetation cover types is presented in Table 13 below:

Table 13: Pintlar Creek Allotment existing vegetation cover types.

Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	4,726	64
Whitebark Pine	1	<1
Engelmann Spruce	28	<1
Douglas Fir	1,394	19
Aspen	1	<1

Table 13: Pintlar Creek Allotment existing vegetation cover types.		
Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Willow-sedge/grass	332	4
Sedge/grass meadow (wet)	39	1
Sagebrush-grassland	533	7
Mixed Grassland	211	3
Other Vegetation	143	2
Total Allotment Vegetation Acres = 7,408		

Rangeland Vegetation: A major upland rangeland habitat type that occurs within the allotment is the mountain big sagebrush/Idaho fescue type where Richardson's needlegrass (*Achnatherum richardsonii*) is often the dominant grass species in the composition. The grazing response of this plant is not well understood in this habitat type. In Mueggler and Stewart (1980) they classified it as having good palatability for cattle. This suggests that cattle may have a moderate preference for this plant, but will likely seek out more desirable species such as Idaho fescue (good to very good palatability) and bluebunch wheatgrass (excellent palatability) before much use occurs on it. There are also unclassified mixed grasslands present, but were not sampled as part of this project. The only riparian type sampled within the allotment was the Drummond willow/beaked sedge habitat type, which is a minor type that occurs at mid to moderately high elevations in the project area. A major type that is found at lower elevations within the allotment is the Geyer willow/beaked sedge habitat type (*personal observation by Kevin Greenwood*). Other riparian habitat types likely exist, but they were not sampled and identified as part of this project.

According to the Mueggler and Stewart (1980), and Hansen et al. (1995) publications, under climax vegetation conditions these plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 14: Mountain big sagebrush/Idaho fescue habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Mountain big sagebrush - 18 Idaho fescue – 39 Bluebunch wheatgrass – 5 Thickspike wheatgrass – 2 Prairie junegrass – 4 Richardson's needlegrass - <1	Not provided
Shrub Cover (canopy cover)	21	5 - 44
Ground Cover	97	91 - >99
Noxious Weeds	Not recorded	Not recorded

Table 15: Drummond willow/beaked sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Drummond willow – 10 Booth willow – 3 Geyer willow - <1 Beaked sedge – 7 Water sedge – 6 Bluejoint reedgrass - 3	6 – 17 0 – 4 0 – <1 0 – 15 0 – 11 0 - 7
Shrub Cover (canopy cover)	132 (all shrubs) 69 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of five long-term transects were reread in 2011 and 2012. All are located within sagebrush-grassland habitat types. These transects were last read in 1976, 1985, and 1987. In addition, baseline riparian vegetation data was collected on Pintler Creek in Pintler Meadows in 2008 (see *Project File* for a summary of rangeland health indicator data collected on these upland and riparian transects). An assessment of the four rangeland health indicators for the Pintlar Creek allotment is as follows:

Species Composition
In a review of upland long-term monitoring transect data for sagebrush-grassland types on this allotment, it was determined that, overall, the composition of important grass species on these rangelands are thought to be below amounts expected for this habitat type (i.e., mountain big sagebrush/Idaho fescue h.t.), but shrub composition was consistent with what was found in research data.

In regards to species composition on the Pintler Creek riparian site, the composition of some important sedges (e.g., beaked sedge) appear to be well below desired amounts for this habitat type. The composition of this sedge was recorded to be 2 percent in 2008. Other important forage-producing sedges and grasses such as water sedge and bluejoint reedgrass were found in composition quantities expected for this type. The composition of important riparian shrubs (i.e., willows) also appears to be present in desired amounts for this habitat type.

Shrub Cover
Shrub (sagebrush) canopy cover averaged 18 percent on the sagebrush-grassland sites, which is the same average presented in Tables *14 and 15* above for similar habitat types in a late seral to climax vegetation condition.

Total canopy cover for dominant riparian shrubs (i.e., willows) on the Pintler Creek monitoring site was measured to be 42 percent, which is appreciably below amounts recorded in research data.

Ground Cover

Based on a review of upland long-term monitoring transect data for sagebrush-grassland types on the Pintlar Creek allotment, it was determined that ground cover averaged 95 percent, which is slightly below the average of 97 percent recorded for sites in late seral to climax conditions, but is within the range of variability for this habitat type.

On the sampled riparian habitat type, ground cover averaged 64 percent, which left approximately 36 percent as being bare ground. This amount of bare ground is considered to be excessive for this riparian habitat type, and should most likely be less than 10 percent.

Noxious Weeds

No noxious weeds, or other invasive plants of concern, were recorded in the upland transects. However, a known spotted knapweed infestation is within close proximity of two sagebrush-grassland transect sites. On the Pintler Creek riparian transect site, no noxious weeds were observed within the stream reach for this transect.

Rangeland Health Indicator Assessment Conclusion: In regards to the upland sites, there were appreciable to important changes recorded for the composition of important desirable grass species on all transects when compared to data collected in 1976, 1985, and 1987. Important forage species such as Idaho fescue had decreased in composition by as much as 14 percent on one transect (C2-T2), and 12 percent on another (S1). Conversely, less desirable grasses such as Richardson's needlegrass and oatgrass (*Danthonia* spp.) increased by as much as 35 percent and 31 percent, respectively, on transects C3-T2 and S1. Other important changes included major increases and decreases in sagebrush canopy cover. Although the reason for some of these shrub cover changes are not very clear, photographs from 1985 and 1987 suggest that all these transect areas had received prescribed burning to reduce sagebrush densities. There were also important increases (greater than10%) in ground cover on two of the five transects, but there was a 7 percent decrease recorded on one transect in 2011. Overall, these sites are considered to be below desired rangeland health objectives for species composition, and on one transect site (S1) the composition and vigor of important forage species such as Idaho fescue appeared to be greatly diminished. This would suggest that allotment sagebrush-grasslands are likely trending away from late seral, or climax vegetation conditions. Even though the composition is currently skewed towards less desirable grasses, these upland rangeland sites appear to be functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds.

Based on riparian transect data for Pintler Creek, this site is considered to be not meeting desired conditions for species composition, shrub cover, and ground cover. The site is in a disturbed condition due to past natural disturbance events and livestock grazing impacts. The stream channel is deeply entrenched, and there is excessive bare ground due to raw, vertical banks and stream bank trampling damage by livestock. No noxious weeds were recorded within the stream reach; however, nonnative species such as common dandelion (*Taraxacum officinale*) and Kentucky bluegrass (*Poa pratensis*) were a frequent occurrence within the ransect. However, similar riparian habitats at lower elevations on Pintler Creek are estimated to be meeting desired vegetation conditions for species composition, shrub cover, ground

cover, and are functioning in a manner that protects the soil resource and resists invasion by noxious weeds (*personal observations by Kevin Greenwood*).

Invasive Plant Assessment and Conclusion: There are approximately 10 acres of inventoried noxious weed infestations within the Pintlar Creek allotment. The presence of these spotted knapweed infestations near and within rangeland plant communities automatically creates a moderate invasion risk for these sites, especially if they are not actively controlled. Ground cover on the sampled upland sites is mostly consistent with amounts you would expect to find in sagebrush-grassland plant communities that are in a late seral or climax vegetation condition. For this reason, these sites are considered to be functioning in manner that would resist, but not prevent, invasion by noxious weeds. In regards to the sampled riparian site on Pintler Creek, existing low ground cover would suggest that this plant community is at increased risk to invasion by noxious weeds, and expansion of nonnative plants such as dandelion and Kentucky bluegrass.

Mussigbrod Allotment

Allotment Management Summary: The Mussigbrod allotment is currently being managed under a 2-pasture deferred rotation grazing strategy, and BLM lands contained within the allotment boundary are managed by the Forest Service under a coordinated management agreement with the BLM. These BLM lands provide an additional 26 HMs of use during the grazing season. Prior to 2012, the allotment was grazed for about 90 days by 165 cow/calf pairs for a total of approximately 499 HMs. In 2012, authorized livestock numbers and season of use were 165 cow/calf pairs for an approximate 75 day season of use between July 1 and September 13, or about 413 HMs of use. This change was made to try and address permittee noncompliance with Forest Plan grazing standards the previous year on this allotment. Based on previous allotment inspections, this allotment typically receives mostly moderate to moderately heavy forage utilization on both suitable upland and riparian areas. During the period of 2003 to 2012, the Mussigbrod allotment has been grazed in compliance with Forest Plan grazing standards eight out of the 10 years. Standards have not been met the last two years (2011 and 2012), and there was documented marginal compliance on some years prior to 2011.

The Mussigbrod allotment was identified in the 1995 Beaverhead National Forest Grazing Lawsuit Settlement Agreement, which directs the Forest Service to complete a NEPA environmental analysis and decision for the authorization of livestock grazing and associated resource protection measures on allotments identified in the agreement's allotment planning schedule.

Suitable Allotment Acres: The Mussigbrod Allotment consists of approximately 5,245 total acres, including about 5,037 acres of NFS land, and 208 acres of BLM land. Although BLM lands within the allotment boundary provide forage for livestock, they were not analyzed in this exercise because the capability and suitability of these lands are not known. Of total NFS acres, approximately 680 acres are considered capable for livestock grazing. From these capable acres, after verifying GIS polygons with aerial imagery and on-the-ground knowledge, 56 acres were considered too steep, forested, within grazing exclosures, or

otherwise not suitable for cattle use. Suitable range identified from this exercise consists of 624 National Forest acres that are considered suitable for livestock grazing. Suitable vegetation types within the Mussigbrod Allotment include open grasslands, sagebrush/grasslands, and riparian areas. Suitability for livestock grazing is delineated on the Mussigbrod Allotment suitability map (see *Appendix A3* of the DEIS)..

Total NFS Acres	5,037
Capable NFS Acres	680
Conifer Cover Greater Than 60%	4
Timber Harvest Units Older Than 1994	6
Greater Than 40% Slope	0
Existing Exclosures	46
Total Allotment Suitable NFS Acres	624

Allotment Vegetation: There is a mix of vegetation types throughout all elevation zones of the Mussigbrod Allotment, with a majority of the allotment being covered by conifer cover types. The minimum elevation is 6,240 feet, and the maximum is 7,360 feet. The topography is mostly moderately sloping, with some flat to gently sloping valley bottoms. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 34 inches in the upper elevation zones. Allotment vegetation is characterized by a dominant conifer cover type, with appreciable inclusions of grasslands, xeric shrublands, and mesic shrublands. Conifer vegetation types in this allotment had received moderate timber harvest activity between the 1980's and 2003. Activity treatments were mostly special cuts and seed-tree seed cuts. Other harvest types consisted of stand clearcut and shelterwood establishment cuts. These past activities total about 1,384 acres. In addition, it is estimated that about 87 percent of allotment was burned during the 2000 Mussigbrod wildfire. However, the burn intensity was highly variable, and varied from light to high. A summary of existing vegetation cover types is presented in Table 16 below:

Table 16: Mussigbrod Allotment existing vegetation cover types.

Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	3,349	64
Engelmann Spruce	4	<1
Douglas Fir	124	2
Aspen	2	<1
Willow-sedge/grass	188	4
Sedge/grass meadow (wet)	79	2
Sagebrush-grassland	278	5
Mixed Grassland	1,203	23
Other Vegetation	1	<1
Total Allotment Vegetation Acres = 5,228		

Rangeland Vegetation: A major upland rangeland habitat type that occurs within the allotment is the mountain big sagebrush/Idaho fescue type. There are also unclassified mixed grasslands that were sampled as part of this project. The only riparian type sampled within

the allotment was the Drummond willow/beaked sedge habitat type, which is a minor type that occurs at mid to moderately high elevations in the project area. Other riparian habitat types may exist, but they were not sampled and identified as part of this project.

According to the Mueggler and Stewart (1980), and Hansen et al. (1995) publications, under climax vegetation conditions these plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 17: Mountain big sagebrush/Idaho fescue habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Mountain big sagebrush - 18 Idaho fescue – 39 Bluebunch wheatgrass – 5 Thickspike wheatgrass – 2 Prairie junegrass – 4 Richardson's needlegrass - <1	Not provided
Shrub Cover (canopy cover)	21	5 - 44
Ground Cover	97	91 - >99
Noxious Weeds	Not recorded	Not recorded

Table 18: Drummond willow/beaked sedge habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Drummond willow – 10 Booth willow – 3 Geyer willow - <1 Beaked sedge – 7 Water sedge – 6 Bluejoint reedgrass - 3	6 – 17 0 – 4 0 – <1 0 – 15 0 – 11 0 - 7
Shrub Cover (canopy cover)	132 (all shrubs) 69 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of five long-term transects were reread in 2004 and 2005. Three are located within sagebrush-grassland habitat types, and two are within unclassified grasslands. These transects were last read in 1979 and 1996. In addition, baseline riparian vegetation data was collected on Mussigbrod Creek in 2006 (see *Project File* for a summary of rangeland health indicator data collected on these upland and riparian transects), and a land health assessment was completed on BLM lands within the allotment in 2009 (USDI, 2009). An assessment of the four rangeland health indicators for the Mussigbrod allotment is as follows:

Species Composition

Based on upland long-term monitoring transect data for sagebrush-grassland and grassland habitat types on this allotment, it was determined that the composition of important shrubs are

thought to be present in desirable amounts. However, the composition of important grass species such as Idaho fescue and bluebunch wheatgrass appears to be below amounts expected for these rangelands, especially within the sagebrush-grassland types.

In regards to species composition on the Mussigbrod Creek riparian site, a high composition of important sedges and grasses such as beaked sedge, water sedge, and bluejoint reedgrass was recorded. The composition of important riparian shrubs such as Drummond willow were recorded to be somewhat below average amounts recorded in research data, but was within the range of variability for this habitat type (7% compared to 10%).

Shrub Cover
In regards to shrub canopy cover on upland sites, it was determined that sagebrush cover was present in amounts (average of 14%) expected for this sagebrush-grassland habitat type. However, there were major decreases (average of 18%) recorded on two transect sites. These sites were burned during the 2000 Mussigbrod wildfire, and shrubs are currently still recovering from this event.

Total shrub canopy cover was recorded to be 15 percent on the Mussigbrod Creek riparian site, and this figure appears to be greatly below that recorded for similar sites in research data. However, this site was burned during the 2000 Mussigbrod wildfire, and shrubs may still be recovering from this event. Another explanation could be that, prior to being burned, shrubs were shaded-out on this site due to heavy conifer cover.

Ground Cover
Based on a review of upland long-term monitoring transect data for sagebrush-grassland and grassland types on the Mussigbrod allotment, it was determined that ground cover (average of 92%) is somewhat below average amounts expected for these rangelands, but is within the range of variability recorded in research data.

For the Mussigbrod Creek riparian site, ground cover was recorded at 92 percent for the stream reach, which is expected for this particular habitat type (e.g., Drummond willow/beaked sedge).

Noxious Weeds
No noxious weeds, or other invasive plants of concern, were recorded in the upland transects. However, there are known spotted knapweed infestation within close proximity of all the transect sites. Canada thistle, a state-listed noxious weed, was observed and recorded to occur within the stream reach for the Mussigbrod transect; however, it was a very minor component of total vegetation cover (<1%).

Rangeland Health Indicator Assessment Conclusion: In regards to upland sites, there were important changes in the composition of important desirable perennial grass species on all transects. On two of the three sagebrush-grassland sites (PT-6A and C1-T1), important forage species such as Idaho fescue and bluebunch wheatgrass had decreased in composition by as much as 24 percent and 9 percent, respectively, when compared to 1979 and 1996 data. On another sagebrush-grassland transect (C1-T2), Idaho fescue had decreased by 19 percent, but

bluebunch wheatgrass had increased by 15 percent. Another important change recorded was a major increase in perennial forb cover. This increase averaged greater than 15 percent on four of the five transects. For shrub cover on sagebrush-grassland sites, sagebrush cover had decreased an average of 18 percent on two sites, but had increased by 19 percent on a third site. On these same sagebrush-grassland transects, ground cover had decreased an average of 12 percent on two, but had increased 22 percent on transect PT-6A. These transect sites had been completely or partially burned during the 2000 Mussigbrod wildfire. This would help explain the reductions in shrub cover and ground cover, but changes in desirable forage species composition are more likely a function of past heavy grazing pressure. Overall, these upland sites are considered to be below desired rangeland health conditions for species composition, and appear to be trending away from late seral or climax vegetation conditions. However, they are currently thought to be functioning in a manner that protects the soil resource from wind and water erosion, but where ground cover is below average, these sites have an increased risk to invasion by noxious weeds.

Based on riparian transect data for Mussigbrod Creek, this site is considered to be meeting desired conditions for species composition, and ground cover. Total shrub cover for dominant willows is below desired conditions, but is likely to continue to increase as this site recovers from the 2000 Mussigbrod wildfire event. Although results from the monitoring summary state the site has high plant cover and high species diversity (USDA, 2006), the presence of Canada thistle is of concern. However, the high amount of ground cover recorded for this site would suggest resistance to expansion.

The vegetation condition interpretation for Mussigbrod Creek cannot be used to represent conditions on other streams within the allotment, or even in the same pasture. There is too much variation between riparian systems, especially on those streams impacted by the 2000 Mussigbrod wildfire. For example, the riparian system on the east fork, or east tributary, of Bender Creek is in a severely entrenched condition due to natural disturbances including wildfire, beaver dam blowouts, and major spring runoff events. These conditions have been further aggravated by livestock grazing impacts, past and current. As a result of these past disturbances there are high amounts of bare ground, and the plant species composition is currently skewed towards plants indicative of a disturbed condition. In addition, noxious weeds including Canada thistle and houndstongue have invaded the site (*personal observation by Kevin Greenwood*).

In regards to BLM lands within the Mussigbrod allotment, the 2009 land health assessment concluded that upland habitats were functioning properly, and that current livestock management is maintaining sagebrush-grassland sites in a mid to late seral condition. However, on one of the two riparian sites assessed they found impaired conditions, and concluded that it was in a nonfunctioning status due to grazing impacts.

Invasive Plant Assessment and Conclusion: There are approximately 53 acres of inventoried noxious weed (primarily spotted knapweed) infestations within the Mussigbrod allotment. The presence and size of these spotted knapweed weed infestations would create a high invasion risk to rangeland plant communities. Although most of these plant communities

have high ground cover that would help them resist invasion, existing weed populations are likely to expand if they are not actively controlled.

Ruby Creek Allotment

Allotment Management Summary: The Ruby Creek allotment is currently being managed under a mostly season-long grazing strategy within three pastures. Partial deferment occurs within the Lower Ruby pasture on most years. Season-long use occurs in the other two. There are currently 283 cow/calf pairs authorized to graze the Cow Creek and Lower Ruby pastures, and a portion of the Butler Creek pasture. This grazing use is authorized for an approximate 105 day grazing season between June 16 and September 30 for a total of 714 HMs of use on National Forest lands. Private lands contained within the Cow Creek pasture provide for approximately 290 HMs of additional grazing capacity. However, a typical of season of use for these pastures is about June 23 to September 15 due to range readiness concerns in late spring, and permittee convenience in the fall. In addition, there are currently 28 head of mature horses authorized to graze the Butler Creek pasture for an approximate 90 day season of use between June 16 and September 15, or 85 HMs of use. Based on previous allotment inspections, the Ruby Creek allotment typically receives variable levels of grazing intensity, depending on the year and pasture. The Cow Creek pasture generally receives moderate to moderately heavy use on suitable upland and riparian sites. Mostly moderate use occurs on suitable rangeland sites within the Lower Ruby pasture. Variable forage utilization occurs in the Butler Creek pasture, with mostly light use occurring in the uplands, and light to moderate use occurring on major riparian sites. Smaller isolated springs and tributaries generally receive moderate to heavy use by horses within this pasture, and trailing by horses has created a system of heavily used and overly wide trails that are susceptible to erosion and invasion by noxious weeds. The Ruby Creek allotment was not grazed in compliance with all Forest Plan standards in 2012, but had met standards for the years 2003 through 2011. However, compliance with grazing standards during this time period was documented to be marginal on many years.

The Ruby Creek allotment was identified in the 1995 Beaverhead National Forest Grazing Lawsuit Settlement Agreement, which directs the Forest Service to complete a NEPA environmental analysis and decision for the authorization of livestock grazing and associated resource protection measures on allotments identified in the agreement's allotment planning schedule.

Suitable Allotment Acres: The Ruby Creek Allotment consists of approximately 26,873 total acres, including about 25,355 acres of NFS land, 42 acres of BLM land, and 1,476 acres of grazed private land. Although these other lands within the allotment boundary provide forage for livestock, they were not analyzed in this exercise because the capability and suitability of these lands are not known. Of total NFS acres, approximately 2,483 acres are considered capable for livestock grazing. From these capable acres, after verifying GIS polygons with aerial imagery and on-the-ground knowledge, 662 acres were considered too forested, within grazing exclosures, or otherwise not suitable for cattle use. Suitable range identified from this exercise consists of 1,821 National Forest acres. Suitable vegetation types within the Ruby Creek Allotment include open grasslands, sagebrush/grasslands, and riparian areas.

Suitability for livestock grazing is delineated on the Ruby Creek Allotment suitability map (see *Appendix A3* of the DEIS).

Total NFS Acres	25,355
Capable NFS Acres	2,483
Conifer Cover Greater Than 60%	3
Timber Harvest Units Older Than 1994	653
Greater Than 40% Slope	0
Existing Exclosures	6
Total Allotment Suitable NFS Acres	1,821

Allotment Vegetation: The Ruby Creek allotment has a mix of vegetation types, but the dominant cover type consists of lodgepole pine at all elevation zones. The minimum elevation is 6,320 feet, and the maximum is 8,280 feet. The topography varies greatly, from flat to gently sloping valley bottoms at lower elevations to moderately steep to steep timbered slopes at higher elevations. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 60 inches in the upper elevation zones along the Montana/Idaho border. Allotment vegetation is characterized by a dominant conifer cover type, with appreciable inclusions of grasslands (wet and dry), xeric shrublands, and mesic shrublands. Conifer vegetation types in this allotment had received extensive timber harvest activity between the 1960's and 2003. Activity treatments were mostly stand and patch clearcuts. Other harvest types consisted of sanitation (salvage), single-tree selection, group selection, liberation, seed-tree preparatory, improvement, and special cuts. These past activities total about 4,233 acres. In addition, there were an estimated 300 acres harvested on private lands within the allotment boundary in 2012. A summary of existing vegetation cover types is presented in Table 19 below:

Table 19: Ruby Creek Allotment existing vegetation cover types.

Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	22,585	84
Engelmann Spruce	68	<1
Subalpine Fir	60	<1
Douglas Fir	1,299	5
Aspen	3	<1
Willow-sedge/grass	1,355	5
Sedge/grass meadow (wet)	467	2
Sagebrush-grassland	422	2
Mixed Grassland	610	2
Other Vegetation	<1	<1
Total Allotment Vegetation Acres = 26,869		

Rangeland Vegetation: A major upland rangeland habitat type that occurs within the Ruby Creek allotment is the tufted hairgrass/sedge type. There are also unclassified mixed grasslands, and sagebrush-grasslands that were not sampled as part of this project. Riparian types sampled within the allotment included the Drummond willow/beaked sedge, Geyer

willow/beaked sedge, and beaked sedge (water sedge phase) habitat types. Other riparian habitat types may exist, but they were not sampled and identified as part of this project.

According to the Mueggler and Stewart (1980), and Hansen et al. (1995) publications, under climax vegetation conditions these plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 20: Tufted hairgrass/sedge habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Tufted hairgrass - 33 Timber oatgrass – 4 Alpine timothy – 2 Alpine foxtail - 2 Kentucky bluegrass - <1 Sedges (*Carex* spp.) – 27	Not provided
Shrub Cover (canopy cover)	1	0 - 4
Ground Cover	>99	>99 - 100
Noxious Weeds	Not recorded	Not recorded

Table 21: Drummond willow/beaked sedge habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Drummond willow – 10 Booth willow – 3 Geyer willow - <1 Beaked sedge – 7 Water sedge – 6 Bluejoint reedgrass - 3	6 – 17 0 – 4 0 – <1 0 – 15 0 – 11 0 - 7
Shrub Cover (canopy cover)	132 (all shrubs) 69 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 22: Geyer willow/beaked sedge habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Geyer willow – 8 Booth willow – 6 Beaked sedge – 7 Water sedge – 3 Tufted hairgrass – 3 Bluejoint reedgrass - 2	0 – 12 0 – 12 0 – 12 0 – 9 0 – 3 0 - 3
Shrub Cover (canopy cover)	195 (all shrubs) 90 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 23: Beaked sedge (water sedge phase) habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Beaked sedge – 7 Water sedge – 7 Bluejoint reedgrass – 4 Tufted hairgrass - 1 Alpine foxtail – 1 Slender wheatgrass - <1	<1 – 16 2 – 15 0 – 7 0 – 4 0 – 2 0 - <1
Shrub Cover (canopy cover)	13 (all shrubs)	N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of two upland long-term transects were reread in 2005. Both transects are located in grassland habitat types. These transects were last read in 1980. In addition, baseline riparian vegetation data was collected on Cow Creek in 2006 and 2008, and on Big Moosehorn Creek in 2006 (see *Project File* for a summary of rangeland health indicator data collected on these upland and riparian transects). An assessment of the four rangeland health indicators for the Ruby Creek allotment is as follows:

Species Composition
Based on upland long-term monitoring transect data for grassland habitat types on the Ruby Creek allotment, it was determined that the composition of important grass species on these rangelands are below amounts expected for this habitat type (i.e., tufted hairgrass/sedge h.t.). Specifically, the composition of important grass and sedge species such as tufted hairgrass and the various upland sedges appear to be below amounts expected for these rangelands. Of concern is the major increase (average of 18%) in Kentucky bluegrass composition, an aggressive nonnative species that typically increases with heavy grazing pressure. No shrubs were recorded on these grassland transects, which is expected for this habitat type.

In regards to species composition on riparian sites sampled within the Ruby Creek allotment, it was found that important shrubs, grasses, and sedges occur with high proportionate cover and frequency. This would suggest that riparian vegetation is in a desirable condition, and composition amounts are generally within the range of variation when compared to research data for similar habitat types.

Shrub Cover
No shrubs were recorded on sampled grasslands, which can be expected for this habitat type.

Total shrub canopy cover for dominant willows on the Cow Creek (43%) and Big Moosehorn Creek (average of 12% for two transects) riparian sites appear to be appreciably below average amounts recorded for similar habitat types in research data.

Ground Cover

For grassland types on this allotment, it was determined that ground cover averaged 95 percent, which is somewhat lower than the expected range of greater than 99 percent to 100 percent.

For the sampled riparian sites, ground cover was determined to average 90 percent across all transects, which left 10 percent as being bare ground. Although the average ground cover is high for these riparian habitats, two of the four sampled sites had 15 percent and 16 percent bare ground, respectively.

Noxious Weeds

On upland sites, no noxious weeds were recorded in these transects, or were observed in close proximity to transect sites. However, Canada thistle, a state-listed noxious weed, was observed and recorded in one riparian site transect, but it was a very minor component of total vegetation cover (<1%).

Rangeland Health Indicator Assessment Conclusion: In regards to upland sites, there were important changes recorded on all transects. For example, the composition of important desirable grass species such as tufted hairgrass and the various upland sedge species had decreased in composition by as much as 27 percent and 24 percent, respectively, in 2005. Other major changes included an increase (greater than 30%) in forb cover on transect PT2. Although the reason for this increase is not very clear, a corresponding increase in less desirable grasses (i.e., Kentucky bluegrass) on this same transect would suggest past heavy grazing pressure on this site. The amount of ground cover has remained fairly constant; however, there was 7 percent decreases recorded on transect PT1 in 2005. The somewhat high amounts of bare ground on these grasslands may be a reflection of past grazing pressure, and changes in plant composition. Overall, these sites are considered to be below desired rangeland health conditions for species composition and ground cover, and are considered to be static, or are trending away from desired vegetation conditions when compared to 1980 data. Although these upland sites may be functioning in a manner that protects the soil resource from erosion, the higher than desired amounts of bare ground may cause these sites to be at a greater risk to invasion by noxious weeds.

For sampled riparian sites, overall they are considered to be meeting desired rangeland health conditions for species composition and ground cover; however, riparian vegetation monitoring reports (USDA, 2007 and 2012) have identified a need for increased cover of some important grass species such as tufted hairgrass, and reduced stream bank disturbance. The amount of willow cover recorded for riparian shrub-grass plant communities is thought to be lower than desirable amounts, but the reasons for this are unclear. The monitoring reports also recommend limiting the amount of time livestock spend in these riparian areas to improve plant vigor and stream bank stability, which would contribute to the long-term sustainability and function of these sites. Currently these riparian sites are considered to be in mid to late seral ecological condition, and are functioning in a manner that resists invasion by noxious weeds, or slows the expansion of existing weed populations within these sites. This assessment conclusion could also be extrapolated to other similar riparian sites that occur at

similar elevations within the Ruby Creek allotment boundary (*personal observation by Kevin Greenwood*).

Invasive Plant Assessment and Conclusion: There are approximately 433 acres of inventoried noxious weed infestations within the Ruby Creek allotment. Inventoried infestations are predominantly small and large area infestations of spotted knapweed that are located within the boundaries of old timber harvest units. Other infestations are found along Forest roads, and in sagebrush-grassland plant communities within the allotment. The size and extent of these existing weed infestations creates a high invasion risk to rangeland plant communities, and other native plant habitats, that are currently free of weeds. In addition, existing weed populations are likely to expand if they are not actively controlled.

Dry Creek Allotment

Allotment Management Summary: The Dry Creek allotment is currently being managed under a 2-pasture deferred rotation grazing strategy, and BLM lands contained within the allotment boundary are managed by the Forest Service under a coordinated management agreement with the BLM. These BLM lands provide an additional 40 HMs of grazing use during the grazing season. Existing authorized livestock numbers and season of use are 150 cow/calf pairs for an approximate 45 day season of use between August 10 and September 24, or about 222 HMs of use. Prior to about 2004, the authorized numbers and season of use was 100 head for an approximate 90 day season between July 1 and September 30, or 302 HMs of use. Based on previous allotment inspections, this allotment typically receives light-moderate to moderate forage utilization on suitable upland sites, and mostly moderate utilization on suitable riparian grazing areas; however, excessive use of some riparian sites such as lower Dry Creek have been a reoccurring issue on this allotment. The Dry Creek allotment has been grazed in compliance with Forest Plan standards eight out of the last 10 years (2003-2012), but compliance has been documented to be marginal for some years within this time period.

Because the existing Dry Creek AMP is outdated, the allotment has been identified by the Forest Service as needing a revised allotment management plan to comply with Section 504 of the 1995 Rescissions Act that directs the Forest Service to establish and adhere to a schedule for the completion of NEPA analysis for all National Forest System grazing allotments where such analysis was needed.

Suitable Allotment Acres: The Dry Creek Allotment consists of approximately 15,030 total acres, including about 13,991 acres of NFS land, 1,012 acres of BLM land, and 27 acres of private land. Although these other lands within the allotment boundary provide forage for livestock, they were not analyzed in this exercise because the capability and suitability of these lands are not known. Of total NFS acres, approximately 955 acres are considered capable for livestock grazing. From these capable acres, after verifying GIS polygons with aerial imagery and on-the-ground knowledge, 583 acres were considered too steep, forested, or otherwise not suitable for cattle use. Suitable range identified from this exercise consists of 373 National Forest acres. Suitable vegetation types within the Dry Creek Allotment include open grasslands, sagebrush/grasslands, early seral conifer stands, and riparian areas.

Suitability for livestock grazing is delineated on the Dry Creek Allotment suitability map (see *Appendix A3* of the DEIS).

Total NFS Acres	13,991
Capable NFS Acres	955
Conifer Cover Greater Than 60%	239
Timber Harvest Units Older Than 1994	332
Greater Than 40% Slope	10
Existing Exclosures	1
Total Allotment Suitable NFS Acres	373

Allotment Vegetation: The Dry Creek allotment has a mix of vegetation types, but the dominant cover type consists of lodgepole pine at all elevation zones. The minimum elevation is 6,640 feet, and the maximum is 8,560 feet. The topography is mostly flat to gently sloping at lower elevations, to some moderately steep timbered slopes at the higher elevations. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 34 inches in the upper elevation zones. Allotment vegetation is characterized by a dominant conifer cover type, with appreciable inclusions of xeric (i.e., sagebrush-grasslands) and mesic shrublands. Conifer vegetation types in this allotment had received moderate timber harvest activity between the 1970's and 2003. Activity treatments were mostly stand clearcuts consisting of approximately 1,254 acres. Other harvest types consisted of strip clearcutting, and single-tree selection and special cuts. These past activities total about 1,474 acres. A summary of existing vegetation cover types is presented in Table 24 below:

Table 24: Dry Creek Allotment existing vegetation cover types.

Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	12,220	82
Whitebark Pine	129	<1
Engelmann Spruce	201	1
Subalpine Fir	101	<1
Douglas Fir	1,242	8
Willow-sedge/grass	196	1
Sedge/grass meadow (wet)	40	<1
Sagebrush-grassland	627	4
Mixed Grassland	139	1
Other Vegetation	29	<1
Total Allotment Vegetation Acres = 14,924		

Rangeland Vegetation: A major upland rangeland habitat type that occurs within the Dry Creek allotment is the mountain big sagebrush/Idaho fescue type. Other upland types (i.e., grasslands) likely exist, but they were not identified, or sampled, as part of this project. Riparian types sampled within the allotment included a Drummond willow plant community that is likely a grazing disclimax of the Drummond willow/beaked sedge habitat type. Other

riparian habitat types likely exist, but they were not sampled and identified as part of this project.

According to the Mueggler and Stewart (1980), and Hansen et al. (1995) publications, under climax vegetation conditions these plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 25: Mountain big sagebrush/Idaho fescue habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Mountain big sagebrush - 18 Idaho fescue – 39 Bluebunch wheatgrass – 5 Thickspike wheatgrass – 2 Prairie junegrass – 4 Richardson's needlegrass - <1	Not provided
Shrub Cover (canopy cover)	21	5 - 44
Ground Cover	97	91 - >99
Noxious Weeds	Not recorded	Not recorded

Table 26: Drummond willow/beaked sedge habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Drummond willow – 10 Booth willow – 3 Geyer willow - <1 Beaked sedge – 7 Water sedge – 6 Bluejoint reedgrass - 3	6 – 17 0 – 4 0 – <1 0 – 15 0 – 11 0 - 7
Shrub Cover (canopy cover)	132 (all shrubs) 69 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of three upland long-term transects were reread in 2011. All transects are located within sagebrush-grasslands, and were last read in 1980. In addition, baseline riparian vegetation data was collected on Big Lake Creek in 2006 (see *Project File* for a summary of rangeland health indicator data collected on these upland and riparian transects), and a land health assessment was completed on BLM lands within the allotment in 2009. An assessment of the four rangeland health indicators for the Dry Creek allotment is as follows:

Species Composition

A review of upland long-term monitoring transect data for sagebrush-grassland types on this allotment showed that, overall, the composition of important shrubs and grass species on these rangelands are thought to be present in desirable amounts for this habitat type.

A review of species composition data for the Big Lake Creek riparian site indicated that the composition of desirable shrubs (willows) and graminoids (grasses and sedges) for the habitat type was below desired amounts. An important native sedge (beaked sedge) was completely absent from this site, and nonnative plants such as white clover (*Trifolium repens*), common dandelion (*Taraxacum officinale*), and Kentucky bluegrass comprised about 4 percent of the total composition.

Shrub Cover
On sampled sagebrush-grasslands, sagebrush canopy cover averaged 17 percent. This is very close to the average recorded for similar sites in late seral to climax vegetation conditions (see *Tables* 25 and 26 above), and is within the range of variability for these plant communities.

Total shrub canopy cover for dominant willows (17%) on the Big Lake Creek riparian site appears to be well below the average amount recorded for similar habitat types in research data.

Ground Cover
For sagebrush-grassland types on the Dry Creek allotment, the average ground cover of 89 percent is lower than expected, and outside the range of variability for this habitat type.

Ground cover on the sampled riparian site was recorded to average about 83 percent, which left 17 percent as being bare ground. This amount of bare ground is considerably higher than what is desirable for this particular habitat type.

Noxious Weeds
On upland sites, no noxious weeds were recorded in these transects, but known spotted knapweed infestations are in close proximity to all transect locations.

Based on riparian vegetation monitoring data from Big Lake Creek, no noxious weeds were detected in the transect. However, there are known spotted knapweed populations within close proximity to this transect site.

Rangeland Health Indicator Assessment Conclusion: In regards to the composition of important upland shrubs and desirable perennial grass species, there were major changes recorded on all three transects. Important forage species such as Idaho fescue and bluebunch wheatgrass had increased in composition by as much as 21 percent and 15 percent, respectively. Other major changes included a decrease in sagebrush canopy cover on two transects, but the reasons for these changes are not clear. Except for one upland transect (C1-T3), the amount of ground cover has increased when compared to 1980 data. On C1-T1 there was a major increase in ground cover in 2011 from 81 percent to 91percent. Even though there were appreciable increases, existing ground cover is considered to be below desired objectives. It is thought that these lower ground cover amounts on sagebrush-grasslands may be a result of low soil productivity coupled with past grazing impacts. Overall, these sites are considered to be meeting desired rangeland health conditions, or are trending towards desired conditions in regards to species composition, shrub cover, and ground cover amounts. They are also functioning in a manner that protects the soil resource from erosion, but currently

may be at increased risk to invasion by noxious weeds due to less than desirable ground cover.

In regards to riparian health, vegetation conditions on lower Big Lake Creek are considered to be not meeting desired objectives for species composition, shrub canopy cover, and ground cover. Because of the higher than expected amounts of bare ground, this area is susceptible to invasion by noxious weeds. However, it should be noted that the monitoring site on lower Big Lake Creek is not considered to be very representative of riparian vegetation conditions across the allotment. This site consists of a narrow riparian corridor that has been heavily encroached upon by conifers, primarily lodgepole pine. High conifer cover can "shade-out" shrubs and grasses, and this could partially explain the lower than desirable amounts of these species on this particular site. Past heavy grazing use may have also played a role in composition changes. With the exception of lower Dry Creek, riparian systems within the allotment are better characterized by a more diverse and extensive composition of desirable shrubs and grasses (*personal observation by Kevin Greenwood*). Examples include the middle reaches of both Big Lake Creek and Dry Creek.

In regards to BLM lands within the Dry Creek allotment, the 2009 land health assessment concluded that, overall, upland and riparian habitats were functioning properly, and that current livestock management is maintaining sagebrush-grassland sites in a mid to late seral condition.

Invasive Plant Assessment and Conclusion: There are approximately 26 acres of inventoried noxious weed infestations within the Dry Creek allotment. Inventoried infestations are predominantly small, low density infestations of spotted knapweed along allotment roads and trails. Although the size and extent of these existing weed infestations is not large, the location of these weed populations near, or within, rangeland plant communities would create a moderate risk for invasion if they are not actively controlled. On the Big Lake Creek riparian site, nonnative plant species such as common dandelion, white clover, Kentucky bluegrass, and Canada bluegrass (*Poa compressa*) were frequently recorded on the monitoring transect. These plants are considered increaser species, which means they typically increase in density with grazing pressure and disturbance. The high amounts of bare ground recorded within the monitoring transect would suggest this site is at moderate risk to expansion by these species, and invasion by noxious weeds.

Twin Lakes Allotment

Allotment Management Summary: The Twin Lakes allotment is currently being managed as two distinct grazing units where separate cattle herds graze allocated areas, or pastures, within the allotment. One herd grazes the northern part of the allotment, which is known as the Big Lake portion. This portion consists of two pastures (Lower Big Lake and Upper Big Lake) where 166 cow/pairs are currently authorized to graze during an approximate 45 day season of use between the approximate dates of July 15 and September 12, or about 249 HMs of use. Prior to 2012, there were 166 head authorized to graze for an approximated 60 day season of use, or 332 HMs. The reduction in the season was made to address permittee noncompliance with Forest Plan grazing standards. The current management strategy consists of a deferred

or deferred rotation, grazing system. Livestock entry into this portion of the allotment is deferred to approximately August 1 every other year. For the Big Lake portion of the allotment, compliance with Forest Plan grazing standards has occurred eight out of the last 10 years (2003-2012), with noncompliance occurring in 2004 and 2011.

On the southern part of the allotment, which is known as the Little Lake portion, 174 cow/calf pairs are currently authorized to graze during an approximate 60 day season of use between July 10 and September 10 for 360 HMs of use. However, actual numbers that have grazed the Little Lake portion of the allotment over the last ten years (2002-2011) have varied between 110 and 130 head, with use averaging about 156 HMs. The management system consists of a two pasture (Lower Little Lake and Upper Little Lake) modified rest grazing strategy where this portion of the allotment is completely rested from livestock use two out of six years. When this portion of the allotment is grazed, a two-pasture deferred rotation grazing strategy is typically implemented. On the Little Lake portion of the Twin Lakes allotment, compliance with Forest Plan grazing standards has occurred eight out of the last 10 years as well, with noncompliance occurring 2004 and 2007.

Overall, this allotment typically receives light to moderate forage utilization in the uplands, but some upland areas in the Big Lake portion has received repeated heavy use in the past. Suitable riparian areas generally receive moderate use, but heavy use has been documented on some sites in the last ten years.

The Twin Lakes allotment was identified in the 1995 Beaverhead National Forest Grazing Lawsuit Settlement Agreement, which directs the Forest Service to complete a NEPA environmental analysis and decision for the authorization of livestock grazing and associated resource protection measures on allotments identified in the agreement's allotment planning schedule.

Suitable Allotment Acres: The Twin Lakes Allotment consists of approximately 12,716 total acres, including about 12,701 acres of NFS land, and 15 acres of private land. Although these private lands within the allotment boundary provide forage for livestock, they were not analyzed in this exercise because the capability and suitability of these lands are not known. Of the total NFS acres, approximately 1,106 acres are considered capable for livestock grazing. From these capable acres, after verifying GIS polygons with aerial imagery and on-the-ground knowledge, 381 acres were considered too forested, or otherwise not suitable for cattle use. Suitable range identified from this exercise consists of 725 National Forest acres. Suitable range was not analyzed for private lands within the allotment in this exercise. Suitable vegetation types within the Twin Lakes Allotment include open grasslands, sagebrush/grasslands, early seral conifer stands, and riparian areas. Suitability for livestock grazing is delineated on the Twin Lakes Allotment suitability map (see *Appendix A3* of the DEIS).

Total NFS Acres	12,701
Capable NFS Acres	1,106
Conifer Cover Greater Than 60%	25
Timber Harvest Units Older Than 1994	358

Greater Than 40% Slope	0
Existing Exclosures	0
Total Allotment Suitable NFS Acres	725

Allotment Vegetation: The Twin Lakes allotment has a mix of vegetation types, but the dominant cover type consists of lodgepole pine at all elevation zones. The minimum elevation is 6,760 feet, and the maximum is 8,680 feet. The topography is mostly flat to gently sloping at lower elevations, to some moderately steep timbered slopes at the higher elevations. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 34 inches in the upper elevation zones. Some areas of the allotment may receive in excess of 34 inches on favorable precipitation years. Allotment vegetation is characterized by a dominant conifer cover type, with sizable inclusions of xeric and mesic shrublands. Conifer vegetation types in this allotment had received moderate timber harvest activity between the 1970's and 1990's. Activity treatments were mostly stand and patch clearcuts consisting of approximately 1,572 acres. Other harvest types consisted of single-tree selection and special cuts. These past activities total about 1,710 acres. A summary of existing vegetation cover types is presented in Table 27 below:

Table 27: Twin Lakes Allotment existing vegetation cover types.

Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	10,032	79
Whitebark Pine	374	3
Engelmann Spruce	304	2
Subalpine Fir	210	2
Douglas Fir	737	6
Aspen	5	<1
Willow-sedge/grass	523	4
Sedge/grass meadow (wet)	75	<1
Sagebrush-grassland	374	3
Mixed Grassland	49	<1
Other Vegetation	10	<1
Total Allotment Vegetation Acres = 12,693		

Rangeland Vegetation: A major upland rangeland habitat type that occurs within the Twin Lakes allotment is the mountain big sagebrush/Idaho fescue type. Other upland types exist (i.e., mixed grasslands), but they were not identified, or sampled, as part of this project. Riparian types sampled within the allotment included one conifer-dominated type, and one willow/grass type: Engelmann spruce (*Picea engelmannii*)/field horsetail (*Equisetum arvense*) on Big Swamp Creek, and a narrow Drummond willow/bluejoint reedgrass type on Little Lake Creek that is being heavily encroached upon by conifers. The spruce type generally provides little or no value to livestock other than shading. Although they typically lack important shrubs such as willows, and major forage-producing grasses and sedges, some sites can have an appreciable composition of these plants. Other riparian habitat types are known to exist within the allotment; however, they were not sampled and identified as part of this project.

According to the Mueggler and Stewart (1980), and Hansen et al. (1995) publications, under climax vegetation conditions these plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 28: Mountain big sagebrush/Idaho fescue habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Mountain big sagebrush - 18 Idaho fescue – 39 Bluebunch wheatgrass – 5 Thickspike wheatgrass – 2 Prairie junegrass – 4 Richardson's needlegrass - <1	Not provided
Shrub Cover (canopy cover)	21	5 - 44
Ground Cover	97	91 - >99
Noxious Weeds	Not recorded	Not recorded

Table 29: Engelmann spruce/field horsetail habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Drummond willow – 13 Beaked sedge – 8 Bluejoint reedgrass - 7	0 – 13 0 – 8 0 – 11
Shrub Cover (canopy cover)	52 (all willows)	N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 30: Drummond's willow/bluejoint reedgrass habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Drummond willow – 11 Bluejoint reedgrass - 9 Tufted hairgrass - 2	4 – 18 0 – 14 0 – 4
Shrub Cover (canopy cover)	69 (all willows)	N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of three upland long-term transects were reread in 2012. All transects are located within sagebrush-grasslands. These transects were last read in 1979 and 1980. In addition, baseline riparian vegetation data was collected on Big Swamp Creek and Little Lake Creek in 2006 and 2008, respectively (see *Project File* for a summary of rangeland health indicator data collected on these upland and riparian transects). An assessment of the four rangeland health indicators for the Twin Lakes allotment is as follows:

Species Composition
A review of upland long-term monitoring transect data for sagebrush-grassland types on this allotment showed that, overall, the composition of important shrubs are thought to be present in expected amounts for this habitat type. However, the composition of grasses appears to be heavily skewed towards increaser species on one transect (C3-T1), and found in high quantities on other transects which may suggest past heavy grazing use.

For the Big Swamp Creek and Little Lake Creek riparian sites, riparian vegetation sampled on these two transects indicate that these sites are either forested riparian habitats, or are trending towards a forested plant community. With the exception of bluejoint reedgrass and Holm's Rocky Mountain sedge (*Carex scopulorum*), other important forage species are mostly absent, or are present in very low amounts. This would be expected for these habitat types where conifer cover is progressively "shading out" grasses and sedges. Shrubs such as mountain alder (*Alnus incana*) and willow are present, which help armor the stream banks.

Shrub Cover
On upland sites, shrub canopy cover averaged 20 percent, which is very close to average amounts expected for these sagebrush-grassland sites (see *Table*s 28-30 above), or is within the range of variability for this habitat type.

Total canopy cover for important riparian shrubs (i.e., willows) on the Big Swamp Creek site was 25 percent, and 43 percent on the Little Lake Creek site. These amounts appear to be considerably below those recorded for similar habitat types in research data.

Ground Cover
For sagebrush-grassland types on the Twin Lakes allotment, ground cover was recorded to average 97 percent. This is the same average amount that has been recorded for similar habitat types in high seral to climax vegetation condition (see *Tables* 28-30 above).

Ground cover on the sampled riparian sites was calculated to average 96 percent, which is desirable for these particular habitat types.

Noxious Weeds
No noxious weeds were recorded on upland transects; however, there are known small spotted knapweed populations within close proximity to all transect sites.

On the Big Swamp Creek and Little Lake Creek monitoring transects, no noxious weeds were detected in either transect, and there are no known infestations near these sites.

Rangeland Health Indicator Assessment Conclusion: Based on upland long-term monitoring transect data for sagebrush-grassland habitat types on this allotment, there were a few major changes detected in species composition and shrub canopy cover. Specifically, on one transect (C3-T1) within the Big Lake portion of the allotment there was a major increase (31%) in sagebrush cover when compared to 1980 data. In addition, there was a notable increase (16%) in Kentucky bluegrass, which is considered a nonnative increaser species. On this same site, there were also major decreases recorded, including a 26 percent reduction in

both the sedge and forb composition. In regards to the composition of important desirable perennial grass species on other transects, it was noted that the composition appears to be heavily weighted with increaser species, specifically threadleaf sedge (*Carex filifolia*). It is suspected that past heavy grazing pressure has resulted in the changes detected on these upland sites. In regards to ground cover, it was determined that percent bare ground (average of 3%) is within the expected range of variability (<1% to 9%) for mountain big sagebrush/Idaho fescue rangelands. Although no noxious weeds or other invasive plants of concern were recorded in these transects, there are known small infestations of spotted knapweed within close proximity of many of these transect locations. Overall, these sites are considered to be meeting desired conditions for shrub and ground cover, but are currently below desired rangeland health objectives for species composition. Compared to 1979 and 1980 data, these upland sites appear to be in a mostly static condition with no clear trend indicators; however, they are considered to be functioning in a manner that protects the soil resource from wind and water erosion, and resists invasion by noxious weeds.

Riparian areas sampled in 2006 and 2008 are not a very accurate reflection of riparian habitat types or vegetation conditions on the Twin Lakes allotment, especially on Little Lake Creek. For example, within the mid to upper reaches of the Little Lake Creek drainage there are extensive meadow and wet meadow complexes with a diverse array of riparian shrubs, grasses, and sedges. With the exception of isolated stream reaches, these riparian meadow complexes are estimated to be meeting desired rangeland health conditions for species composition, shrub cover, ground cover, and noxious weeds (*personal observation by Kevin Greenwood*). On Big Swamp Creek, riparian habitats are mostly forested, or are trending towards forested conditions. Encroachment by conifers has resulted in a reduction of important grasses and sedges, and has limited the amount of suitable rangeland available for livestock use. This has resulted in livestock distribution and forage utilization issues on remaining suitable lands.

Invasive Plant Assessment and Conclusion: There are approximately 72 acres of inventoried noxious weed infestations within the Twin Lakes allotment. Inventoried infestations are predominantly medium-sized area infestations of Canada thistle, and other nonnative thistle species. There are also small, low density infestations of spotted knapweed along allotment roads and trails. Of greatest concern is the proximity of spotted knapweed infestations to rangeland plant communities. The locations of these weed populations near, or within, these plant communities create a moderate risk for invasion, or expansion, if they are not actively controlled.

Monument Allotment

Allotment Management Summary: The Monument allotment is currently being managed under a 2-pasture deferred rotation grazing strategy where each pasture is grazed for about 40 days. Existing authorized livestock numbers and season of use are 300 cow/calf pairs for an approximate 85 day season of use between July 20 and October 15, or 868 HMs of use. According to actual use records for the last 10 years (2003- 2012), use of the allotment averaged closer to 641 HMs, and the majority of this use has been occurring in only one pasture the last few years. Based on previous allotment inspections from 2007 to 2011, this

allotment has typically received mostly light to light moderate forage utilization on suitable upland and riparian areas. Prior to about 2006, this use was documented to be considerably higher on most suitable rangeland sites within the allotment, but the reasons for this are unclear. It is suspected that the permittee at that time may have been placing excess numbers of cattle on the allotment. Over the last 10 years (2003-2012), the Monument allotment has been grazed in compliance with Forest Plan standards every year; however, marginal compliance was documented for a number of years prior to 2006.

The Monument allotment was identified in the 1995 Beaverhead National Forest Grazing Lawsuit Settlement Agreement, which directs the Forest Service to complete a NEPA environmental analysis and decision for the authorization of livestock grazing and associated resource protection measures on allotments identified in the agreement's allotment planning schedule.

Suitable Allotment Acres: The Monument Allotment consists of approximately 23,343 total acres, including about 23,217 acres of NFS land, 122 acres of BLM land, and 4 acres of private land. Although these other lands within the allotment boundary provide forage for livestock, they were not analyzed in this exercise because the capability and suitability of these lands are not known. Of total NFS acres, approximately 1,790 acres are considered capable for livestock grazing. From these capable acres, after verifying GIS polygons with aerial imagery and on-the-ground knowledge, 269 acres were considered too steep, forested, or otherwise not suitable for cattle use. Suitable range identified from this exercise consists of 1,521 National Forest acres. Suitable vegetation types within the Monument Allotment include open grasslands, sagebrush/grasslands, and riparian areas. Suitability for livestock grazing is delineated on the Monument Allotment suitability map (see *Appendix A3* of the DEIS).

Total NFS Acres	23,217
Capable NFS Acres	1,790
Conifer Cover Greater Than 60%	264
Timber Harvest Units Older Than 1994	0
Greater Than 40% Slope	4
Existing Exclosures	1
Total Allotment Suitable NFS Acres	1,521

Allotment Vegetation: The Monument allotment has a mix of vegetation types, but the dominant cover type consists of lodgepole pine at all elevation zones. The minimum elevation is 6,680 feet, and the maximum is 9,120 feet. The topography is mostly flat to gently sloping at lower elevations, to some moderately steep timbered slopes at the higher elevations. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 34 inches in the upper elevation zones. Some areas of the allotment may receive in excess of 34 inches on favorable precipitation years. Allotment vegetation is characterized by a dominant conifer cover type, with sizable inclusions of dry and wet grasslands, and xeric and mesic shrublands. Conifer vegetation types in this allotment had received light timber harvest activity between the 1980's and 1990's. Activity treatments were mostly stand clearcuts with leave trees consisting of approximately 68 acres. Other

harvest types consisted of single-tree selection and patch clearcuts. These past activities total about 104 acres. A summary of existing vegetation cover types is presented in Table 31 below:

Table 31: Monument Allotment existing vegetation cover types.

Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	19,387	83
Whitebark Pine	125	1
Engelmann Spruce	70	<1
Subalpine Fir	108	1
Douglas Fir	914	4
Aspen	3	<1
Willow-sedge/grass	1,106	5
Sedge/grass meadow (wet)	298	1
Sagebrush-grassland	896	4
Mixed Grassland	309	1
Other Vegetation	23	<1
Total Allotment Vegetation Acres = 23,239		

Rangeland Vegetation: A major upland rangeland habitat type that occurs within the Monument allotment is the mountain big sagebrush/Idaho fescue type. Other upland types exist (i.e., mixed grasslands), but they were not identified, or sampled, as part of this project. Riparian types sampled within the allotment included one willow/sedge dominated type (Geyer willow/beaked sedge h.t.) on Miner Creek, and two riparian grassland types on Englejard Creek consisting of a water sedge habitat type and a beaked sedge habitat type. Other riparian habitat types likely exist within the allotment; however, they were not sampled and identified as part of this project.

According to the Mueggler and Stewart (1980), and Hansen et al. (1995) publications, under climax vegetation conditions these plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 32: Mountain big sagebrush/Idaho fescue habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Mountain big sagebrush - 18 Idaho fescue – 39 Bluebunch wheatgrass – 5 Thickspike wheatgrass – 2 Prairie junegrass – 4 Richardson's needlegrass - <1	Not provided
Shrub Cover (canopy cover)	21	5 - 44
Ground Cover	97	91 - >99
Noxious Weeds	Not recorded	Not recorded

Table 33: Geyer willow/beaked sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Geyer willow – 8 Booth willow – 6 Beaked sedge – 7 Water sedge – 3 Tufted hairgrass – 3 Bluejoint reedgrass - 2	0 – 12 0 – 12 0 – 12 0 – 9 0 – 3 0 - 3
Shrub Cover (canopy cover)	195 (all shrubs) 90 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 34: Water sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Water sedge – 16 Beaked sedge – 3 Tufted hairgrass - <1 Alpine timothy - <1	0 – 22 0 – 5 0 – 1 0 - <1
Shrub Cover (canopy cover)	15 (all shrubs)	N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 35: Beaked sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Beaked sedge - 8 Nebraska sedge – 3 Tufted hairgrass - <1	0 – 12 0 – 5 0 – <1
Shrub Cover (canopy cover)	6 (all shrubs)	N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of three upland long-term transects were reread in 2004. Two are located in sagebrush-grasslands, and one is located in a wet grassland. These transects were last read in 1979. In addition, baseline riparian vegetation data was collected on Miner Creek in 2006, and on Englejard Creek in 2008 (see *Project File* for a summary of rangeland health indicator data collected on these upland and riparian transects). An assessment of the four rangeland health indicators for the Monument allotment is as follows:

Species Composition
After review of upland long-term monitoring transect data for sagebrush-grassland sites, it has been determined that, overall, the composition of important shrubs and grass species on these rangelands are thought to be present in desirable amounts, and occur in quantities expected for this habitat type.

On riparian sites sampled, there was a high composition of important riparian shrubs and grasses. On the wet grassland transect site (PT4) in Englejard Meadows, it appears that the composition of the dominant grass for this habitat type (e.g., beaked sedge) is greatly above amounts recorded in research data (28% versus 8%). Another species, tufted hairgrass, is also far above composition amounts expected for this site (16% versus <1%). The reason for these differences is not clear.

Shrub Cover
On sagebrush-grassland sites, shrub canopy cover averaged 20 percent, which is very close to the average amount recorded on similar sites in a late seral to climax vegetation condition (see *Tables 32-35* above).

Shrub canopy cover for dominant willows on the Miner Creek site was measured at 45 percent. This amount appears to be considerably below that recorded for similar habitat types in research data, but is within the range of variability for this type. No shrub cover was recorded on the Englejard Creek or Englejard Meadows transects, which can be expected for these riparian habitat types.

Ground Cover
For sagebrush-grassland sites on the Monument allotment, ground cover averaged 79 percent. This leaves 21percent as being bare ground, which is not a desirable condition for these sites, and is outside the range of variability for this habitat type.

For sampled riparian sites, ground cover was recorded to average around 86 percent, which is somewhat below desirable levels for these riparian habitats.

Noxious Weeds
No noxious weeds, or other invasive plants of concern, were recorded in upland or riparian transects, or were observed in close proximity to transect sites.

Rangeland Health Indicator Assessment Conclusion: On upland sites, the composition of important desirable perennial grass species has mostly remained in a desirable condition when compared to 1979 data. However, exceptions to this conclusion were found in transect C3-T1. On this transect there was a major (greater than 10%) increase in the amount of ground cover, but also an appreciable decrease in grass and forb cover, including a 17 percent decrease in Idaho fescue. The reasons for this are unclear, but sagebrush canopy cover had increased by 21 percent since 1979. This could partially explain the reduction in grass and forb cover, but heavy grazing pressure prior to about 2006 may have also influenced the distribution and amounts of these plants, and the low amount of ground cover recorded on two transects. Other factors may include climatic differences, and low productivity of soils in this

area. In summary, there is no obvious trend in upland range conditions on the Monument allotment. Because of the high amounts of bare ground in the sagebrush-grasslands, these sites are more susceptible to invasion by noxious weeds, and to erosion events.

A review of riparian vegetation monitoring data and reports indicate that, overall, riparian areas within the Monument allotment are meeting desired rangeland health conditions for plant species composition, shrub cover, and ground cover. Ground cover was low, however, on the Englejard Creek site, and was measured to be 58 percent. This is considered to be undesirable for the site's habitat type (e.g., water sedge h.t.). For transect PT4, a beaked sedge habitat type, it is thought that this rangeland site may be becoming drier due to encroachment by conifers. Transect photos taken in 2004 showed major encroachment by lodgepole pine (*Pinus contorta*) onto this site when compared to 1979 photographs. This could also explain the higher than expected composition of plant species such as tufted hairgrass, which is typically found in greater quantities on drier sites. Overall, sampled riparian sites are considered to be functioning in a manner that protects the soil resource from erosion and invasion by noxious weeds, and this assessment conclusion can be extrapolated to include other similar riparian sites within the boundary of the Monument allotment (*personal observation by Kevin Greenwood*).

Invasive Plant Assessment and Conclusion: There are approximately 8 acres of inventoried noxious weed infestations within the Monument allotment. Inventoried infestations consist mostly of small, widely scattered populations of spotted knapweed. These existing populations are not currently creating a high risk for invasion to allotment rangelands. However, the high amounts of bare ground recorded on sagebrush-grassland sites is of concern; therefore, there is at least a moderate risk of these populations expanding, especially if they are not actively controlled.

Pioneer Allotment

Allotment Management Summary: The Pioneer allotment is currently being managed under a 3-pasture deferred rotation grazing strategy. Existing authorized livestock numbers and season of use are 250 cow/calf pairs for an approximate 65 day season of use that typically occurs between July 7 and September 10 for 542 HMs of use. Based on previous allotment inspections, this allotment typically receives light forage utilization on suitable upland areas, and light moderate to moderate utilization on suitable riparian areas. The Pioneer allotment has been grazed in compliance with Forest Plan standards nine out of the last 10 years (2003-2012). Noncompliance with riparian forage utilization standards occurred in 2007, and there were a number of years where marginal compliance with standards was documented.
The Pioneer allotment was identified in the 1995 Beaverhead National Forest Grazing Lawsuit Settlement Agreement, which directs the Forest Service to complete a NEPA environmental analysis and decision for the authorization of livestock grazing and associated resource protection measures on allotments identified in the agreement's allotment planning schedule.

Suitable Allotment Acres: The Pioneer Allotment consists of approximately 18,650 total acres, including about 18,424 acres of NFS land, and 226 acres of private land. Although these other lands within the allotment boundary provide forage for livestock, they were not

analyzed in this exercise because the capability and suitability of these lands are not known. Of total NFS acres, approximately 1,711 acres are considered capable for livestock grazing. From these capable acres, after verifying GIS polygons with aerial imagery and on-the-ground knowledge, 452 acres were considered too steep, forested, or otherwise not suitable for cattle use. Suitable range identified from this exercise consists of 1,259 National Forest acres. Suitable vegetation types within the Pioneer Allotment include open grasslands, sagebrush/grasslands, and riparian areas. Suitability for livestock grazing is delineated on the Pioneer Allotment suitability map (see *Appendix A3* of the DEIS).

Total NFS Acres	18,424
Capable NFS Acres	1,711
Conifer Cover Greater Than 60%	346
Timber Harvest Units Older Than 1994	0
Greater Than 40% Slope	98
Existing Exclosures	8
Total Allotment Suitable NFS Acres	1,259

Allotment Vegetation: The Pioneer allotment has a mix of vegetation types, but the dominant cover type consists of lodgepole pine at all elevation zones. The minimum elevation is 6,880 feet, and the maximum is 9,600 feet. The topography is mostly flat to gently sloping at lower elevations, to some steep timbered slopes at the higher elevations. Average annual precipitation ranges from approximately 16 inches at lower allotment elevations to 34 inches in the upper elevation zones. Some higher elevation areas of the allotment likely receive in excess of 34 inches on most years. Allotment vegetation is characterized by a dominant conifer cover type, with sizable inclusions of grasslands, and xeric and mesic shrublands. Conifer vegetation types in this allotment have received minimal timber harvest activity. Only about 10 acres had received harvest treatment between 1990 and 1999, and these treatments consisted of special cuts. A summary of existing vegetation cover types is presented in Table 36 below:

Table 36: Pioneer Allotment existing vegetation cover types.

Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	14,856	80
Whitebark Pine	370	2
Engelmann Spruce	178	1
Subalpine Fir	249	1
Douglas Fir	879	5
Aspen	1	<1
Willow-sedge/grass	574	3
Sedge/grass meadow (wet)	231	1
Sagebrush-grassland	834	5
Mixed Grassland	204	1
Other Vegetation	186	1
Total Allotment Vegetation Acres = 18,562		

Rangeland Vegetation: A major upland rangeland habitat type that occurs within the Pioneer allotment is the mountain big sagebrush/Idaho fescue type. Other upland types exist (i.e., mixed grasslands), but they were not sampled for this project. Riparian types sampled within the allotment included one conifer dominated type (subalpine fir/bluejoint reedgrass h.t.) on the north fork of Pioneer Creek, a willow/sedge type (Drummond willow/beaked sedge h.t.) on the Big Hole River, a sedge type (water sedge h.t.) on Berry Creek, and an unclassified grassland type in Skinner Meadows. Depending upon the season of use and availability of other forage species, the subalpine fir/bluejoint reedgrass type can provide moderate to high forage value for livestock. Other riparian habitat types are known to exist within the allotment; however, they were not sampled and identified as part of this project (*personal observation by Kevin Greenwood*).

According to the Mueggler and Stewart (1980), and Hansen et al. (1995) publications, under climax vegetation conditions these plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 37: Mountain big sagebrush/Idaho fescue habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Mountain big sagebrush - 18 Idaho fescue – 39 Bluebunch wheatgrass – 5 Thickspike wheatgrass – 2 Prairie junegrass – 4 Richardson's needlegrass - <1	Not provided
Shrub Cover (canopy cover)	21	5 - 44
Ground Cover	97	91 - >99
Noxious Weeds	Not recorded	Not recorded

Table 38: Subalpine fir/bluejoint reedgrass habitat type.

Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Bluejoint reedgrass - 8	5 - 16
Shrub Cover (canopy cover)	61 (all shrubs)	N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 39: Drummond willow/beaked sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Drummond willow – 10 Booth willow – 3 Geyer willow - <1 Beaked sedge – 7 Water sedge – 6 Bluejoint reedgrass - 3	6 – 17 0 – 4 0 – <1 0 – 15 0 – 11 0 - 7
Shrub Cover (canopy cover)	132 (all shrubs) 69 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 40: Water sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Water sedge – 16 Beaked sedge – 3 Tufted hairgrass - <1 Alpine timothy - <1	0 – 22 0 – 5 0 – 1 0 - <1
Shrub Cover (canopy cover)	15 (all shrubs)	N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of five upland long-term transects were reread in 2004 and 2005. Four of the transects are located in sagebrush-grasslands, and one is located in an unclassified grassland. The sagebrush-grassland transects were last read in 1996, and the riparian grassland transect was last read in 1980. In addition, baseline riparian vegetation data was collected on Berry Creek and the Big Hole River in 2006, and on the North Fork of Pioneer Creek in 2008 (see *Project File* for a summary of rangeland health indicator data collected on these upland and riparian transects). An assessment of the four rangeland health indicators for the Pioneer allotment is as follows:

Species Composition

Based on upland long-term monitoring transect data for sagebrush-grasslands, overall, the composition of important shrubs and grass species on these rangelands are thought to be present in desirable amounts for this habitat type. However, the composition of a key forage plant, Idaho fescue, appears to be somewhat below amounts recorded in research data.

On riparian sites sampled, overall, there was a high composition of desirable riparian plant species, with both high frequency and cover being recorded. On only one transect (PT7) do desired grass species appear to be lacking. Specifically, important sedge species are mostly absent, or are present in very low quantities when compared to what should occur on this particular riparian grassland site.

Shrub Cover

On sagebrush-grassland sites, shrub canopy cover was recorded to vary from 16 percent to 44 percent, with the average being 27 percent. For this habitat type, these sites are considered to be within the range of variability expected for shrub cover, but are considered to be lacking age-class diversity because of their existing late seral or climax vegetation condition.

Shrub canopy cover for dominant willows on the Big Hole River site was measured at 13 percent. This amount is greatly below that recorded for similar habitat types in research data. The reason for this is not clear, but this site has a very high composition (53%) of deep-rooted sedge species. This situation would not be considered conducive to willow establishment on this site. No willow cover was recorded on the Berry Creek or North Fork of Pioneer Creek transects, which can be expected for these riparian habitat types.

Ground Cover

On sagebrush-grassland sites, ground cover was recorded to average 92 percent. This figure falls within the expected range of variability for this habitat type, but is somewhat below the average amount recorded for sites in a late seral or climax vegetation condition.

Ground cover was recorded to average around 96 percent on sampled riparian sites, which is desirable for these habitats.

Noxious Weeds

No noxious weeds were recorded in upland or riparian transects, or were observed in close proximity to transect sites.

Rangeland Health Indicator Assessment Conclusion: Overall, the composition of important shrubs and desirable perennial grass species has remained mostly static, or relatively unchanged, on allotment upland sites when compared to 1996 data. However, some exceptions to this conclusion were found on three of the four transects. Specifically, there has been a decrease in the composition of Idaho fescue, ranging from 3 percent to 9 percent. Although these decreases are relatively small, they are of concern. Coincidentally, on three of the four transects there was an increase in sagebrush canopy cover, ranging from 3 percent to 9 percent. These increases in shrub cover could partially explain the loss of grass composition on some transects. In regards to ground cover, there were sizable increases recorded for all transects except one. On C1-T2 there was a notable decrease (99% to 79%) in the amount of ground cover in 2004. The reason for this is unclear, and there is no obvious correlation in the data to make a determination. It is thought that sampling and/or climatic variation may have led to this difference. In summary, except for ground cover there is no obvious trend in upland range conditions on the Pioneer allotment; however, suitable upland plant communities are considered to be meeting desired rangeland health conditions overall. They are also functioning in a manner that protects the soil resource from erosion, and resists invasion by noxious weeds.

Sampled riparian sites within the Pioneer allotment are considered to be meeting desired vegetation and ground cover conditions, and are functioning in a manner that protects the soil resource from erosion and invasion by noxious weeds. This assessment conclusion can be extrapolated to other similar riparian habitats within the Pioneer allotment boundary.

However, there are some exceptions to this conclusion. On the Big Hole River riparian transect, willow cover is considered to be low for this habitat type; however, it is thought that this site is more likely to be classified as a sedge type (e.g. water sedge h.t.). This sedge type allows for minor inclusions of willows (average of 12% canopy cover). For transect PT7, an unclassified grassland type located in Skinner Meadows, there is a conspicuous absence of desirable sedge and grass species that should occur on this site. Furthermore, there was a major increase (greater than 10%) in slender wheatgrass, a species not typically associated with this kind of site. It is thought that this rangeland site is in an early seral condition due to the area becoming drier, and because of past heavy grazing pressure in this area.

Invasive Plant Assessment and Conclusion: There are approximately 4 acres of inventoried noxious weed infestations within the Pioneer allotment, consisting mostly of very small, widely scattered populations of spotted knapweed. These existing populations are not currently creating a high risk for invasion to allotment rangelands, but the risk is still considered moderate due to the aggressive nature of knapweed. Overall, the high amounts of ground cover recorded on upland and riparian sites is desirable for resisting invasion by weeds, or other nonnative plant species, but high ground cover would not prevent establishment by aggressive invaders such as spotted knapweed.

Saginaw Allotment

Allotment Management Summary: The Saginaw allotment is currently being managed under a 4-pasture rest rotation grazing strategy where each pasture is rested from livestock use one year out of four. Existing authorized livestock numbers and season of use are 300 cow/calf pairs for an approximate 70 day season of use between July 10 and September 17, or 690 HMs of use. These existing numbers and season have been authorized since 2004. Prior to this time, there were up to 400 cow/calf pairs being authorized to graze for about 90 days, but authorized numbers and the season of use have been voluntarily reduced to bring grazing in compliance with Forest Plan grazing standards. Based on allotment inspections since 2004, this allotment typically receives moderate forage utilization on suitable upland areas, but reoccurring heavy utilization has been documented on some sites. In general, mostly moderate to moderately heavy forage utilization occurs on suitable riparian areas. The Saginaw allotment has been grazed in compliance with Forest Plan standards seven out of the last 10 years (2003-2012), but marginal compliance was noted for many of the years that grazing standards had been met.

The Saginaw allotment was identified in the 1995 Beaverhead National Forest Grazing Lawsuit Settlement Agreement, which directs the Forest Service to complete a NEPA environmental analysis and decision for the authorization of livestock grazing and associated resource protection measures on allotments identified in the agreement's allotment planning schedule.

Suitable Allotment Acres: The Saginaw Allotment consists of approximately 12,603 total acres, including about 12,508 acres of NFS land, and 95 acres of private land. Although these private lands within the allotment boundary provide forage for livestock, they were not analyzed in this exercise because the capability and suitability of these lands are not known.

Of total NFS acres, approximately 2,756 acres are considered capable for livestock grazing. From these capable acres, after verifying GIS polygons with aerial imagery and on-the-ground knowledge, 796 acres were considered too forested, or otherwise not suitable for cattle use. Suitable range identified from this exercise consists of 1,960 National Forest acres. Suitable vegetation types include open grasslands, sagebrush/grasslands, early seral conifer stands, and riparian areas. Suitability for livestock grazing is delineated on the Saginaw Allotment suitability map (see *Appendix A3* of the DEIS).

Total NFS Acres	12,603
Capable NFS Acres	2,756
Conifer Cover Greater Than 60%	338
Timber Harvest Units Older Than 1994	458
Greater Than 40% Slope	0
Existing Exclosures	0
Total Allotment Suitable NFS Acres	1,960

Allotment Vegetation: The Saginaw allotment has a mix of vegetation types, but the dominant cover type consists of lodgepole pine at all elevation zones. The minimum elevation is 7,000 feet, and the maximum is 9,120 feet. The topography is mostly moderately sloping, with some steep timbered slopes at higher elevations. Average annual precipitation ranges from approximately 22 to 34inches at most allotment elevations. Some higher elevation areas of the allotment can receive in excess of 34 inches. Allotment vegetation is characterized by a dominant conifer cover type, with sizable inclusions of grasslands, and xeric and mesic shrublands. Conifer vegetation types within this allotment had received moderate timber harvest activity in the 1980's. Additional, but minimal activity had occurred from the 1990's through 2003. Activity treatments were mostly stand clearcuts, or stand clearcuts with leave trees, consisting of approximately 745 acres. Other harvest types consisted of patch clearcuts and group selection cuts. These past activities total about 786 acres. A summary of existing vegetation cover types is presented in Table 41 below:

Table 41: Saginaw Allotment existing vegetation cover types.		
Cover Type Description	Total Acres	Percent of Total Allotment Vegetation Acres
Lodgepole Pine	9,420	75
Whitebark Pine	125	1
Engelmann Spruce	51	<1
Subalpine Fir	14	<1
Douglas Fir	834	7
Willow-sedge/grass	187	1
Sedge/grass meadow (wet)	155	1
Sagebrush-grassland	1,346	11
Mixed Grassland	462	4
Total Allotment Vegetation Acres = 12,594		

Rangeland Vegetation: Two major upland rangeland habitat types occur within the Saginaw allotment: Mountain big sagebrush/Idaho fescue, and Idaho fescue/slender wheatgrass types. In addition, a minor rangeland plant community (tufted hairgrass h.t.) occurs within the allotment, and was sampled. Other upland types exist (i.e., unclassified mixed grasslands), but they were not sampled for this project. Riparian types sampled within the allotment included a Geyer willow/beaked sedge and water sedge type on the East Fork of Englebaugh Creek, a Drummond willow/beaked sedge type on Indian Creek, a water sedge type on a Governor Creek tributary locally known as Little Indian Creek, and an unclassified riparian type on another unnamed Governor Creek tributary. Other riparian habitat types may exist within the allotment; however, they were not identified or sampled as part of this project.

According to the Mueggler and Stewart (1980), and Hansen et al. (1995) publications, under climax vegetation conditions these plant communities would exhibit the following important forage species composition, shrub cover, ground cover, and noxious weed occurrence:

Table 42: Mountain big sagebrush/Idaho fescue habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Mountain big sagebrush - 18 Idaho fescue – 39 Bluebunch wheatgrass – 5 Thickspike wheatgrass – 2 Prairie junegrass – 4 Richardson's needlegrass - <1	Not provided
Shrub Cover (canopy cover)	21	5 - 44
Ground Cover	97	91 - >99
Noxious Weeds	Not recorded	Not recorded

Table 43: Idaho fescue/slender wheatgrass habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Slender wheatgrass – 11 Timber oatgrass – 15 Idaho fescue – 36 Prairie junegrass – 4 Western needlegrass - 7	Not provided
Shrub Cover (canopy cover)	<1	0 - 2
Ground Cover	95	87 - >99
Noxious Weeds	Not recorded	Not recorded

Table 44: Tufted hairgrass habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Tufted hairgrass - 9 Timber oatgrass – 8 Alpine timothy - 2 Baltic rush – <1	6 – 16 0 – 8 0 – 4 0 - <1
Shrub Cover (canopy cover)	5	N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 45: Geyer willow/beaked sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Geyer willow – 8 Booth willow – 6 Beaked sedge – 7 Water sedge – 3 Tufted hairgrass – 3 Bluejoint reedgrass - 2	0 – 12 0 – 12 0 – 12 0 – 9 0 – 3 0 - 3
Shrub Cover (canopy cover)	195 (all shrubs) 90 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 46: Drummond willow/beaked sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Drummond willow – 10 Booth willow – 3 Geyer willow - <1 Beaked sedge – 7 Water sedge – 6 Bluejoint reedgrass - 3	6 – 17 0 – 4 0 – <1 0 – 15 0 – 11 0 - 7

Table 46: Drummond willow/beaked sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Shrub Cover (canopy cover)	132 (all shrubs) 69 (dominant willows)	N/A N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Table 47: Water sedge habitat type.		
Rangeland Health Indicator	Average (Percent)	Range (Percent)
Species Composition	Water sedge – 16 Beaked sedge – 3 Tufted hairgrass - <1 Alpine timothy - <1	0 – 22 0 – 5 0 – 1 0 - <1
Shrub Cover (canopy cover)	15 (all shrubs)	N/A
Ground Cover	Not provided	Not provided
Noxious Weeds	Not recorded	Not recorded

Rangeland Health Indicator Assessment: A total of six upland long-term transects were reread in 2004 and 2005. Two are located in sagebrush-grasslands, three are in Idaho fescue/slender wheatgrass types, and one in tufted hairgrass plant community. Five of these transects were last read in 1996, and one in 1980. In addition, baseline riparian vegetation data was collected on four sites including the East Fork of Englebaugh Creek (2 sites in 2006), Indian Creek in 2009, Little Indian Creek in 2006, and on a Governor Creek tributary in 2009 (see *Project File* for a summary of rangeland health indicator data collected on these upland and riparian transects). An assessment of the four rangeland health indicators for the Saginaw allotment is as follows:

Species Composition

Based on upland long-term monitoring transects for sagebrush-grassland and grassland habitat types, overall, the composition of important shrubs and grass species on these rangelands appear to be present in satisfactory amounts, but on three of six transects the composition of dominant, and/or co-dominant, grass species (Idaho fescue for example) are considered to be appreciably below average amounts recorded in research data. On one grassland transect (PT10), Idaho fescue was completely absent, which may suggest this grassland was misclassified. It was not recorded in the 1996 data as well.

On willow/sedge riparian sites sampled, overall, there was a high composition of desirable riparian shrubs and sedges. The composition of some important grasses such as bluejoint reedgrass and tufted hairgrass was recorded to be somewhat below desired amounts. With the exception of the unnamed Governor Creek tributary, a high composition of desirable sedges and grasses was found on sampled riparian grasslands. On the unnamed Governor Creek tributary, an unclassified riparian site, there were low cover amounts recorded for important

graminoids such as water sedge and bluejoint reedgrass, and relatively high cover amounts for introduced plants such as dandelion, white clover, timothy (*Phleum pratense*), and Kentucky bluegrass. Lodgepole pine was the most dominant plant recorded in the transect.

Shrub Cover
On sagebrush-grassland sites, sagebrush canopy cover averaged 9 percent, which is notably below the average amount presented in research data, but is within the range of variability for this habitat type.

Total canopy cover for dominant willows on the willow/sedge riparian sites was recorded to average about 29 percent. This amount is considerably below amounts recorded for similar habitat types in research data. Although the reason for these low amounts of willow cover is not clear, both of these willow/sedge sites have a high composition of conifers that may be shading-out, or competing with, desirable willows. Minimal willow cover was recorded on riparian grassland transects, which can be expected for these riparian habitat types.

Ground Cover
Ground cover was recorded to average 97 percent on sagebrush-grassland sites, and 97 percent on grassland habitat types. These high ground cover amounts are very desirable, and are consistent with amounts recorded for similar sites in a late seral or climax vegetation condition.

Based on riparian vegetation monitoring transects, the amount of ground cover recorded on sampled sites was considered to be somewhat below desired rangeland health conditions for these habitat types. Across all transects ground cover averaged 85 percent, with two sites (East Fork of Englebaugh Creek and the unnamed Governor Creek tributary) having 15 percent and 33 percent bare ground, respectively.

Noxious Weeds
No noxious weeds were recorded in upland transects, or were observed in close proximity to them. For riparian transects, a noxious weed (Canada thistle) was recorded on one site, but consisted of minimal cover (2%) overall.

Rangeland Health Indicator Assessment Conclusion: With few exceptions, the composition of important desirable perennial grass species on allotment upland sites has remained mostly static, or relatively unchanged, when compared to 1980 and 1996 data. However, an important (greater than 10%) reduction in less desirable grasses was recorded on at least three transects (PT1, PT10, and PT12). Other important differences were recorded in the composition and canopy cover of sagebrush on two transects (C1-T1 and C1-T2). Sagebrush canopy cover had been reduced by an average of 27 percent. Perennial forbs had appreciable composition increases on five transects (C1-T1, C1-T2, PT1, PT10, and PT12), and averaged about 27 percent as well. These differences are mostly a result of prescribed fire being applied to transect sites in 2004, but major forb increases recorded on unburned transect sites were likely a response to favorable growing conditions that year, and/or repeated past heavy grazing pressure. In conclusion, there is no clear, or obvious, trend in upland range conditions on the Saginaw allotment; however, suitable upland plant communities are considered to be

meeting desired rangeland health conditions overall. They are also functioning in a manner that protects the soil resource from erosion, and resists invasion by noxious weeds.

For sampled riparian sites, overall they are considered to be meeting desired rangeland health conditions for species composition, shrub cover, and noxious weeds. However, on two sites monitoring reports identified a need for increased cover of willow and/or important sedge and grass species. In regards to ground cover, monitoring reports identified a need to reduce the amount of bare ground through reduced livestock trampling damage to stream banks. This conclusion can be extrapolated to include other similar riparian sites within the allotment boundary. Currently, some riparian areas within the Saginaw allotment are not meeting desired rangeland health conditions for ground cover, and, as a result, are susceptible to erosion events and invasion by noxious weeds (*personal observation by Kevin Greenwood*).

Invasive Plant Assessment and Conclusion: There are approximately 17 acres of inventoried noxious weed infestations within the Saginaw allotment, consisting of mostly small to medium sized populations of Canada thistle. There are also widely scattered populations of spotted knapweed, and other nonnative thistle species such as bull thistle. Due to the presence of spotted knapweed, there would automatically be a moderate invasion risk to allotment rangelands. The high amounts of ground cover recorded on upland sites is desirable for resisting invasion by weeds, or other aggressive nonnative plant species, but it would not prevent establishment of aggressive invaders such as spotted knapweed. Some riparian sites are currently considered at moderate risk to invasion by weeds, and/or expansion of existing infestations due to higher than expected amounts of bare ground.

Analysis

Methodology

Spatial Scale

The analysis of direct, indirect, and cumulative effects will be confined to individual allotments, including any grazed Bureau of Land Management (BLM), State, or private lands contained within each allotment boundary. Exceptions include comanaged allotments where the analysis of cumulative effects would be extended to include other lands outside the National Forest allotment boundary. Examples include the Seymour, Mussigbrod, and Dry Creek allotments. Except where noted, these boundaries were selected because the authorization of livestock grazing activities would not result in direct, indirect, or cumulative effects to the vegetation resource outside of the allotment boundary being analyzed.

Temporal Scale

The temporal boundaries for the analysis include both short-term, and long-term grazing effects to the vegetation resource. Short-term grazing effects to vegetation are generally one year or less, and include annual effects to plants through livestock grazing (i.e., cropping) or browsing actions on the current years growth of palatable grasses, forbs, and shrubs.

Long-term effects of grazing or browsing on vegetation occur when there is repeated annual removal of vegetative growth over a period of time. For the purposes of this analysis, this period will be from two to 10 years. The rationale for using this time period is that ten years is typically the term of Forest Service Term Grazing Permits (Forest Service Handbook 2209.13), and approximately the term of Allotment Management Plans before they are reviewed for needed changes.

Resource Indicators to be Analyzed and Units of Measure

<u>Rangeland Health</u>

In *Indicators of Rangeland Health and Functionality in the Intermountain West* (O'Brien et al., 2003), the authors found that four indicators were useful for describing the health and functionality of rangelands at many scales: species composition, shrub cover, ground cover, and noxious weeds. Rangeland health has been defined in *Interpreting Indicators of Rangeland Health* (USDI, 2005) as… "The degree to which the integrity of the soil, vegetation, water, and air, as well as the ecological processes of the rangeland ecosystem are balanced and sustained".

The key mechanisms of livestock grazing effects to rangeland vegetation are largely a function of the timing, intensity, and frequency of grazing actions, and livestock grazing preference for certain plants and plant communities throughout the grazing season (Stoddart et al., 1975). To effectively describe and compare the potential impacts of grazing activities on rangeland vegetation, there are four indicators, or resource factors, that will be used in this analysis: *species composition, shrub cover, ground cover, and noxious weeds*. Because rangeland vegetation types produce a majority of the forage within the project area, this

analysis will focus on the health of these sites using these resource indicators. The rationale for why these indicators were chosen is as follows:

Species Composition: Composition is the proportion of various plant species in relation to the total on a given area. Livestock grazing actions can influence (positively or negatively) the amount and distribution of desirable and undesirable plant species, which in turn directly affects the ability of a rangeland site to capture and store precipitation, and to protect the site from wind and water erosion. Composition is also a principal factor in the productivity of a particular site. The composition of important shrubs and native perennial graminoids (i.e., sedge and grass species) will be the primary basis for analyzing this resource indicator.

Shrub Cover: Livestock grazing actions can influence the amount and distribution of shrubs (desirable and undesirable) on rangeland sites, which includes riparian areas suitable for livestock use. For example, repeated heavy grazing use could result in an increase in the density and canopy cover of sagebrush (*Artemisia* spp.) on upland sites, or could result in a decrease of desirable shrubs such as willow (*Salix* spp.) in riparian areas. Both of these actions can have direct or indirect effects on the stability and productivity of rangelands. To illustrate, sagebrush ecosystems naturally have a variety of age classes and structures, but when sagebrush cover is outside of desired conditions there may be a risk to the overall ecological health and diversity of these plant communities (O'Brien et al., 2003). Percent shrub cover will be primary basis for analyzing this resource indicator.

Ground Cover: Ground cover is the percentage of mineral soil covered by vegetation (basal and canopy cover), litter, standing dead vegetation, gravel/rock, and a visible biological crust such as lichen and mosses. What land surface is not covered by one of these components is considered bare ground. Ground cover plus bare ground would total 100 percent. The amount and distribution of bare ground is considered to be one of the more important indicators of rangeland health (USDI, 2005). It is an important indicator of rangeland site stability relative to site potential, and is considered to be a direct indication of site susceptibility to accelerated wind or water erosion. Livestock grazing actions can have direct and indirect effects on the amount of bare ground present on a rangeland site through actions such as ground disturbance (i.e., trampling), and grazing-induced changes in plant composition. For these reasons, percent bare ground will be the primary basis for analyzing this resource indicator.

Noxious Weeds: Noxious weeds have potential to become a dominant or co-dominant species on a rangeland site if their future establishment and growth is not actively controlled by management interventions. In general, these plants are considered to be a problem because of their unfavorable economic or ecological impacts to a particular area or region. Some noxious plants such as knapweed (*Centaurea* spp.) are capable of invading pristine, undisturbed grassland plant communities, which emphasizes the importance of using this indicator to assess rangeland health (USDI, 2005). The presence or absence of noxious weeds will be the primary basis for analyzing this resource indicator.

The four rangeland health indicators and their applicable units of measure are described below in *Table 48*.

Table 48: Rangeland Health Indicators and Units of Measure	
Indicator	**Unit of Measure**
Species Composition	Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts for a particular rangeland site in late seral or climax vegetation condition. Percent composition is calculated by dividing percent canopy cover of individual plant species by the total cover for all plant species recorded on a given sample site, or transect.
Shrub Cover	Percent canopy cover of shrubs in relation to expected potential amounts for a particular rangeland site in late seral or climax vegetation condition.
Ground Cover	Percentage of bare ground in relation to expected potential amounts for a particular rangeland site in late seral or climax vegetation condition.
Noxious Weeds	Presence or absence within sampled rangeland sites.

Invasive Plants

Invasive plants include noxious weeds, nonnative, and native plants. Although invasive plants may or may not be noxious, this indicator deals primarily with noxious weeds because these plants have the greatest potential to become a dominant or co-dominant species on rangeland sites within the project area. The presence of noxious weeds within native rangeland plant communities automatically creates a risk to the health and sustainability of these sites, even if ground cover is adequate (O'Brien et al., 2003). However, the dominance (i.e., infestation level) of this presence on a rangeland site determines the potential, or risk, for continued spread of a particular infestation, especially if it is not actively controlled (USDI, 2005). For these reasons, the following indicator and unit of measure in Table 49 will be used in the analysis to evaluate the risk to rangeland health and sustainability from invasive plants:

Table 49: Invasive Plant Indicator and Unit of Measure**.**	
Indicator	**Units of Measure**
Noxious Weed Presence and Dominance	Current acres infested, acres treated on an annual basis, and risk (low, medium, high) of continued spread and establishment.

Analysis Methods and Assumptions

Methodology for Determining Suitable Allotment Acres

Forest Capability: Capability is defined in Forest Service Manual (FSM) 1905 as "the potential of an area of land to produce resources, supply goods and services and allow resource uses under an assumed set of management practices and given level of management intensity." According to the 2009 Corrected Final Environmental Impact Statement (CFEIS) for the Forest Plan, about 929,000 acres, or 27% of the Beaverhead-Deerlodge National

Forest (BDNF), are capable of supporting livestock grazing as determined by FSM 1905, excluding the Elkhorn Mountains.

Forest Suitability: Suitability is defined in FSM 1905 as "the appropriateness of applying certain resource management practices to a particular area of land as determined by an analysis of the economic and environmental consequences and alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices." Assessments of suitability by alternative occur to determine compatibility of livestock grazing with other uses and values in that area. For this project, the suitability assessment analyzed National Forest System (NFS) land acres only, and not private, State, or other federal lands within the project area. The suitability of these other lands was not analyzed because information on their capability and suitability to provide livestock forage is not known, or is lacking. No forest-wide issues were identified to cause reassessment of currently stocked NFS suitable lands (CFEIS, 2009).

The suitability assessment completed for this project used the Region 1 protocol outlined in "*Rangeland Suitability for Livestock Grazing at the Forest Plan Level and Standards for NEPA Display*" (2003), and only NFS suitable acres were calculated for the allotments. To begin with, capable acres were delineated through Geographic Information System (GIS) mapping. Rangelands not considered capable through the Forest Planning level were dropped from further suitability analysis. Acreage not considered capable consisted of rock outcrops, soil types that were not capable of producing more than 200 pounds of forage/acre within their Potential Natural Community (i.e., badlands, shallow soils, alkali flats), road surfaces, water (lakes, reservoirs, ponds, rivers and streams), and slopes greater than 40% in which cattle will not use on a regular basis. After filtering out these acreages, a total of **21,910** acres of NFS land were considered capable to begin the suitability analysis.

From the capable acres within the project area, lands were further analyzed for grazing suitability utilizing the methodology stated below. As stated in the 2009 Corrected Final Environmental Impact Statement (CFEIS) for the BDNF Forest Plan, the Forest will use the allotment management planning process to determine additional lands that are not suitable, and determine the site specific permit actions necessary to meet Forest Plan desired conditions, objectives, and standards. This analysis determined that additional lands in these allotments were not suitable for livestock grazing, and took into account the site-specific allotment management actions necessary to meet Forest Plan desired conditions, objectives, and standards. Changes to suitable acreage by alternative is described in the effects analysis of this report.

Following the 2003 protocol and methodology, a separate GIS analysis for each alternative was done. NFS land suitable acreage was delineated through GIS mapping, and through on-the-ground knowledge of the allotments by resource specialists. Additional areas considered not suitable for this analysis included areas with conifer cover greater than 60%, timber harvest units older than 1994, additional areas with slopes greater than 40%, and areas within existing and proposed exclosures that are permanently closed to livestock grazing. Developed recreation areas (i.e., campgrounds) exist in five of the allotments analyzed, and have been

removed from the suitable grazing base. Table 50 below outlines the rangeland suitability summaries by allotment:

Table 50: Suitable Acres by Allotment and Pasture for NFS Lands Only.

Allotment Name	Pasture Name	Total NFS Acres	Suitable NFS Acres
Seymour	Seymour	8005	541
	Sullivan	5449	506
	Tenmile	3893	946
	Total	**17,347**	**1,993**
Fishtrap	West Fork	3007	327
	East Fork	3382	202
	Total	**6389**	**529**
Mudd Creek	Mudd Creek	11,465	739
	Total	**11,465**	**739**
Pintlar Creek	Pintlar Creek	7452	981
	Total	**7452**	**981**
Mussigbrod	Bender	1453	249
	Mussigbrod	3584	375
	Total	**5037**	**624**
Ruby Creek	Cow Creek	9652	356
	Lower Ruby	11,777	1102
	Butler	3926	363
	Total	**25,355**	**1821**
Dry Creek	Lower Dry Creek	2747	215
	Upper Dry Creek	11,244	158
	Total	**13,991**	**373**
Twin Lakes	Lower Big Lake	2924	233
	Upper Big Lake	4565	144
	Lower Little Lake	3432	232
	Upper Little Lake	1780	116
	Total	**12,701**	**725**
Monument	Miner	8967	333
	Hamby	14,043	1106
	Special Use Pasture	207	82
	Total	**23,217**	**1521**
Pioneer	Van Houten	3305	336

Table 50: Suitable Acres by Allotment and Pasture for NFS Lands Only.			
Allotment Name	Pasture Name	Total NFS Acres	Suitable NFS Acres
	Pioneer	9855	503
	Skinner Meadows	5264	420
	Total	**18,424**	**1259**
Saginaw	Unit 1	1573	494
	Unit 2	3908	581
	Unit 3	3585	454
	Unit 4	3442	430
	Total	**12,508**	**1960**
Total National Forest suitable acres in the project area = 12,525			

Methodology for Determining Rangeland Health

Site-specific vegetation and ground cover data was collected for each NWBH AMP grazing allotment between 2004 and 2012. This data was analyzed and summarized in the existing condition above by allotment to describe existing rangeland health conditions using research data presented in the following publications: *Grassland and Shrubland Habitat Types of Western Montana* (Mueggler and Stewart, 1980), and *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen et al., 1995). The data presented in these publications describe late seral or climax vegetation conditions on various sampled rangeland habitat types (upland and riparian), and will serve as desired conditions for similar rangeland sites on each allotment. Existing rangeland conditions on upland sites were also compared to data collected from earlier studies (District 2210 allotment planning and analysis files) to determine condition trend. Vegetation and ground cover data collected on riparian sites will serve as baseline information only, but will be used to assess a site's similarity with collected research data. This analysis used data from the following sources, and data was collected following protocols presented in the publications listed:

- Existing upland vegetation and ground cover data was collected on established long-term monitoring sites (see Project File for map of monitoring site locations) using methods described in the interagency technical references *Sampling Vegetation Attributes* (USDI, 1996), and *Interpreting Indicators of Rangeland Health* (USDI, 2005). Vegetation sampling methods used included the Daubenmire, and line and point intercept methods. Riparian vegetation and ground cover data was collected using the 2010 Beaverhead-Deerlodge National Forest sampling protocol for vegetation parameters (USDA, 2010).

Methodology for Determining Invasive Plant Presence and Dominance

Noxious weed locations and infestation levels within the project area have been inventoried and mapped since the 1980's. Around the year 2002, the inventory data for these infestations were converted into a computerized GIS coverage layer. This layer was used to display and

calculate the presence and infestation dominance of invasive plants within the project area (see *Appendix* A3 of the DEIS). Data sources used included the following:

- Wise River and Wisdom Ranger District GIS spatial coverage and attribute data (species and size and density of infestation) for noxious weed locations.

Analysis Assumptions

Suitable Allotment Acres: Based on the Forest Capability model, GIS mapping, and on-the-ground knowledge by resource specialists, the project area contains no less than 12,525 acres of suitable range. Within each allotment there are areas classified as "not suitable" that cattle will continue to utilize because they are capable of producing sufficient amounts of desirable forage on an annual basis. On some allotments these areas may provide appreciable amounts of forage which are not reflected in suitable acreage calculations. In some cases this may result in existing or proposed stocking rates to be uncorrelated with identified suitable acreage figures. The reasons for these areas being classified as not suitable in this analysis could include discrepancies in Forest capability mapping, seasonal variation in climatic and vegetation conditions, as well as misinterpretation of data sources used to conduct the analysis. Suitable range acreages may also fluctuate in the future depending on how climate change, wildfire events, mountain pine beetle, and other insect outbreaks affect forested acreage in the allotments. The acres identified as suitable are just a starting point from which to base stocking rates.

Rangeland Health: The assessment of rangeland health conditions are derived from interpretation of data collected on established, site-specific sample plots. For upland sites, it is assumed that the assessment conclusion for a single sample site can be extrapolated to other similar habitat types found within the same allotment pasture, or the entire allotment if there is only one pasture. However, this assumption is valid only if the following criteria are met: 1) the sites occur at a similar elevation, 2) they have similar soils, topography, and landscape position, and 3) they receive similar grazing intensity by livestock. This same assumption will be difficult to apply to riparian areas because there is typically too much variation between sites within the same pasture, and even between different stream reaches on the same stream. For these reasons, the use and extrapolation of riparian vegetation sample plot data will be clarified in the allotment-specific existing condition.

Noxious Weeds: Project area noxious weed inventories have not been updated since about 2007. It is assumed that the establishment of new infestations has likely occurred since this time, and that existing inventories may not reflect the actual extent, or distribution, of noxious weed populations within the project area.

Past, Present, and Future activities used in the Analysis

Past and ongoing activities within the NWBH AMP project area have directly affected the kind, amount, and distribution of vegetation across the landscape. In regards to rangeland vegetation, land management practices such as timber harvest, prescribed fire, fire suppression, noxious weed control, and livestock grazing have had the greatest effect on

suitable grazing acres, rangeland health, and invasive plants. These activities will likely continue to affect the vegetation resource into the foreseeable future.

Allotment specific Analysis

Seymour Allotment

Seymour No Action (No Grazing) Alternative

Direct/Indirect Effects: Removal of livestock from the Seymour allotment would result in mostly beneficial effects to rangeland health, and invasive plant establishment and spread on NFS lands. These effects would include the following:

Species Composition: On both upland and riparian sites, the percent composition of important native grasses and sedges would be expected to increase the fastest over the long term with removal of livestock grazing effects to vegetation. To illustrate, key forage plants would not be grazed, or cropped, by livestock, which would minimize physical impacts to plants from these actions. This would allow these plants to complete uninterrupted phenological (i.e., development) stages that should result in improved vigor, seed production, and, ultimately, an improving trend in desirable species composition in the long term. However, there would be continued potential for forage plants to be utilized by wild ungulates such as deer and elk, but this use is expected to be minimal and localized within the allotment. In regards to important shrubs such as sagebrush and willows, the composition of these plants is expected to remain mostly static for the long term.

Shrub Cover: With removal of livestock, percent cover of shrubs on both upland and riparian sites would be expected to be static for the long term. However, browsing by wild ungulates such as moose could result in localized short-term and long-term reductions in shrub cover on some willow/grass sites within the allotment.

Ground Cover: Sampled upland and riparian sites within the allotment currently have high ground cover. However, it is expected that removal of livestock may result in increased ground cover on both upland and riparian sites with improved composition of desirable grass and sedge species. There would also be potential for increased ground cover on both upland and riparian sites where past livestock trampling impacts have created higher than expected amounts of bare ground. Examples include impacted stream banks, areas around salt grounds and water developments, and along fence lines and livestock trails.

Invasive Plants (including noxious weeds): Noxious weeds, and other invasive plants, are currently present within the allotment. The presence of these plants automatically creates an invasion risk to rangeland plant communities that are currently free of weeds. Although the removal of livestock would reduce the amount of bare ground caused by trampling, and the potential for establishment and spread of invasive species, some noxious plants such as spotted knapweed have the potential to invade undisturbed, or pristine, native plant communities (Ortega and Pearson, 2005). However, with continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, noxious weed

infestations would be controlled to prevent them from becoming a dominant presence within allotment rangeland plant communities. For these reasons, there would be a low risk for invasive plant establishment and spread with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Seymour allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the analysis area. However, with removal of the three Seymour allotment pastures from the cooperative grazing management agreement, this could result in some increased grazing pressure on MTFWP lands assuming livestock numbers and grazing season are not changed. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Seymour Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of the current grazing management alternative:

Species Composition: The continued implementation of cooperative grazing management on the Seymour allotment and MTFWP lands is expected to result in a slow improving trend in desirable grass and sedge composition on both upland and riparian sites. Proper utilization of key forage plants combined with grazing deferment and periodic rest from grazing would allow for adequate plant development and reproduction, and ensure that forage plants can be grazed on a sustainable basis for the long term. Short-term effects would include physical impacts to plants from livestock grazing, or cropping, actions which results in a temporary reduction in plant development (including root growth and replacement) and reproduction. However, these impacts are most likely to occur when pastures are scheduled for an early grazing treatment (i.e., June 16 to August 15), but for each pasture this early grazing treatment would occur only once every three years. The planned late grazing treatment (i.e., August 15 to October 5) and rest year for each pasture would allow for plant recovery, and mostly uninterrupted plant development and reproduction two out of three years. Livestock grazing effects to shrubs such as sagebrush and willows would be negligible, and the composition of these plants is expected to remain mostly static for the long term.

Shrub Cover: Other than localized reductions in willow cover due to wildlife browsing, the percent cover of shrubs on both upland and riparian sites is not expected to change appreciably under current grazing management for the long term.

Ground Cover: Although sampled rangeland sites currently have high ground cover, an improving trend in species composition on upland sites would suggest that current grazing management could lead to increased ground cover on some sites. On riparian sites, it is expected that ground cover would remain mostly static over the long term due to expected trampling impacts during early and late grazing treatments, or two out of every three years each pasture is grazed.

Invasive Plants (including noxious weeds): Due to the presence of noxious weeds and other invasive plants within the allotment, the continuation of current livestock management practices would likely result in areas of bare ground that would be susceptible to invasion and establishment by invasive plants (i.e., salt grounds and livestock trailing areas). Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. In addition, an improving trend in plant composition and ground cover would help reduce the risk for weed establishment within native rangeland plant communities. For these reasons, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Seymour allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would result in overlapping effects to rangeland vegetation on other lands from implementation of a cooperative livestock management agreement with the MTFWP, including BLM, State, and unfenced private lands. However, this agreement has been in place since 2002, and prescribes a rest-rotation grazing strategy on all nine pastures, including the six MTFWP pastures involved in the cooperative agreement. This grazing strategy provides for grazing deferment to forage plants, and complete rest from grazing use by livestock on a periodic basis. It is expected that this grazing program would continue to positively influence native vegetation by providing maximum rest during the growing season two out of every three years, which promotes plant vigor and health and produces the highest quality potential forage for wildlife as well as nesting, thermal, and hiding cover for other native species (MTFWP, 2011). This has allowed for sustainable livestock use of forage plants on all lands involved, and would continue to do so for the term of the cooperative agreement.

Timber Harvest - Past timber harvest activities on NFS, State, and private lands within the Seymour allotment boundary, and on adjacent MTFWP lands, has created extensive areas of transitory range totaling more than 9,000 acres on NFS lands alone. However, a majority of these areas are no longer considered suitable for livestock use due to increasing tree cover, and loss of forage plants. Harvest units that are currently considered to be suitable for livestock use would continue to "transition" towards a more forested plant community in the next 10 years, and is projected that in the next 15 to 20 years many of these existing suitable transitory range areas would become not suitable for livestock use. This could result in increased grazing pressure on remaining suitable rangelands, especially on NFS lands.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and AMP for the Seymour allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to determine condition trend of upland and riparian sites, and progress towards desired conditions.

Seymour Proposed Action Alternative

Mitigation/Design Features:

The following mitigation /design features would apply to NFS lands only under this alternative:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Expected direct and indirect effects to rangeland health and invasive plants would be very similar to those described under the *Current Grazing Alternative* above. Although it is possible that proposed AUL's could lead to a more rapid attainment of desired resource conditions where needed on NFS lands, the rate of recovery will be highly contingent on compliance with these allowable use standards, and the ability of range permittee's to recognize when these levels have been reached so that movement of livestock occurs prior to meeting or exceeding allowable levels. For these reasons a faster rate of recovery may not be obtainable, or detectable, within the next 10 years when compared to the current grazing management scenario.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative*.

Seymour Alternative 4

Mitigation/Design Feature:

The following mitigation and/or design features would apply to NFS lands only under this alternative:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Overall, direct and indirect effects to rangeland health and invasive plants would be very similar to those described under the *Current Grazing* and *Proposed Action* alternatives. However, the actions proposed under this alternative would likely result is less livestock use within the Forest Service's Tenmile pasture. This could potentially result in improved species composition and ground cover, where needed, on riparian sites within this pasture.

Cumulative Effects: Cumulative effects are not expected to differ appreciably from those described for the other action alternatives.

Monitoring: The same types of monitoring described for the other action alternatives would occur under this alternative.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4*.

Fishtrap

Fishtrap No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Fishtrap allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: On sampled upland sites there was an apparent trend towards a more desirable species composition, especially desired grass species. With removal of livestock from the allotment, this trend towards improved species composition would be expected to increase at a faster rate than if cattle were present on the allotment. Although the current species composition of allotment riparian sites is largely unknown, it is anticipated that there would be similar improvements in riparian vegetation, most notably an increase in desired grasses and sedges. These improvements in species composition on both upland and riparian sites would largely be a function of the removal of livestock grazing effects to vegetation (see Seymour allotment, *No Action Alternative,* for a discussion of grazing effects to vegetation).

Shrub Cover: With removal of livestock it is expected that shrubs such as willows may continue to increase in cover on isolated areas where past livestock impacts have caused a reduction. An example would be the RPP site on Swamp Creek However, on most riparian sites within the allotment, percent cover of shrubs on both upland and riparian sites is anticipated to remain mostly static for the long term. An exception may include sagebrush-grassland sites where sagebrush cover is currently low, and are moving towards a more advanced ecological condition (i.e., late seral or climax vegetation condition). The browsing of willows and other shrubs by wild ungulates could result in localized short-term and long-term reductions in shrub cover on both riparian and upland sites (i.e., aspen stands).

Ground Cover: Upland sites within the allotment are currently meeting desired conditions for ground cover. Removal of livestock may result in increased ground cover with improved composition of plant species, and the cessation of trampling impacts around salt grounds, and along fence lines and livestock trails. Although ground cover on riparian sites is mostly unknown, the removal of livestock trampling impacts can be expected to result in improved ground cover over the long term.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with continued inventory and treatment of existing noxious weed

populations by Forest Service weed control crews, noxious weed infestations would be controlled to prevent them from becoming a dominant presence within allotment rangeland plant communities. For these reasons, there would be a low risk for invasive plant establishment and spread with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Fishtrap allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the allotment boundary. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Fishtrap Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Fishtrap allotment:

Species Composition: Continued implementation of the current grazing management strategy and Forest Plan interim allowable use standards is expected to result in a very slow improving trend in desirable grass composition on allotment upland sites, including both sagebrush-grasslands and unclassified grasslands. The current deferred rotation grazing system can be expected to provide for adequate plant development and reproduction that maintains forage plant vigor over the long term. Annual short-term grazing effects to vegetation would most likely occur during the early grazing treatment (approximately June 16 to August 15) for each pasture (see Seymour allotment, *Current Grazing Alternative*, for short-term effects discussion); however, these effects would occur every other year. The late grazing treatment period of approximately August 16 to September 15 should allow for adequate plant recovery, development, and reproduction every other year, or 5 out of 10 years for each pasture. Although the current species composition of allotment riparian areas is largely unknown, current management is expected to at least maintain existing conditions.

Shrub Cover: Except for localized areas (i.e., Swamp Creek RPP site), shrub cover on both upland and riparian sites is not expected to change appreciably under current grazing management for the long term. Reductions in shrub cover due to browsing are possible where wildlife, primarily moose, tend to congregate during the fall and winter.

Ground Cover: Ground cover on both upland and riparian sites is likely to remain mostly static over the long term due to expected annual livestock trampling impacts.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface. This would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Fishtrap allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would not result in any overlapping effects to rangeland vegetation on other lands outside of the allotment boundary.

Timber Harvest - Past timber harvest activities within the Fishtrap allotment boundary has resulted in fairly extensive areas of transitory range totaling about 1,400 acres. Although these areas are no longer considered suitable for livestock use due to heavy tree cover, some harvest units continue to provide appreciable amounts of forage. As these units continue to "transition" towards a more forested plant community in the next 10 years, this could result in increased grazing pressure on remaining suitable rangelands.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Fishtrap allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to determine condition trend of upland and riparian sites, and progress towards desired conditions.

Fishtrap Proposed Action Alternative

Mitigation/Design Features:

The following mitigation and/or design features would apply to NFS lands only under this alternative:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).

- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Expected direct and indirect effects to rangeland health and invasive plants would be very similar to those described under the *Current Grazing Alternative* above. Although it is possible that proposed Allowable Use Levels (AUL's) could lead to a more rapid attainment of desired resource conditions where needed on NFS lands, the rate of recovery will be highly contingent on compliance with these allowable use standards, and the ability of range permittee's to recognize when these levels have been reached so that movement of livestock occurs prior to meeting or exceeding allowable levels. For these reasons a faster rate of recovery may not be obtainable, or detectable, within the next 10 years when compared to the current grazing management scenario.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative.*

Fishtrap Alternative 4

Mitigation/Design Feature:

The following mitigation and/or design features would apply to NFS lands only under this alternative:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).

- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Overall, direct and indirect effects to rangeland health and invasive plants would be very similar to those described under the *Current Grazing* and *Proposed Action* alternatives. However, incorporation of a rest period where the entire Fishtrap allotment is rested from livestock grazing 1 year out of 3 would potentially result in more rapid recovery of upland and riparian sites that are currently in less than desirable condition. Specifically, this may include improved plant species composition, and increased shrub and ground cover. In addition, incorporation of a rest year is likely to result in improved forage plant vigor, which will allow for sustainable grazing use over the long term.

Cumulative Effects: Cumulative effects are not expected to differ appreciably from those described for the other action alternatives.

Monitoring: The same types of monitoring described for the other action alternatives would occur under this alternative.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4.*

Mudd Creek

Mudd Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Mudd Creek allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: With removal of livestock grazing effects to rangeland vegetation there would be potential for more rapid improvement in species composition than if cattle were present (see Seymour allotment, *No Action Alternative,* for a discussion of grazing effects to vegetation). Specifically, this would occur on sampled upland sites where some important

forage species were recorded to be below desired amounts. The current species composition of allotment riparian sites is largely unknown, but it is anticipated that there would be similar improvements in riparian species composition where needed.

Shrub Cover: With removal of livestock it is expected that shrub cover would continue to move towards a more advanced ecological condition, especially on riparian sites where willow cover may be less than desirable due to grazing impacts.

Ground Cover: Currently upland sites are considered to be not meeting desired conditions for ground cover. Removal of livestock is expected to result in increased ground cover with improved composition of plant species, and the cessation of trampling impacts around salt grounds, and along fence lines and livestock trails. Although ground cover on riparian sites is mostly unknown, the removal of annual livestock trampling impacts can be expected to result in a faster rate of improved ground cover over the long term.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with improved ground cover and continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, there would be a low risk for invasive plant spread and dominance with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Mudd Creek allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the allotment boundary. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Mudd Creek Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Mudd Creek allotment:

Species Composition: Continued implementation of the current grazing management strategy and Forest Plan interim allowable use standards is expected to result in a static condition trend for species composition. The current single-pasture deferred grazing strategy is not likely to provide for adequate plant development and reproduction on some upland and riparian areas

within the Mudd Creek allotment. As a result, there would be little potential for improvement in species composition in the long term, especially for desirable grasses and sedges.

Shrub Cover: Shrub cover on both upland and riparian sites is not expected to change appreciably from current conditions under the present grazing scenario. Over the long term, there may be some noticeable increases on upland sites where sagebrush cover is moving towards a more advanced ecological condition. At the Mudd Creek RPP site there was an appreciable increase in willows recorded through photo interpretation, but it is not expected that current grazing practices would lead to additional measurable improvement at this site.

Ground Cover: Ground cover on upland sites are currently not meeting desired conditions. Continuation of current grazing practices is not likely to result in decreased bare ground, and both upland and riparian sites are likely to remain mostly static over the long term due to expected annual livestock trampling impacts.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface, and maintain less than desirable amounts of ground cover on both upland and riparian sites. This would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Mudd Creek allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would not result in any overlapping effects to rangeland vegetation on other lands outside of the allotment boundary.

Timber Harvest - Past timber harvest activities within the Mudd Creek allotment boundary has resulted in fairly extensive areas of transitory range totaling about 1,800 acres. Although these areas are no longer considered suitable for livestock use due to heavy tree cover, some harvest units continue to provide appreciable amounts of forage. As these units continue to "transition" towards a more forested plant community in the next 10 years, this could result in increased grazing pressure on remaining suitable rangelands.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance

with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Mudd Creek allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to determine condition trend of upland and riparian sites, and progress towards desired conditions.

Mudd Creek Proposed Action Alternative

Mitigation/Design Features:

The following mitigation and/or design features would apply to NFS lands only under this alternative:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Expected direct and indirect effects to rangeland health and invasive plants would be very similar to those described under the *Current Grazing Alternative* above. Although it is possible that proposed Allowable Use Levels (AUL's) could lead to a more rapid attainment of desired resource conditions where needed on NFS lands, the rate of recovery will be highly contingent on compliance with these allowable use standards, and the ability of range permittee's to recognize when these levels have been reached so that movement of livestock occurs prior to meeting or exceeding allowable levels. For these reasons a faster rate of recovery may not be obtainable, or detectable, within the next 10 years when compared to the current grazing management scenario.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative.*

Mudd Creek Alternative 4

Mitigation/Design Feature:

The following mitigation and/or design features would apply to NFS lands only under this alternative:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Overall, direct and indirect effects to rangeland health and invasive plants would be very similar to those described under the *Current Grazing* and *Proposed Action* alternatives. However, incorporation of a rest period where the entire Mudd Creek allotment is rested from livestock grazing 1 year out of 3 would potentially result in more rapid recovery of upland and riparian sites that are currently in less than desirable condition. Specifically, this may include improved plant species composition, and increased shrub and ground cover. In addition, incorporation of a rest year is likely to result in improved forage plant vigor, which will allow for sustainable grazing use over the long term.

Cumulative Effects: Cumulative effects are not expected to differ appreciably from those described for the other action alternatives.

Monitoring: The same types of monitoring described for the other action alternatives would occur under this alternative.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4.*

Pintlar Creek

Pintlar Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Pintlar Creek allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: Removal of livestock grazing effects to rangeland vegetation would potentially result in a more rapid improvement in species composition (see Seymour allotment, *No Action Alternative,* for a discussion of grazing effects to vegetation) than if cattle were present. The composition of important forage species is currently below desired levels on sampled upland and riparian sites, and the apparent trend is away from desired composition objectives on upland sites. Except for one sampled site in Pintler Meadows, current species composition of allotment riparian sites is largely unknown, but it is anticipated that there would be similar improvements in riparian species composition where needed.

Shrub Cover: With removal of livestock it is expected that shrub cover (primarily sagebrush) on upland sites would remain mostly static over the long term. On the sampled riparian site willow cover is considered to be appreciably below desired amounts. Although livestock removal is anticipated to result in improved shrub cover on this site, browsing actions by wildlife, primarily elk and moose, may reduce the rate of recovery. Improved shrub cover can be expected on other allotment riparian sites where needed.

Ground Cover: Currently upland sites are considered to be meeting desired conditions for ground cover. There would be some potential for increased ground cover with improved composition of plant species, and the cessation of annual trampling impacts around salt grounds, and along fence lines and livestock trails. On the sampled riparian site, bare ground was considered to be excessive. Removal of annual livestock trampling impacts from this site would result in a faster rate of improvement in ground cover than if cattle were present. Improved ground cover would also be expected on other allotment riparian sites where improvement is needed.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with improved ground cover and continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, there would be a low risk for invasive plant spread and dominance with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Pintlar Creek allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the allotment boundary. Noxious weeds would continue to be inventoried and controlled to reduce the establishment

and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Pintlar Creek Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Pintlar Creek allotment:

Species Composition: Continued implementation of the current grazing management strategy and Forest Plan interim allowable use standards is expected to result in a static condition trend for species composition. The current single-pasture partially deferred grazing strategy is not likely to provide for adequate plant development and reproduction on most upland sites and riparian areas within the Pintlar Creek allotment. As a result, there would be little potential for improvement in species composition in the long term, especially for desirable grasses and sedges.

Shrub Cover: Shrub cover on both upland and riparian sites is expected to remain mostly unchanged from current conditions. Current grazing practices would not result in measurable improvement over the long term.

Ground Cover: Continuation of current grazing practices is expected to maintain existing desirable ground cover conditions on upland sites. On the sampled riparian site, there would be little to no potential for increased ground cover. Annual livestock trampling impacts are likely to result in unchanged conditions at this site, and on other riparian sites within the allotment boundary.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface that would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Pintlar Creek allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would not result in any overlapping effects to rangeland vegetation on other lands outside of the allotment boundary.

Timber Harvest - Past timber harvest activities within the Pintlar Creek allotment boundary has resulted in fairly extensive areas of transitory range totaling about 1,000 acres. Although these areas are no longer considered suitable for livestock use due to heavy tree cover, some harvest units continue to provide appreciable amounts of forage. As these units continue to "transition" towards a more forested plant community in the next 10 years, this could result in increased grazing pressure on remaining suitable rangelands.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Pintlar Creek allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to determine condition trend of upland and riparian sites, and progress towards desired conditions.

Pintlar Creek Proposed Action Alternative

Mitigation/Design Features:

The following mitigation and/or design features would apply to NFS lands only under this alternative:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Expected direct and indirect effects to rangeland health and invasive plants would be very similar to those described under the *Current Grazing Alternative* above. However, deferred (i.e., delayed) entry of livestock every other year would potentially allow for additional forage plant development and reproduction, and increased plant vigor. This could lead to improved species composition on both upland and riparian sites. It is also possible that proposed Allowable Use Levels (AUL's) could lead to a more rapid attainment of desired resource conditions where needed on NFS lands; however, the rate of recovery will be highly contingent on compliance with these allowable use standards, and the ability of range permittee's to recognize when these levels have been reached so that movement of livestock occurs prior to meeting or exceeding allowable levels. For these reasons a faster rate of recovery may not be obtainable, or detectable, within the next 10 years when compared to the current grazing management scenario.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative*.

Pintlar Creek Alternative 4

Mitigation/Design Feature:

The following mitigation and/or design features would apply to NFS lands only under this alternative:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

With the exception of the Pintler Meadows area, direct and indirect effects to rangeland health and invasive plants would be very similar to those described under the *Proposed Action* alternative. In Pintler Meadows, this part of the allotment would be closed to livestock grazing for a minimum of 10 years to allow for proposed stream and vegetation rehabilitation, and resource recovery following rehabilitation. This would potentially result in more rapid improvement of species composition (including shrubs) and ground cover than if cattle were present.

Cumulative Effects: Cumulative effects are not expected to differ appreciably from those described for the other action alternatives.

Monitoring: The same types of monitoring described for the other action alternatives would occur under this alternative. An exception is that Pintler Meadows would be inspected and evaluated after 10 years of rest to determine if this part of the allotment could be opened again for limited livestock grazing use.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4.*

Mussigbrod

Mussigbrod No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Mussigbrod allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: On sampled upland sites there was an apparent trend away from desirable species composition, especially important forage species such as Idaho fescue and bluebunch wheatgrass. With removal of livestock from the allotment, this trend would be expected to reverse, and there would be measurable increases in the percent composition of these desired species over the long term. Although only one riparian site was sampled within the allotment, it was determined to be meeting desired composition for grasses and sedges, but shrub composition was low. On other allotment riparian sites it is anticipated that with livestock removal there would be similar improvements in species composition where needed. These improvements in species composition on both upland and riparian sites would largely

be a function of the removal of livestock grazing effects to vegetation (see Seymour allotment, *No Action Alternative,* for a discussion of grazing effects to vegetation).

Shrub Cover: With the exception of areas burned during the 2000 Mussigbrod wildfire, removal of livestock is expected to result in little change to shrub cover on both upland and riparian sites. The burned areas are still recovering from the wildfire event, so it can be expected that shrub cover would continue to increase on these sites over the long term.

Ground Cover: Upland sites within the allotment are considered to be slightly below desired objectives for ground cover. Removal of livestock is likely to result in increased ground cover with improved composition of desired plant species, and the cessation of trampling impacts around salt grounds, and along fence lines and livestock trails. Ground cover on the sampled riparian site is considered to be meeting desired conditions. The removal of livestock trampling impacts can be expected to result in improved ground cover on other allotment riparian sites where needed. An example would include the east tributary of Bender Creek, which partially burned in 2000.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, noxious weed infestations would be controlled to prevent them from becoming a dominant presence within allotment rangeland plant communities. For these reasons, there would be a low risk for invasive plant establishment and spread with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Mussigbrod allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the analysis area. The agreement for coordinated management of NFS and BLM rangelands would be terminated. As a result, the Mussigbrod allotment would no longer be managed in conjunction with adjacent BLM lands. Livestock could continue to graze BLM property, but they would need to be fenced separately from NFS lands. It is not anticipated that this action would result in increased grazing use of BLM lands. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Mussigbrod Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Mussigbrod allotment:

Species Composition: Continued implementation of the current grazing management strategy and Forest Plan interim allowable use standards is expected to result in little improvement to current species composition on allotment upland and riparian sites, where needed. The current 2-pasture deferred rotation grazing system can be expected to provide for adequate plant development and reproduction on most years, but current authorized livestock numbers and season of use is likely to result in continued impacts to vegetation that maintains less than desirable species composition on some riparian sites.

Shrub Cover: Shrub cover would continue to increase on upland and riparian sites burned during the 2000 Mussigbrod wildfire. On unburned rangeland sites, the continuation of current grazing management practices would result little change to shrub cover.

Ground Cover: Under current management, ground cover on both upland and riparian sites is likely to remain mostly static over the long term due to expected annual livestock trampling impacts.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface. This would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Mussigbrod allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would result in overlapping effects to rangeland vegetation on other lands from implementation of a coordinated management agreement with the BLM. This agreement allows for FS management of adjacent BLM lands in conjunction with NFS lands, including implementation of FS grazing standards. Current grazing management has maintained desirable rangeland health conditions on BLM upland sites, but has resulted in less than desirable conditions on two small riparian areas on these lands (USDI, 2009). The continuation of current grazing practices is expected to result in little change to these existing conditions on BLM land.

Timber Harvest – There has been extensive timber harvest within the Mussigbrod allotment boundary totaling about 1,300 acres. Although these past harvest areas are no longer considered suitable for livestock use due to heavy tree cover, some harvest units continue to provide appreciable amounts of forage. This is especially true of harvest units that were burned during the 2000 Mussigbrod wildfire. However, as these units continue to "transition" towards a more forested plant community, and burned trees continue to fall over, forage production and access to this forage will be further reduced in the next 10 years. This has resulted, and would continue result, in increased grazing pressure on remaining suitable rangelands.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Mussigbrod allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to determine condition trend of upland and riparian sites, and progress towards desired conditions.

Mussigbrod Proposed Action Alternative

Mitigation/Design Features:

All of the following mitigation and/or design features would apply to NFS lands, but only proposed Allowable Use Levels and annual implementation monitoring would apply to BLM lands:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Implementation of proposed actions under this alternative is expected to lead to a more rapid rate of vegetation recovery on allotment upland and riparian sites when compared to current grazing management. Specifically, implementation of proposed AUL's, a reduction in the season of use, and incorporation of a rest year into the grazing system would result in improved species composition, and increased ground cover over the long term. Improved species composition and ground cover would also help prevent the establishment and spread of invasive plants on allotment rangelands. The conversion of temporary (i.e., electric) exclosure fence into permanent fence is also expected to result in faster recovery through greater protection of riparian sites that are currently in less than desirable condition. This is likely to result in increased shrub cover on these protected sites as well.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*. However, implementation of proposed actions can be expected to result in improved rangeland health on BLM lands where needed.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative*.

Mussigbrod Alternative 4

Mitigation/Design Feature:

All of the following mitigation and/or design features would apply to NFS lands, but only proposed Allowable Use Levels and annual implementation monitoring would apply to BLM lands:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Actions proposed under this alternative are expected to provide for a faster rate of vegetation recovery than those considered under the *Proposed Action* alternative. Proposed rest of the Bender pasture for a minimum of 10 years combined with a single pasture modified rest rotation strategy would substantially reduce the intensity and duration of livestock grazing use on the allotment. These actions would allow for increased forage plant development and reproduction in the Bender pasture, and sustainable forage use in the Mussigbrod pasture. As a result, substantial improvement in species composition, shrub cover (primarily willows), and ground cover is expected on disturbed rangeland sites within the Bender pasture. These improvements would also help prevent establishment and spread of invasive plants. Some improvement in these same rangeland health indicators can be expected in the Mussigbrod pasture as well.

Cumulative Effects: Implementation of proposed actions under this alternative would result in the following cumulative effects within the Mussigbrod analysis area:

Livestock Grazing - Closure of the Bender pasture to grazing for 10 years could potentially result in increased livestock use of BLM lands. BLM land currently fenced in within the Bender pasture boundary could continue to be grazed by livestock under BLM direction and policy; however, they would need to be fenced out from NFS lands to prevent unauthorized use of National Forest ground. If livestock continue to graze these BLM lands, the intensity and duration of grazing actions could potentially be more concentrated, and may result in negative effects to rangeland health.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock. In addition, closure of the Bender pasture to grazing for 10 years would further reduce the risk of establishment and spread due to a reduction in soil surface disturbance by livestock, and a corresponding increase in ground cover.

Monitoring: The same types of monitoring described for the other action alternatives would occur under this alternative.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4*.

Ruby Creek

Ruby Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Ruby Creek allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: On sampled upland sites there was an apparent trend away from desirable species composition, and a substantial increase in nonnative plants such as Kentucky bluegrass. With removal of livestock from the allotment, this trend would be expected to reverse, and there would be a measurable increase in desirable native species over the long term. In regards to sampled riparian sites, it was determined that they are meeting desired conditions for species composition. Improvement in species composition on upland sites would largely be a function of the removal of livestock grazing effects to vegetation (see Seymour allotment, *No Action Alternative,* for a discussion of grazing effects to vegetation).

Shrub Cover: Shrub cover was not recorded on sampled grassland sites; however, it is estimated that shrub cover would remain mostly static on allotment sagebrush-grasslands with removal of livestock. Total shrub cover on sampled riparian sites is considered to below desired conditions. Removal of potential livestock impacts would likely result in some increased cover over the long term.

Ground Cover: Sampled grassland sites within the allotment are considered to be below desired objectives for ground cover, and apparent trend is static. Removal of livestock is likely to result in increased ground cover with improved composition of desired plant species, and the cessation of trampling impacts around salt grounds, and along fence lines and livestock trails. Ground cover on the sampled riparian site is considered to be meeting desired conditions overall, but high amounts of bare ground were recorded on two sites. The removal of livestock grazing and trampling impacts can be expected to result in fairly rapid improvement where increased cover is needed on these sites.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, noxious weed infestations would be controlled to prevent them from becoming a dominant presence within allotment rangeland plant communities. For these reasons, there would be a low risk for invasive plant establishment and spread with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Ruby Creek allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the allotment boundary.

Private lands currently being grazed in conjunction with NFS lands would need to be fenced to prevent unauthorized livestock use. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Ruby Creek Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Ruby Creek allotment:

Species Composition: Continued implementation of the current grazing management strategies and Forest Plan interim allowable use standards is expected to result in little improvement to current species composition on allotment upland sites, especially on the cattle portion of the allotment. The current 2-pasture partially deferred rotation grazing system is not expected to provide for sufficient grazing deferment. On the horse portion (i.e., Butler pasture), the current season-long grazing strategy provides little to no grazing deferment to forage plants. As a result of season long use, grazing effects to vegetation is likely to maintain less than desirable species composition on some riparian and upland sites within the Butler pasture.

Shrub Cover: Shrub cover on upland and riparian sites is expected to be static over the long term with continued implementation of current grazing management.

Ground Cover: Ground cover on both upland and riparian sites is likely to remain mostly static over the long term due to expected annual livestock trampling impacts. For sampled upland sites, this means there would be undesirable amounts of bare ground that would be susceptible to erosion, and invasion by noxious weeds.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface. This would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Ruby Creek allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would result in overlapping effects to rangeland vegetation on private lands currently being grazed in conjunction with NFS lands. Use of private lands is authorized through a Term Private Land Grazing Permit. This permit allows for FS management of private grazing lands that are currently unfenced within the Ruby Creek allotment boundary, including implementation of Forest Plan interim grazing standards. Although the condition of these private rangelands is not known, it is expected that continued implementation of current grazing practices would result in little change to existing rangeland health conditions on these private lands.

Timber Harvest – Since the 1960's, there has been over 4000 acres of timber harvest within the Ruby Creek allotment boundary. Although these past harvest areas are no longer considered suitable for livestock use due to an increase in tree cover, some harvest units continue to provide appreciable amounts of forage. However, as these units continue to "transition" towards a more forested plant community, forage production and access to this forage will be further reduced in the next 10 years. This has resulted, and would continue result, in increased grazing pressure on remaining suitable rangelands.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Ruby Creek allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to determine condition trend of upland and riparian sites, and progress towards desired conditions.

Ruby Creek Proposed Action Alternative

Mitigation/Design Features:

All of the following mitigation and/or design features would apply to NFS lands, but only proposed Allowable Use Levels and annual implementation monitoring would apply to private lands:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).

- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Implementation of proposed actions under this alternative is expected to result in little change to existing rangeland health conditions. However, complete rest of the Butler pasture one year out of three would be expected to improve plant species composition and ground cover where needed within the pasture. In addition, improved species composition and increased ground cover would also help prevent the establishment and spread of invasive plants on allotment rangelands.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative*.

Ruby Creek Alternative 4

Mitigation/Design Feature:

All of the following mitigation and/or design features would apply to NFS lands, but only proposed Allowable Use Levels and annual implementation monitoring would apply to private lands:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.

- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Actions proposed under this alternative are expected to provide better grazing deferment to forage plants, and to provide for improved plant vigor. As a result, it is anticipated that there would be improvement in species composition, and increased ground cover in all pastures over the long term. These improvements would also help prevent establishment and spread of invasive plants. Shrub cover is expected to remain static.

Cumulative Effects: Implementation of proposed actions under this alternative would result in cumulative effects similar to those described under the *Current Grazing* and *Proposed Action* alternatives.

Monitoring: The same types of monitoring described for the other action alternatives would occur under this alternative.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4*.

Dry Creek

Dry Creek No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Dry Creek allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: On sampled upland sites there was an apparent trend towards increased composition of desirable grass species. With removal of livestock from the allotment, this trend towards improved species composition would be expected to continue, but at a faster rate than if cattle were present on the allotment. Only one riparian site was sampled, and species composition was considered to be not meeting desired conditions. Although the actual composition of allotment riparian sites is largely unknown, it is anticipated that removal of livestock would result in a trend towards a desirable composition of shrubs and

grasses where needed (i.e., lower Big Lake Creek and lower Dry Creek). These improvements in species composition on riparian sites would largely be a function of the removal of livestock grazing effects to vegetation (see Seymour allotment, *No Action Alternative,* for a discussion of grazing effects to vegetation).

Shrub Cover: With removal of livestock it is expected that shrubs such as willows may continue to increase in cover on isolated areas where past livestock impacts may have caused a reduction. On most other allotment riparian sites within the allotment, it is estimated that percent cover of shrubs would remain mostly static for the long term. Shrub cover on allotment sagebrush-grasslands is likely to remain static over the long term under this alternative; however, data collected on these sites suggested that cover may be actually decreasing. The reason for this is unclear.

Ground Cover: Overall, sampled upland sites within the allotment are considered to be not meeting desired conditions for ground cover. Removal of livestock may result in increased ground cover with improved composition of plant species, but the high amounts of bare ground recorded is thought to be more a function of low site productivity. On the sampled riparian site on lower Big Lake Creek ground cover was considered to be well below desired amounts. The removal of potential livestock trampling impacts can be expected to result in improved ground cover over the long term on sites where improvement is needed.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, noxious weed infestations would be controlled to prevent them from becoming a dominant presence within allotment rangeland plant communities. For these reasons, there would be a low risk for invasive plant establishment and spread with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Dry Creek allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the analysis area. The agreement for coordinated management of NFS and BLM rangelands would be terminated. As a result, the Dry Creek allotment would no longer be managed in conjunction with adjacent BLM lands. Livestock could continue to graze BLM property, but they would need to be fenced separately from NFS lands. It is not anticipated that this action would result in increased grazing use of BLM lands. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and

potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Dry Creek Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Dry Creek allotment:

Species Composition: Continued implementation of the current grazing management strategy and Forest Plan interim allowable use standards is expected to result in a slow improving trend in desirable grass composition on allotment upland sites. The current 2-pasture deferred rotation grazing system with deferred allotment entry date can be expected to provide for adequate plant development and reproduction that maintains forage plant vigor over the long term. Although the current species composition of allotment riparian areas is largely unknown, current management is expected to result in little change in species composition on the one sampled riparian site, and is estimated to maintain existing conditions on other riparian areas.

Shrub Cover: Shrub cover on both upland and riparian sites is expected to remain mostly static, or unchanged, under current grazing management for the long term.

Ground Cover: Ground cover on both upland and riparian sites is likely to remain mostly static over the long term due to low site productivity, and expected annual livestock trampling impacts.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface. This combined with low site productivity in the uplands would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Dry Creek allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would result in overlapping effects to rangeland vegetation on other lands from implementation of a coordinated management agreement with the BLM. This agreement allows for FS management of adjacent BLM lands in conjunction with NFS lands, including implementation of FS grazing standards. Current grazing management has maintained desirable rangeland health conditions on BLM upland sites (USDI, 2009). The continuation

of current grazing practices is expected to result in little change to these existing conditions on BLM land.

Timber Harvest – There has been extensive timber harvest within the Dry Creek allotment boundary. Over 1,400 acres were harvested between the 1970's and 2003, with most harvest occurring in the 1970's. Except for very minimal acreage, these past harvest areas are no longer considered suitable for livestock use due to increasing tree cover. However, some harvest units continue to provide substantial amounts of transitory forage on this allotment. It is anticipated that these units will continue to "transition" towards a more forested plant community, and forage production and access to this forage will be further reduced in the next 10 years. This is projected to result in increasing grazing pressure on remaining suitable rangelands.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Dry Creek allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to determine condition trend of upland and riparian sites, and progress towards desired conditions.

Dry Creek Proposed Action Alternative

Mitigation/Design Features:

All of the following mitigation and/or design features would apply to NFS lands, but only proposed Allowable Use Levels and annual implementation monitoring would apply to BLM lands:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Implementation of proposed actions under this alternative is expected to potentially result in greater improvements to rangeland health on allotment upland and riparian sites when compared to current grazing management. Specifically, implementation of proposed AUL's, and incorporation of a rest year into the grazing system would allow for improved plant vigor and reproduction. This is expected to result in improved species composition, and increased ground cover over the long term on allotment rangeland sites where improvement is needed. These changes would also help prevent the establishment and spread of invasive plants on allotment rangelands. Except for isolated riparian sites (i.e., lower Big Lake Creek), proposed actions under this alternative are not expected to result in appreciable changes to shrub cover.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative.*

Dry Creek Alternative 4

Mitigation/Design Feature:

All of the following mitigation and/or design features would apply to NFS lands, but only proposed Allowable Use Levels and annual implementation monitoring would apply to BLM lands:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Direct and indirect effects to rangeland health and invasive plants would not differ from those described under the *Proposed Action* alternative.

Cumulative Effects: Cumulative effects are not expected to differ from those described for the other action alternatives.

Monitoring: The same types of monitoring described for the other action alternatives would occur under this alternative.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4.*

Twin Lakes

Twin Lakes No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Twin Lakes allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: On sampled upland sites, overall, the composition of important forage species such as Idaho fescue was meeting desired conditions; however, there is an apparent trend towards less desirable species such as Kentucky bluegrass. The removal of livestock from the allotment would be expected to reverse this trend, and allow for a faster rate of composition improvement than if cattle were present on the allotment. Riparian sites sampled were mostly forested riparian habitats, and not very representative of allotment riparian plant communities (see *Existing Condition*, Twin Lakes allotment). Although the composition of allotment shrub-grass and grassland riparian sites is largely unknown, it is anticipated that removal of livestock would result in a trend towards a desirable composition of shrubs and grasses where needed on the allotment. These improvements in species composition on upland and riparian sites would largely be a function of the removal of livestock grazing effects to vegetation (see Seymour allotment, *No Action Alternative,* for a discussion of grazing effects to vegetation).

Shrub Cover: Shrub cover on allotment sagebrush-grasslands is likely to remain static over the long term under this alternative; however, data collected on these sites suggested that there has been a trend towards increased sagebrush cover. This may continue as sagebrush sites move towards a higher ecological condition. For sampled riparian sites, it is expected that shrub cover may continue to decline, even with the removal of livestock. This is because these forested riparian sites are likely to increase in conifer cover as they continue to trend

towards a more forested plant community. On other riparian sites not sampled, it is expected that shrubs such as willows may increase in cover where past livestock impacts have caused a reduction.

Ground Cover: Sampled upland and riparian sites within the allotment are considered to be meeting desired conditions for ground cover. Removal of livestock may result in increased ground cover, where needed, with improved composition of plant species, and removal of potential livestock trampling impacts.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, noxious weed infestations would be controlled to prevent them from becoming a dominant presence within allotment rangeland plant communities. For these reasons, there would be a low risk for invasive plant establishment and spread with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Twin Lakes allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the allotment boundary. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Twin Lakes Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Twin Lakes allotment:

Species Composition: Continued implementation of the current grazing management strategy and Forest Plan interim allowable use standards is expected to result in little or no change to desirable species composition. Specifically it is expected that a trend towards less desirable forage species would continue to occur on upland sites within the Big Lake portion of the allotment. On the Little Lake portion, continued implementation of a modified rest grazing strategy is expected to maintain existing upland conditions, or possibly result in a slow improving trend in desirable grass composition where needed. Although the current species composition of suitable allotment riparian areas is largely unknown, current management is expected to result in little change in species composition on the Big Lake portion of the

allotment, and a possible improving trend on the Little Lake portion with continued complete rest of the lower and upper Little Lake pastures 2 out of every 6 years.

Shrub Cover: Shrub cover on allotment upland sites is expected to remain mostly static under current management, but there may be some measurable increases over the long term as these sites move towards a higher ecological condition. The opposite would be true for sampled riparian sites where these forested plant communities continue to increase in tree cover.

Ground Cover: Ground cover on both upland and riparian sites is likely to maintain existing desirable conditions, with little or no change expected over the long term.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface, which would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Twin Lakes allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would not result in overlapping effects to rangeland vegetation outside of the allotment boundary.

Timber Harvest – Over 1,700 acres of timber harvest has occurred within the Twin Lakes allotment boundary between the 1970's and 1990's. Except for very minimal acreage, these past harvest areas are no longer considered suitable for livestock use due to increasing tree cover. However, on the Big Lake portion of the allotment there are some large harvest units that continue to provide substantial amounts of forage. It is anticipated that these units will continue to "transition" towards a more forested plant community, and forage production and access to this forage will be further reduced in the next 10 years. This is projected to result in increasing grazing pressure on remaining suitable rangelands, especially on the Big Lake portion of the allotment.

Noxious Weed Management - The continuation of noxious weed control work on NFS lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Twin Lakes allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to

determine condition trend of upland and riparian sites, and progress towards desired conditions.

Twin Lakes Proposed Action Alternative

Mitigation/Design Features:

All of the following mitigation and/or design features would apply to NFS lands within the Twin Lakes allotment:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Implementation of proposed actions under this alternative is expected to potentially result in greater improvements to rangeland health on allotment upland and riparian sites when compared to current grazing management, especially on the Big Lake portion of the allotment where implementation of proposed AUL's, and incorporation of rest periods into the grazing system would allow for improved plant vigor and reproduction. This is expected to result in improved species composition, and some increased ground cover over the long term on allotment rangeland sites where improvement is needed. These changes would also help prevent the establishment and spread of invasive plants on allotment rangelands. In regards to shrub cover, proposed actions under this alternative are not expected to result in changes that would differ appreciably from those described under the current grazing alternative.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative*.

Twin Lakes Alternative 4

Mitigation/Design Feature:

All of the following mitigation and/or design features would apply to NFS lands within the Twin Lakes allotment:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Direct and indirect effects to rangeland health and invasive plants would not differ from those described under the *Proposed Action* alternative.

Cumulative Effects: Cumulative effects are not expected to differ from those described for the other action alternatives.

Monitoring: The same types of monitoring described for the other action alternatives would occur under this alternative.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4*.

Monument

Monument No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Monument allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: On sampled upland sites the existing composition of important shrubs and grasses is desirable, but there was an apparent trend towards decreased amounts of desirable grass species such as Idaho fescue. With removal of livestock from the allotment, this trend would be expected to reverse over the long term, and species composition would improve at a faster rate than if cattle were present on the allotment. Sampled riparian sites are considered to be meeting desired conditions for species composition. It is possible that removal of livestock may further increase the composition of desirable shrubs and grasses where needed. Any additional improvements in species composition would likely be a function of the removal of livestock grazing effects to vegetation (see Seymour allotment, *No Action Alternative,* for a discussion of grazing effects to vegetation).

Shrub Cover: Shrub cover on allotment sagebrush-grasslands is likely to remain static over the long term under this alternative; however, data collected on these sites suggested that sagebrush cover appears to be increasing. On sampled riparian sites, total shrub cover is considered to be below desired levels, but was within the range of variability for sampled habitat types. With removal of livestock it is expected that shrubs such as willows would likely increase in cover where past livestock impacts may have caused a reduction.

Ground Cover: Sampled upland sites within the allotment are considered to be not meeting desired conditions for ground cover. Removal of livestock may result in increased ground cover with improved composition of plant species, but the high amounts of bare ground recorded is thought to be more a function of past drought conditions and/or low site productivity. On sampled riparian sites ground cover was considered to be somewhat below desired amounts. The removal of potential livestock trampling impacts can be expected to result in improved ground cover over the long term on sites where improvement is needed.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, noxious weed infestations would be controlled to prevent them from becoming a dominant presence within allotment rangeland plant communities. For these reasons, there would be a low risk for invasive plant establishment and spread with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Monument allotment would not result in any detrimental additive effects to vegetation that would overlap in time

and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the allotment boundary. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Monument Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Monument allotment:

Species Composition: Continued implementation of the current grazing management strategy and Forest Plan interim allowable use standards is expected to result in a static species composition trend on both upland and riparian sites. The current 2-pasture deferred rotation grazing system is likely to provide for adequate plant development and reproduction on most years, but over the long term little change in species composition is anticipated due to annual grazing effects to vegetation under this alternative.

Shrub Cover: Shrub cover on both upland and riparian sites is expected to remain mostly static, or unchanged, under current grazing management for the long term. However, there may be measurable increases in sagebrush cover on some sagebrush-grassland sites as they continue to move towards a higher ecological condition.

Ground Cover: On upland sites ground cover is likely to remain mostly static over the long term due to low site productivity, and annual grazing effects to vegetation. In regards to riparian areas, annual livestock trampling impacts are likely to result in little change to ground cover, and bare ground would be maintained at less than desirable levels on some sites.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface. This combined with low site productivity in the uplands would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Monument allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would continue to result in overlapping effects to rangeland vegetation on other lands within the allotment boundary. BLM lands currently fenced in the boundary would continue to receive moderate to heavy grazing pressure due to the location of these lands within the allotment, and accessibility to livestock. Although the condition of these BLM lands is not known, current grazing management is expected to result in little change (positive or negative) to rangeland health conditions over the long term.

Timber Harvest – The Monument allotment has had minimal past timber harvest activity. Only about 100 acres were harvested between the 1980 and 1999. Except for about 3 acres, these past harvest areas are no longer considered suitable for livestock use due to increasing tree cover. The continued transition of these suitable transitory range areas towards a more forested plant community will result in a loss of forage production and access to this forage in the next 10 years. However, this is projected to result in a minimal loss to the existing forage base, and would likely result in a slight grazing pressure increase to remaining suitable rangelands.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Monument allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to determine condition trend of upland and riparian sites, and progress towards desired conditions.

Monument Proposed Action Alternative

Mitigation/Design Features:

All of the following mitigation and/or design features would apply to NFS lands only:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water

troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Although it is possible that proposed AUL's could result in reduced livestock use of allotment rangelands, implementation of proposed actions under this alternative are not expected to result in effects to rangeland health that would differ appreciably from those described under the *Current Grazing* alternative.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative.*

Monument Alternative 4

All of the following mitigation and/or design features would apply to NFS lands only within the Monument allotment:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Under this alternative, implementation of proposed actions could potentially result in improved species composition and ground cover. Specifically, the implementation of proposed AUL's, and incorporation of a rest period into the grazing system would allow for greater forage plant development and reproduction over the long term. The rest period is also expected to result in improved plant vigor where needed. These changes would also help

prevent the establishment and spread of invasive plants on allotment rangelands. In regards to shrub cover, proposed actions under this alternative are not expected to result in changes that would differ appreciably from those described under the *Current Grazing* and *Proposed Action* alternatives.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*. However, implementation of proposed actions can be expected to result in improved rangeland health on BLM lands where needed.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative*.

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4*.

Pioneer

Pioneer No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Pioneer allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: On sampled upland sites the existing composition of important shrubs and grasses is considered to be meeting desired conditions, but, overall, there was a trend towards decreased amounts of desirable grass species such as Idaho fescue. With removal of livestock from the allotment, this trend would be expected to reverse over the long term, and species composition would improve at a faster rate than if cattle were present on the allotment. Sampled riparian sites are considered to have both high frequency and cover of desirable plants. Except for localized areas, removal of livestock is expected to result in little additional improvement to species composition on these sites.

Shrub Cover: Shrub cover on allotment sagebrush-grasslands is considered to be high, but is within the range of variability for the sampled habitat type. On sampled riparian sites, total shrub cover for dominant willows is considered to be well below desired levels, but this is thought to be a result of site characteristics or misclassification of the habitat types versus livestock impacts (see *Existing Condition*, Pioneer allotment). With removal of livestock it is expected that shrub cover on both upland and riparian sites would not change appreciably from existing conditions.

Ground Cover: Overall, sampled upland and riparian sites within the allotment are considered to be meeting desired conditions for ground cover; however, on some upland sites ground cover is considered to be somewhat below amounts expected for allotment sagebrush-

grassland habitats that are currently in a late seral or climax ecological condition. Removal of livestock is likely result in increased ground cover on these sites over the long term.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, noxious weed infestations would be controlled to prevent them from becoming a dominant presence within allotment rangeland plant communities. For these reasons, there would be a low risk for invasive plant establishment and spread with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Pioneer allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the allotment boundary. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Pioneer Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Pioneer allotment:

Species Composition: Continued implementation of the current grazing management strategy and Forest Plan interim allowable use standards is expected to result in a static species composition trend on both upland and riparian sites. The current 3-pasture deferred rotation grazing system is likely to provide for adequate plant development and reproduction on most years, but over the long term little change in species composition percentages is anticipated.

Shrub Cover: Shrub cover on both upland and riparian sites is expected to remain mostly static, or unchanged, under current grazing management for the long term. However, there may be measurable increases in sagebrush cover on some sagebrush-grassland sites as they continue to move towards a higher ecological condition.

Ground Cover: On both upland and riparian sites ground cover is expected to remain mostly static over the long term due to annual grazing effects to vegetation.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface. This would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Pioneer allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would not result in overlapping effects to rangeland vegetation on other lands outside of the allotment boundary.

Timber Harvest – The Pioneer allotment has had very minimal past timber harvest activity. Only about 10 acres were harvested between 1990 and 1999. These acres are no longer considered suitable for livestock use, and the continued transition of these harvest areas towards a more forested plant community would have no effect to the existing forage base over the long term.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Pioneer allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to determine condition trend of upland and riparian sites, and progress towards desired conditions.

Pioneer Proposed Action Alternative

Mitigation/Design Features:

All of the following mitigation and/or design features would apply to NFS lands only:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.

- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Although it is possible that proposed AUL's could result in reduced livestock use of allotment rangelands, implementation of proposed actions under this alternative are not expected to result in effects to rangeland health that would differ appreciably from those described under the *Current Grazing* alternative.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative.*

Pioneer Alternative 4

All of the following mitigation and/or design features would apply to NFS lands only within the Pioneer allotment:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Under this alternative, implementation of proposed actions is expected to improve forage plant vigor through periodic rest from grazing. Specifically, the implementation of proposed AUL's, and incorporation of a rest period into the grazing system 1 out of every 4 years would allow for greater forage plant development and reproduction over the long term. As a result, it is anticipated that these actions would lead to a faster rate of improvement in species composition on those upland sites where key forage species such as Idaho fescue has been reduced. There would also be greater potential for increased ground cover on upland sites where it is currently considered to be below desired amounts. These changes would also help prevent the establishment and spread of invasive plants on allotment rangelands. In regards to riparian sites, proposed actions under this alternative may result in some improvement to species composition and ground cover where needed. Except for some increases in sagebrush cover on sagebrush-grassland sites, shrub cover is expected to remain mostly static on allotment rangeland sites.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing* and *Proposed Action* alternatives.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing* and *Proposed Action* alternatives.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4*.

Saginaw

Saginaw No Action (No Grazing) Alternative

Direct/Indirect Effects: The discontinuation of livestock grazing activities on the Saginaw allotment would be expected to result in mostly beneficial effects to rangeland vegetation. It is also expected to reduce the potential for invasive plant establishment and spread on NFS lands. Specifically, these effects would include the following:

Species Composition: On sampled upland and riparian sites the composition of important shrubs and grasses is considered to be present in satisfactory amounts. However, the composition of Idaho fescue, a key forage species, was recorded to be appreciably below average amounts expected for sampled habitat types. With removal of livestock from the allotment, the percent composition of this plant would be expected to increase substantially over the long term, and at a faster rate than if cattle were present on the allotment. Where needed, similar improvements in desirable riparian plant composition can be also be expected.

Shrub Cover: Shrub cover on allotment sagebrush-grasslands is considered to be meeting desired conditions. On sampled riparian sites, total shrub cover for dominant willows is

considered to be below desired amounts. The removal of potential livestock impacts to riparian shrubs can be expected to result in increased shrub cover over the long term. In regards to upland sites, the removal of livestock would not result in changes to shrub cover when compared to existing conditions.

Ground Cover: Sampled upland sites within the allotment are considered to be meeting desired conditions for ground cover. Overall, on sampled riparian sites it was found that ground cover was below desired amounts. The removal of potential livestock impacts to vegetation and the soil surface is likely to result in increased ground cover on both upland and riparian sites, but this increase would be most apparent on riparian areas over the long term.

Invasive Plants (including noxious weeds): The current presence of invasive plants within the allotment automatically creates an invasion risk to rangeland plant communities, even with removal of livestock (see Seymour allotment, *No Action Alternative*, for invasive plant discussion). However, with continued inventory and treatment of existing noxious weed populations by Forest Service weed control crews, noxious weed infestations would be controlled to prevent them from becoming a dominant presence within allotment rangeland plant communities. For these reasons, there would be a low risk for invasive plant establishment and spread with implementation of this alternative.

Cumulative Effects: Removal of livestock grazing activities from the Saginaw allotment would not result in any detrimental additive effects to vegetation that would overlap in time and space with other vegetation management actions that have occurred in the past, are currently ongoing, or are reasonably foreseeable future actions within the allotment boundary. Noxious weeds would continue to be inventoried and controlled to reduce the establishment and spread of these plants into native plant communities. Removal of livestock would also reduce the likelihood of weed seed transport into areas that are currently not infested.

Monitoring: Periodic monitoring of existing structural range improvements such as fences and water developments would occur every five to ten years to assess their condition, and potential need for removal. Their need for removal would be based on whether or not they are posing a hazard for wildlife or the public, or are creating impacts to other resources.

Saginaw Current Grazing Alternative

Direct/Indirect Effects: The following direct and indirect effects to rangeland health would occur with continued implementation of current grazing management on the Saginaw allotment:

Species Composition: Continued implementation of the current grazing management strategy and Forest Plan interim allowable use standards is expected to result in a mostly static trend for species composition on both upland and riparian sites over the long term. Although the current 4-pasture rest rotation grazing system is likely to provide for adequate forage plant development and reproduction on most years, the current intensity and duration of livestock grazing actions is not expected to result in sufficient plant recovery following grazing

treatments. As a result, little improvement in plant vigor is anticipated, and, thus, little change in species composition percentages is anticipated as well.

Shrub Cover: Shrub cover on both upland and riparian sites is expected to remain mostly static under current grazing management for the long term. An exception would be where prescribed burning has reduced shrub cover on sagebrush-grassland sites, and sagebrush is continuing to increase in cover on these sites as they naturally move towards a more advanced ecological condition.

Ground Cover: On both upland and riparian sites ground cover is expected to remain mostly static over the long term due to annual grazing effects to vegetation, and annual trampling impacts to the soil surface.

Invasive Plants (including noxious weeds): The continuation of current livestock grazing practices is expected to result in annual trampling impacts to the soil surface. This would result in areas of bare ground susceptible to invasion and establishment by invasive plants. Livestock may also serve as vectors for weed seed transport and spread. However, noxious weed infestations within the allotment boundary would continue to be inventoried and controlled by Forest Service weed control crews to prevent them from becoming a dominant presence on the landscape. For this reason, there is an overall low risk that livestock grazing activities as currently authorized would result in measurable spread and establishment of invasive plants.

Cumulative Effects: Continuation of current livestock grazing activities on the Saginaw allotment would result in the following cumulative effects:

Livestock Grazing – The continued authorization of current livestock management practices would not result in overlapping effects to rangeland vegetation on other lands outside of the allotment boundary.

Timber Harvest – The Saginaw allotment has received moderate timber harvest activity in the past. Between 1980 and 2003 there were approximately 920 acres harvested within the allotment boundary. Except for very minimal acreage, these transitory range areas are no longer considered suitable for livestock use. The loss of this transitory range is thought to have led to increased pressure on remaining suitable grazing lands.

Noxious Weed Management - The continuation of noxious weed control work on NFS and other lands would continue to reduce the risk of spread and establishment of weeds by livestock.

Monitoring: Both the short term (i.e., annual) and long term allotment monitoring would occur under this alternative. Short term monitoring would include inspections for compliance with Term Grazing Permit terms and conditions, and management practices identified in the current AOI and/or AMP for the Saginaw allotment. Long term monitoring would include rereading established long-term monitoring transects at approximately 5-year intervals to

determine condition trend of upland and riparian sites, and progress towards desired conditions.

Saginaw Proposed Action Alternative

Mitigation/Design Features:

All of the following mitigation and/or design features would apply to NFS lands only:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Although it is possible that proposed AUL's could result in reduced livestock use of allotment rangelands, implementation of proposed actions under this alternative are not expected to result in effects to rangeland health that would differ appreciably from those described under the *Current Grazing* alternative.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing Alternative*.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing Alternative*.

Saginaw Alternative 4

Mitigation/Design Features:

All of the following mitigation and/or design features would apply to NFS lands only within the Saginaw allotment:

- All existing improvements would continue to be maintained at a level that serves their intended purposes. (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All new fencing would follow recommended fence specifications for big game movement outlined in the Forest Service GTR 2400-Range 8824 2803 (USFS 1988).
- All allotments would have Range Implementation Monitoring annually.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or greater from known populations, routing water pipe around known populations, etc.).

Direct/Indirect Effects: The following direct and indirect effects to rangeland health, and invasive plants would be expected from implementation of proposed actions under this alternative:

Under this alternative, implementation of proposed actions is expected to result in some improvements to existing rangeland health conditions. Specifically, a reduction in the season of use would reduce the duration of livestock grazing effects to vegetation, which could possibly lead to improved plant vigor where needed on the allotment. The potential benefits of this include improved forage species composition, and increased ground cover on both upland and riparian sites. In addition, the implementation of a grazing avoidance period from July 1 through August 25 in Unit 4 would likely result in the same beneficial effects within this pasture. However, this could also lead to less grazing deferment for the remaining pastures since it no longer would be grazed in the early part of the season as part of the allotment pasture rotation. Potential negative effects associated with this action could include reduced plant vigor in other pastures over the long term. Except for some increases in shrub cover on sagebrush-grassland sites, over the long term shrub cover is expected to remain mostly static under this alternative.

Cumulative Effects: Cumulative effects would be very similar to those described for the *Current Grazing* and *Proposed Action* alternatives.

Monitoring: The same types of monitoring would occur under this alternative when compared to the *Current Grazing* and *Proposed Action* alternatives.

Irreversible or Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources with implementation of the *No Action* alternative, or any of the action alternatives including the *Current Grazing* and *Proposed Action* alternatives, and *Alternative 4.*

Comparison of Alternatives

Table 51: Summary of Effects by Alternatives for Seymour Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Most rapid improvement in composition of desirable grasses and sedges on both upland and riparian sites. Shrub composition expected to remain static over the long term.	Slow improving trend in the composition of desirable grasses and sedges on both upland and riparian sites. Shrub composition expected to remain static over the long term.	Slow but potentially more rapid improving trend in the composition of desirable grasses and sedges on both upland and riparian sites when compared to current grazing alternative due to proposed AUL's. Shrub composition expected to remain static over the long term.	Slow but potentially more rapid improving trend in the composition of desirable grasses and sedges on both upland and riparian sites when compared to current grazing alternative due to proposed AUL's. Improvement may occur at a faster rate in the Tenmile pasture when compared to the proposed action. Shrub composition expected to remain static over the long term.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Shrub cover expected to remain static over the long term.	Shrub cover expected to remain static over the long term.	Shrub cover expected to remain static over the long term.	Shrub cover expected to remain static over the long term.

Table 51: Summary of Effects by Alternatives for Seymour Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Ground Cover *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Some potential for increased ground cover on both upland and riparian sites with removal of livestock trampling impacts, and improvement in species composition.	Some potential for increased ground cover on upland sites with improved species composition. Riparian ground cover expected to remain static due to continuation of annual livestock trampling impacts to stream banks.	Some potential for increased ground cover on upland sites with improved species composition. Riparian ground cover expected to remain static due to continuation of annual livestock trampling impacts to stream banks. Proposed AUL's could result in a faster improvement in ground cover compared to current grazing, but would not be detectable in the next 10 years.	Some potential for increased ground cover on upland sites with improved species composition. Overall, riparian ground cover expected to remain static due to continuation of annual livestock trampling impacts to stream banks, but is some potential for improvement in the Tenmile pasture with reduced livestock use.
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present

Table 51: Summary of Effects by Alternatives for Seymour Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Presence of noxious weeds continues to create invasion risk to rangelands with removal of livestock, but continued inventory and treatment would result in low risk of noxious weeds becoming dominant within the allotment over the long term.	Current grazing activities would continue to result in areas of bare ground susceptible to invasion by noxious weeds, and result in some potential for weed seed transport to new areas not currently infested. However, continued inventory and treatment of existing infestations would result in a low risk of noxious weeds becoming dominant within the allotment over the long term.	Effects would be very similar to *Current Grazing* alternative.	Effects would be very similar to *Current Grazing* alternative.

Table 52: Summary of Effects by Alternatives for Fishtrap Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Most rapid improvement in desirable species composition where needed.	Static to very slow improvement in desirable species composition over the long term where needed.	Slow improvement in desirable species composition over the long term where needed.	Potential for more rapid improvement in desirable species composition over the long term when compared to current grazing and proposed action alternatives.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Localized increases in shrub cover, but static overall.	Shrub cover would remain mostly static.	Shrub cover would remain mostly static.	Potential for localized increases over the long term.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Bare ground amounts would remain mostly static over the long term.	Some potential for increased ground cover, but bare ground amounts are expected to remain mostly static over the long term.	Potential for greater reductions in bare ground amounts when compared to current grazing and proposed action alternatives.

Table 52: Summary of Effects by Alternatives for Fishtrap Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Table 53: Summary of Effects by Alternatives for Mudd Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Most rapid improvement in desirable species composition where needed.	Static condition trend in desirable species composition over the long term.	Slow improvement in desirable species composition over the long term where needed.	Potential for more rapid improvement in desirable species composition over the long term when compared to current grazing and proposed action alternatives.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Localized increases in shrub cover as rangeland sites move towards higher ecological status.	Shrub cover would remain mostly static.	Some potential for increase in willow cover, but, overall, shrub cover would remain mostly static.	Greater potential for localized increases in willow cover over the long term when compared to the proposed action.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Bare ground amounts would remain mostly static over the long term.	Some potential for increased ground cover, but bare ground amounts are expected to remain mostly static over the long term.	Potential for greater reductions in bare ground amounts when compared to current grazing and proposed action alternatives.

Table 53: Summary of Effects by Alternatives for Mudd Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Table 54: Summary of Effects by Alternatives for Pintlar Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Most rapid improvement in desirable species composition.	Static to downward trend in desirable species composition over the long term.	Slow improvement in desirable species composition over the long term.	Potential for rapid improvement in desirable species composition in the Pintler Meadows area. Slow improvement on other allotment upland and riparian sites over the long term.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Shrub cover would remain static on most upland and riparian sites. Potential for appreciable increase in willow cover in Pintler Meadows.	Shrub cover would remain mostly static.	Shrub cover would remain mostly static.	Shrub cover would remain static on most upland and riparian sites. Potential for appreciable increase in willow cover in Pintler Meadows.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Rapid improvement in ground cover where needed (i.e., Pintler Meadows).	Bare ground amounts would remain mostly static over the long term.	Some potential for increased ground cover, but bare ground amounts are expected to remain mostly static over the long term.	Rapid improvement in ground cover in Pintler Meadows. Some potential for increased ground cover on other upland and riparian sites, but bare ground amounts are expected to remain mostly static over the long term.

Table 54: Summary of Effects by Alternatives for Pintlar Creek Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Table 55: Summary of Effects by Alternatives for Mussigbrod Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Most rapid improvement in desirable species composition.	Static trend in desirable species composition over the long term.	Potential for moderate rate of improvement in desirable species composition over the long term.	Potential for rapid improvement in desirable species composition in the Bender pasture. Some potential for improvement on other allotment upland and riparian sites within the Mussigbrod pasture.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Potential for appreciable increases in shrub cover on burned areas still recovering from 2000 wildfire. Shrub cover would remain mostly static on other upland and riparian sites.	Shrub cover would continue to increase on burned sites, but would remain mostly static on other rangeland sites.	Potential for appreciable increases on exclosure sites. Except for burned sites, shrub cover would remain mostly static elsewhere.	Potential for appreciable increase in willow cover in Bender pasture. Except for burned sites, shrub cover would remain mostly static elsewhere.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Rapid improvement in ground cover where needed.	Bare ground amounts would remain mostly static over the long term.	Good potential for increased ground cover with reduced livestock use, and greater protection of existing disturbed areas.	Rapid improvement in ground cover in Bender pasture. Some potential for increased ground cover on other upland and riparian sites within the Mussigbrod pasture.

Table 55: Summary of Effects by Alternatives for Mussigbrod Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Removal of livestock and continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Reduced livestock use and continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Reduced livestock use, closure of Bender pasture, and continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Table 56: Summary of Effects by Alternatives for Ruby Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Most rapid improvement in desirable species composition.	Static trend in desirable species composition over the long term.	Static trend in desirable species composition over the long term.	Potential for some improvement in desirable species composition.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Some potential for increased shrub cover on riparian sites.	Shrub cover would remain mostly static on all rangeland sites.	Shrub cover would remain mostly static on all rangelands sites.	Shrub cover would remain mostly static on all rangelands sites.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Little to no improvement in ground cover.	Little to no improvement in ground cover.	Some potential for increased ground cover with improved species composition and plant vigor.

Table 56: Summary of Effects by Alternatives for Ruby Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Removal of livestock and continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Table 57: Summary of Effects by Alternatives for Dry Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Most rapid improvement in desirable species composition where needed.	Slow improvement in desirable species composition on upland sites. Little to no change on riparian areas over the long term.	Potential for faster rate of improvement in desirable species composition over the long term where needed.	Same as proposed action alternative.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Localized increases in shrub cover on some riparian sites, but static overall.	Shrub cover would remain mostly static.	Potential for some localized increases on some riparian sites, but would remain static overall.	Same as proposed action alternative.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Bare ground amounts would remain mostly unchanged over the long term.	Some potential for increased ground cover on riparian sites, but bare ground amounts are expected to remain mostly static on upland areas due to low site productivity.	Same as proposed action alternative.

Table 57: Summary of Effects by Alternatives for Dry Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Table 58: Summary of Effects by Alternatives for Twin Lakes Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Most rapid improvement in desirable species composition where needed.	Slow improvement in desirable species composition on Little Lake portion. Potential for continued trend towards less desirable plant species on Big Lake portion over the long term.	Potential for faster rate of improvement in desirable species composition over the long term, especially on the Big Lake portion where needed.	Same as proposed action alternative.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Localized increases in shrub cover, but static overall on most upland and riparian sites. On sampled coniferous riparian sites, shrub cover would continue to decline with increased tree cover.	Shrub cover would remain mostly static, but would continue to decline on sampled coniferous riparian sites.	Potential for localized increases on some riparian sites, but would remain static overall. Continued decline on sampled riparian sites.	Same as proposed action alternative.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Ground cover amounts would remain mostly unchanged over the long term.	Some potential for increased ground cover on both upland and riparian sites.	Same as proposed action alternative.

Table 58: Summary of Effects by Alternatives for Twin Lakes Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Table 59: Summary of Effects by Alternatives for Monument Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Potential for most rapid improvement in desirable species composition on upland sites. Some potential on riparian sites where needed.	Little to no change in species composition over the long term.	Little to no change in species composition over the long term.	Potential for faster rate of improvement in desirable species composition with incorporation of rest period.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Localized increases in willow cover on riparian sites, but mostly static overall. Sagebrush cover may continue to increase as upland sites move towards a higher ecological condition.	Shrub cover would remain mostly static on riparian sites. Sagebrush cover may continue to increase as upland sites move towards a higher ecological condition.	Shrub cover would remain mostly static on riparian sites. Sagebrush cover may continue to increase as upland sites move towards a higher ecological condition.	Same as proposed action alternative.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Most rapid improvement in ground cover where site productivity is favorable.	Ground cover amounts would remain mostly unchanged over the long term.	Little to no change in ground cover over the long term.	Potential for measurable improvement in ground cover over the long term.

Table 59: Summary of Effects by Alternatives for Monument Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Table 60: Summary of Effects by Alternatives for Pioneer Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Potential for most rapid improvement in desirable forage species composition on upland sites. Some potential on riparian sites where needed.	Little to no change in species composition over the long term.	Little to no change in species composition over the long term.	Potential for faster rate of improvement in desirable species composition with incorporation of rest period.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Shrub cover would remain mostly static on most upland and riparian sites. Potential for some increases in sagebrush cover as these upland sites move towards a higher ecological condition.	Except for increases in sagebrush cover on some upland sites, shrub cover would remain mostly static on allotment rangelands.	Same as current grazing alternative.	Same as current grazing alternative.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Ground cover amounts would remain mostly unchanged over the long term.	Little to no change in ground cover over the long term.	Potential for measurable improvement in ground cover over the long term.

Table 60: Summary of Effects by Alternatives for Pioneer Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Table 61: Summary of Effects by Alternatives for Saginaw Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Species Composition *Unit of Measure*: Percent composition of desirable shrubs, grasses, and grass-like species in relation to expected potential amounts.	Potential for most rapid improvement in desirable forage species composition on upland sites. Some potential on riparian sites where needed.	Little to no change in species composition over the long term.	Little to no change in species composition over the long term.	Potential for some improvement in desirable species composition with reduced duration of grazing activities.
Shrub Cover *Unit of Measure*: Percent canopy cover of shrubs in relation to expected potential amounts.	Shrub cover would remain static on most upland sites, but is potential for increase in sagebrush cover on burned sites. Potential for appreciable increase in riparian shrub cover over the long term.	Shrub cover would remain mostly static over the long term on most upland and riparian sites. Potential for increases in sagebrush cover on burned sites.	Same as current grazing alternative.	Same as current grazing alternative.
Ground Cover *Unit of Measure*: Percentage of bare ground in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Ground cover amounts would remain mostly unchanged over the long term.	Little to no change in ground cover over the long term.	Potential for measurable improvement in ground cover over the long term with reduced duration of grazing activities.

Table 61: Summary of Effects by Alternatives for Saginaw Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Noxious Weeds *Unit of Measure*: Presence or absence	Present	Present	Present	Present
Noxious Weed Presence and Dominance *Unit of Measure*: Current acres infested, acres treated on an annual basis, and risk (low, moderate, high) of weed establishment and spread.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.	Continued inventory and control of noxious weeds would result in low risk of weeds becoming dominant in allotment.

Sensitive Plants

Existing Condition

Regulatory Framework

National Forest Management Act of 1976

The National Forest Management Act of 1976 as amended directs the FS to provide for diversity of plant and animal communities and requires the development and implementation of a resource management plan for a National Forest. The B-D revised its Land and Resource Management Plan in 2009. By implementing and following the direction in the Forest Plan for sensitive plants, the project is in compliance with this Act for sensitive plants.

Beaverhead-Deerlodge National Forest Land and Resource Management Plan (Forest Plan)

The Beaverhead-Deerlodge National Forest Plan has no standards specific to sensitive plants; however, it includes the following goal:

- Sensitive plant populations and their habitat are maintained or restored. Large core populations or fringe-of-range populations of sensitive plants are conserved in research natural areas, botanical special interest areas, or protected as populations in conservation strategies, or project design specifications. (USDA Forest Service 2009 p, 43).

Measures to reduce impacts to sensitive plants have been incorporated into the design features of the proposed action and alternative 4.

Forest Service Manual 2600 Wildlife, Fish and Sensitive Plant Habitat Management

Forest Service Sensitive Species Policy (FSM 2670) directs national forests to assist states in achieving conservation goals for endemic species; complete biological evaluations of programs and activities; avoid and minimize impacts to species with viability concerns; analyze the significance of adverse effects on populations or habitat; and coordinate with states and USDI Fish and Wildlife Service. The Forest Service Manual (2670.15) further defines sensitive species as those plant species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trend in numbers, density or habitat capability that would reduce a species distribution. By analyzing the effects on sensitive plants through this document, and ensuring that sensitive species are not trending toward federal listing, the project is in compliance with the manual direction.

Endangered Species Act

The Endangered Species Act of 1973, (as amended (16 U.S.C. 1531 *et seq*) Section 2, directs federal agencies to conserve endangered and threatened species and to ensure that actions authorized, funded, or carried out by these agencies are not likely to jeopardize the continued existence of threatened or endangered species, or result in the destruction or adverse modification of their critical habitats. Within the state of Montana, there are two plant species listed as threatened under the Endangered Species Act (USDA Forest Service 2011). There are none listed as endangered, and one (whitebark pine-*Pinus albicaulis*) listed as a candidate for federal listing. Of the species listed or candidate, only Whitebark pine occurs on the Beaverhead-Deerlodge National Forest. Whitebark pine has been added to the Region 1 Sensitive Plant Species list and occurs within the project area. Impacts to whitebark pine are analyzed in this document and implementation of the various alternatives will not jeopardize the continued existence of the species, nor lead toward further need for listing. Therefore, this project is in compliance with the act.

National Environmental Policy Act of 1969

The National Environmental Policy Act requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. This evaluation considers the environmental impacts of the proposed action as well as several other alternatives; therefore meeting the National Environmental Policy Act.

Plant Populations in the Project Area

Sensitive plant populations within the project area have likely been shaped by past activities including grazing. Current knowledge of sensitive plant populations within the project area is based on recorded observations, which date back as late as 1989 (MNHP 2011).

Currently, no federally listed threatened or endangered plant species are known to occur on the Beaverhead-Deerlodge National Forest; therefore there are no known federally listed plants in the project area. In 2011, the US Fish and Wildlife Service found whitebark pine to be warranted for federal listing as either threatened or endangered, but precluded listing due to workload. In the meantime, they designated whitebark pine a federal candidate species. As a result, Region 1 of the Forest Service included whitebark pine on their Region 1 Sensitive Plant Species List. The BDNF manages a sensitive plants species list designated by the Regional Forester. Currently, there are 40 sensitive plant species listed as either known, suspected, or with potential to occur on the BDNF. Of these 40 species, six are known to occur within the analysis area:

- Hall's rush (*Juncus hallii*)
- Hiker's gentian (*Gentianopsis simplex*)
- Lemhi penstemon (*Penstemon lemhiensis*)
- Primrose monkey-flower (*Mimulus primuloides*)
- Wavy moonwort (*Botrychium crenulatum*)
- Whitebark pine (*Pinus albicaulis*)

Three additional species were suspected to occur within the project area and were targeted during project surveys.

- California false-helleborne (*Veratrum californicum*)
- English sundew (*Drosera anglica*)
- Idaho sedge (*Carex idahoa*)

Survey results suggest that potential habitat is present for these three additional species, but no current populations are known. A complete list of BDNF sensitive plants can be found in Appendix B of the Sensitive Plants BE. As described above, due to inadequate training for Idaho sedge identification, the species is considered present for analysis purposes in a few allotments, due to suitable habitat availability and potential misses during surveys.

Within the project area, all 11of the allotments were found to have sensitive plant populations. Of the six sensitive plant species known to be present within the allotments, most appear to be reproducing successfully and withstanding grazing effects (see Existing Condition Table 3). A small population of wavy moonwort may be dwindling, but likely due to a lack of disturbance such as grazing or other natural events that reduce competing vegetation (see Existing Condition in Table 3).

Weed invasion into native habitats is a major threat to biodiversity (Vavra et al. 2007). Livestock grazing is a known vector for weed spread and establishment (Vavra et al. 2007). With weed species already present in the allotments, their continued spread and establishment can pose threats to sensitive plant populations regardless of whether or not livestock grazing continues.

Spotted knapweed (*Centaurea stoebe* (*maculosa*)) has been identified as a major threat to Lemhi penstemon (Mosely et al. 1990; Elzinga 1997; Stucki et al. 2013), since both species occupy similar habitats of sparsely vegetated slopes. As stated in the Range Report, spotted knapweed is capable in invading pristine, undisturbed grassland plant communities, and has been classified as a "strong" invader (Ortega and Pearson 2005).

Additional noxious weed species present within the project area include: Canada thistle (*Cirsium arvense*), houndstongue (*Cynoglossum officinale*), leafy spurge (*Euphorbia esula*), common tansy (*Tanacetum vulgare*), oxeye daisy (*Leucantheum vulgare*), and St. Johnswort, (*Hypericum perforatum*). Other nonnative invasive plants (not listed as noxious) present within the project area include: bull thistle (*Cirsium vulgare*), musk thistle (*Carduus nutans*), common mullein (*Verbascum thapsus*), black henbane (*Hyoscyamus niger*), and cheatgrass (*Bromus tectorum*). For additional weed information within the project area see the Range Report, and the Existing Condition Table (3), of this report.

Table 1 below provides a thorough description of the species analyzed in this document and existing condition information for each sensitive plant population within the project area.

Table 1: Sensitive Plant Descriptions and Additional Background

California false-helleborne (*Veratrum californicum*)					
Sensitive Rationale	**Habitat**	**Geographical Range**	**Elevation Range**	**Flowering Period**	**References**
Rare in MT, where it occurs on the periphery of its range. Only 6 known occurrences in MT.	Open riparian meadows, thickets and stream banks in the montane and lower subalpine zones.	WA to CA, east to MT, CO and Mexico.	*6200 – 7800 ft	July to August	MNHP 2012; Lesica 2012;
The species was recently found (2011) in two new locations on the Wisdom Ranger District, where it had previously been known to occur only on the Pintler Ranger District of the BDNF. Personal observation found conifer encroachment and elk bedding to pose notable threats to one of the Wisdom populations. Only one individual out of hundreds was observed to have successfully set fruit. Most others had been matted down by elk for bedding. Under heavy grazing scenarios where desirable livestock forage is removed, California false-helleborne has been found to aggressively expand in some areas (Anderson and Thompson 1993), even to the point where chemical and mechanical means of controlling it have been utilized (Cosgriff et al., 2004). One study by Loft et al. (1987) found that increased livestock levels reduced the amount of wildlife cover provided by California false-helleborne due to trampling. They also found a reduction in the number of reproductive structures through trampling and herbivory. Some level of disturbance is thought to be preferred for California false-helleborne establishment, however heavy grazing can cause a reduction in population stability and reproductive output. When ingested by pregnant livestock during certain developmental periods of the fetus, mutations or death of the calf can occur (Panter et al. 1992). Regardless of the known toxic effects of California false-helleborne to livestock and its ability to become aggressive, the populations within southwest Montana have not been found to be aggressive and are not known to be causing any ill effects on livestock. No populations are known to occur within the allotments.					
English sundew (*Drosera anglica*)					
Sensitive Rationale	**Habitat**	**Geographical Range**	**Elevation Range**	**Flowering Period**	**References**
Sparsely distributed species, known from 40 occurrences in MT.	Swamps, bogs, fens, wet meadows often associated with Sphagnum in the montane zone.	Eurasia and AK to CA, east to ID, MT, WY, and the Great Lakes	*7000 ft	June-July	MNHP 2012
No known locations within the project area. The closest known location is up by Lost Trail Ski Area on the Bitterroot National Forest.					
Hall's rush (*Juncus hallii*)					
Sensitive Rationale	**Habitat**	**Geographical Range**	**Elevation Range**	**Flowering Period**	**References**
Rare in MT, where it occurs on the	Subalpine parks and moist to wet meadows and	WA to MT south to UT and CO.	*6900 – 8600 ft	July to August	MNHP 2012; Lesica 2012.

Table 1: Sensitive Plant Descriptions and Additional Background

periphery of its range. 30 known occurrences in MT.	slopes in the montane zone.				
Hall's rush has short branched rhizomes and often occurs in groups/bunches (MNHP 2012). The species has been found to have little viability concern and has been removed from the MTNHP species of concern list. In the next update to the R1 Sensitive Plant List, this species will be removed. The species does occur within the project area.					
Hiker's gentian (*Gentianopsis simplex*)					
Sensitive Rationale	**Habitat**	**Geographical Range**	**Elevation Range**	**Flowering Period**	**References**
Rare in MT, where it occurs on the periphery of its range. 10 known occurrences in MT.	Non-calcareous *Sphagnum* fens, meadows, and seeps, in the montane and lower subalpine zones.	OR, south to CA, and east through OR to MT, ID, NV.	*6600 – 8400 ft	July to August	MNHP 2012; Lesica 2012;
Hiker's gentian is a rhizomatous perennial, making it potentially more able to withstand disturbance. The majority of populations on the BDNF are found in light to moderately disturbed sites, primarily from livestock grazing. Some disturbance may benefit the plants by reducing competition. Populations are only known on the Wisdom District of the Beaverhead-Deerlodge National Forest. Seasonal crews identified potential habitat within allotments of the Wise River District, however, the habitat is likely too far north and out of its range for the species. Populations do occur within the allotments on the Wisdom Ranger District (See Table 2 below).					
Idaho sedge (*Carex idahoa*)					
Sensitive Rationale	**Habitat**	**Geographical Range**	**Elevation Range**	**Flowering Period**	**References**
Regional endemic with 52 known occurrences in MT.	Moist, alkaline, streamside meadows in the montane zone. Most often occurring in areas between wet meadow and sagebrush steppe, and on terraces of headwater streams.	MT, OR, ID, CA, and UT	Typically above 6000 ft	July to August	MNHP 2012; Lesica 2012
Idaho sedge is a rhizomatous perennial that occupies late successional habitats where graminoid (grass like plants) canopy cover is high (60-100%) (Lesica 1989). It persists in strongly competitive environments and is able to withstand light to moderate grazing as described in Lesica 1989. Road construction has impacted three known Idaho sedge populations within MT (Lesica 1989). Surveys were conducted but inadequate training may be the reason for a lack of populations found during surveys.					
Lemhi penstemon (*Penstemon lemhiensis*)					
Sensitive Rationale	**Habitat**	**Geographical Range**	**Elevation Range**	**Flowering Period**	**References**

Table 1: Sensitive Plant Descriptions and Additional Background

Regional endemic known only in southwest MT and adjacent ID. 246 known occurrences in MT.	Sparsely vegetated soil of grasslands, sagebrush steppe, open forest, along roads and other disturbances in the montane zone. Often on east to southwest facing slopes (with natural slippage).	Southwest MT and adjacent ID	3200-8100 ft	Early June to Late July	MNHP 2012; Lesica 2012;

Lemhi penstemon is generally found occurring below or near the lower extent of Douglas fir and or lodgepole pine forests, in habitats dominated by big sagebrush and bunchgrasses. Bare ground at most sites are between 30 and 70% (Elzinga 1997).

Intensive studies conducted in the late 80's through 2013, revealed that population dynamics of Lemhi penstemon can vary dramatically between years, with individuals appearing one year and not the next (Heidel and Shelly 2001; Stucki et al. 2013) The level of flowering and seed germination is also highly variable between years and depends primarily on climatic conditions from year to year (Heidel and Shelly 2001). Years with wet springs and early summers typically yield the highest flowering and seed germination (Elzinga 1997).

Lemhi penstemon is a poor competitor, and therefore vegetation succession is thought to reduce habitat quality. The lack of wildfire on the landscape as a result of fire suppression has allowed conifers to encroach into native sagebrush grasslands, and poses a threat to the continued existence of some Lemhi penstemon populations (Heidel and Shelly 2001; Stucki et al. 2013). Prescribed fire has been shown to restore *P. lemhiensis* habitat and population numbers when encroachment occurs, as long as invasive weeds and livestock grazing are adequately managed following fire to prevent competition and over grazing (Heidel and Shelly 2001).

Livestock grazing has been identified as a potential threat to Lemhi penstemon through browsing of reproductive stalks (reducing reproductive output), trampling damage and indirectly through weed invasion (transporting weed seed and creating open habitats for establishment) (Elzinga 1997). Outside the project area, browsing of flowering stems by livestock and native ungulates has been found to be as high as 90% in some populations, though deer were suspected to be the largest culprit (Shelly 1990). Some browsing of flowering stems by livestock likely occurs within the project area, but is not known to be reducing population viability (personal observation). Monitoring of existing sites in 2013 found that two sites excluded from livestock grazing had high browse rates, pointing again to native ungulate browsing (personal observation).

Spotted knapweed has been identified as a major threat to Lemhi penstemon (Elzinga 1997; Moseley et al. 1990; Stucki et al. 2013). Both Lemhi penstemon and spotted knapweed occupy similar habitats of sparsely vegetated slopes, yet the strongly competitive, prolific seed producer, and possibly allelopathic traits of spotted knapweed may give it an extra leg up on Lemhi penstemon. Thus far, no declines in Lemhi penstemon populations have been observed on the Beaverhead-Deerlodge National Forest as a result of spotted knapweed invasion, though continued spread within the populations may become a problem in the long term, regardless of continued livestock grazing.

70 % of Lemhi penstemon populations occur as roadside populations which face several threats, including:

Table 1: Sensitive Plant Descriptions and Additional Background

weed invasion, inadvertent weed spraying (on non-FS lands), and road maintenance activities (Elzinga 1997). These roadside populations are generally small in size and because of the apparent threats are considered to be ephemeral and too costly to manage effectively (Elzing 1997). It is suggested that conservation efforts be reserved for larger core populations not associated with roadsides (Elzinga 1997). The Beaverhead-Deerlodge Weed Management Plan (2002) protects sensitive plants by employing the following mitigation measure:

- No herbicide will be applied directly on sensitive plants during spot applications and a 100' buffer will be employed around known populations of sensitive plants during broadcast applications (including aerial). All aerial treatment areas will be surveyed for sensitive plants prior to initial spraying.

The Beaverhead-Deerlodge weed spraying crews are aware of the Lemhi penstemon populations and do careful spot treatments within populations if needed. Because of this, the perceived threat of inadvertent herbicide spraying shall not pose impact to known populations within the allotments.

Slope slippage and fire have been attributed to increase populations of Lemhi penstemon (Elzinga 1997; Heidel and Shelly 2001).

Several populations occur within the allotments.

Primrose monkey-flower (*Mimulus primuloides*)

Sensitive Rationale	Habitat	Geographical Range	Elevation Range	Flowering Period	References
Rare in MT, where it occurs on the periphery of its range. 26 known occurrences in MT.	Poorly drained soils which have a high water table, which include fens, bog-like areas and wet meadows in the montane and subalpine zones.	WA to CA, east to southwestern MT and AZ.	*6600 – 8000 ft	July to early September	MNHP 2012; Lesica 2012;

Primrose monkey-flower is a low growing rhizomatous perennial that reproduces both sexually and asexually (MNHP 2012). It has been found to tolerate light to moderate grazing and benefit from reduced canopy cover (Douglas 1981), though intensive grazing is thought to be one its greatest threats. Heavy grazing can alter the hydrologic conditions of the site and thus reduce or remove available habitat and individuals.

A fire recovery study in California found primrose monkey-flower to recover very well after fire, and was in fact the most common broadleaf species to encounter on their transects in all four years following the fire (DeBenedetti and Parsons 1984).

Within the project area, populations occur in wet meadows adjacent to streams.

Wavy moonwort (*Botrychium crenulatum*)

Sensitive Rationale	Habitat	Geographical Range	Elevation Range	Flowering Period	References
Sparsely distributed species across the western states.	Wide variety of sites from low to moderate elevations that include	AZ to NV, CA, and MT. BC and AB Canada.	2400-8000 ft	June to August	MNHP 2012; Lesica 2012;

Table 1: Sensitive Plant Descriptions and Additional Background

	disturbed meadows, thickets, and openings in moist forests.				

Moonwort are peculiar plants, closely related to ferns. They typically occupy open habitats and are adapted to disturbance.

Beatty et al. (2003) suggests that early successional habitats and disturbances which create and maintain openings may be necessary for moonwort persistence at a site. For instance, low to moderate grazing is thought to create and maintain suitable habitat conditions for moonworts by reducing competition (Beatty et al. 2003; Ahlenslager and Potash 2007). Natural succession, or the absence of grazing can result in increased competition and shading which can decrease habitat quality and cause population extirpation (Ahlenslager and Potash 2007; Farrar 2006).

Moonworts have even been described as "ephemeral," due to their movement with succession. Population may go extinct in some areas where competition is too high, and colonize other areas that have opened up elsewhere (Zika et al. 1995; Beatty et al. 2003; Ahlenslager and Potash 2007). The disturbance frequency, intensity and scale can all work to create, enhance, degrade or destroy moonwort populations or habitat. In general, disturbances that physically break the root and mycorrhizal connections or otherwise uproot the moonwort are considered to be major threats to the plants.

The removal of above ground leaf tissue (through herbivory or other means) has shown to have little if any effect on the plant as a whole since much of the energy obtained is through below ground mycorrhizal associations (Johnson-groh 1997). Studies done by Johhnson-groh (1997; 2002) have found that reservoirs of below ground moonwort structures/individuals (spores, gemmae, juveniles (sporophytes), and adults (gametophytes)) buffer them from above ground disturbances.

Weed invasion has been identified as a potential threat to moonwort populations, as well as weed spraying for roadside populations (Vanderhorst 1997; Beatty et al. 2003). No roadside populations are known within the analysis area.

Fire and other actions which remove above ground biomass, have shown to not be detrimental to moonworts unless soil temperature get exceedingly hot (Johnson-Groh and Farrar 1996). The indirect effects from fire, such as desiccation and sediment could result in population declines in some circumstances.

Survey and field identification of moonworts is difficult due to their complicated biology (Zika et al. 1995; Vanderhorst 1997). For one, they often occur in "genus communities," which are a mix of several different species in one grouping. Second, populations are commonly comprised of few individuals and can fluctuate between years in their above ground appearance. They may be present one year, and not present again for 5 or so years. Third, their taxonomic distinctions are disputed among botanist and very subtle, often requiring several features distinctions that are controversial. And fourthly, their small stature and inconspicuous nature make them very difficult to see, especially when growing under other vegetation. It is possible that many sensitive moonworts are not in fact very rare, but rather under detected and reported.

One population is known within the allotments.

Whitebark pine (*Pinus albicaulis*)

Sensitive Rationale	Habitat	Geographical Range	Elevation Range	Flowering Period	References
Widely distributed	Open and mixed conifer	BC and AB Canada, south to	2950-12000 ft	NA	MNHP 2012; Lesica 2012;

Table 1: Sensitive Plant Descriptions and Additional Background

species in the west facing several threats which include: white pine blister rust, mountain pine beetle, and the effects of fire suppression.	forests, and subalpine habitats including krumholz forms above treeline.	CA, NV, MT, WY			

Whitebark pine is experiencing range-wide decline due to several factors: fire and fire suppression activities, climate change, white pine blister rust (*Cronartium ribicola*), and mountain pine beetle (*Dendroctonus ponderosae*) attack (USDI Fish and Wildlife Service 2011a). The US Fish and wildlife Service found that these four factors, and inadequate regulatory mechanisms to reduce these impacts, warranted whitebark pine for federal listing under the Endangered Species Act (USDI Fish and Wildlife Service 2011a). Due to workload and the existing backlog of the USDI Fish and Wildlife Service, they have precluded listing until they have the appropriate time and funding to do so, and have identified whitebark pine as a candidate species. Well referenced information on the five factors contributing to this designation is presented in the 12-month finding by the USDI Fish and Wildlife Service (2011a), which was posted in the Federal Register of July, 2011. It should be noted that livestock grazing was not identified as one of the major factors for whitebark pine decline.

White pine blister rust and mountain pine beetle attack will likely continue to infect whitebark pine within the analysis area. As discussed in the USDI Fish and Wildlife Service's 12-month finding (2011a), climate change is extending the elevational range of epidemic outbreaks of mountain pine beetle, allowing high elevation sites to receive large losses (once thought to be too cold for the beetle). In addition, climate change is anticipated to cause warmer temperatures in our region, and as a result is anticipated to have the following implications for whitebark pine: reduced habitat due to increased temperatures (and subsequent increased competition) and decreased soil moisture; altered fire regimes that can increase fire frequency, severity and cause habitat loss (USDI Fish and Wildlife Service 2011a).

Whitebark pine is known as a keystone species for the many ecosystem functions it provides in upper subalpine habitats: biodiversity, nurse tree, erosion control, food source, snow retention, pioneer species, etc. (Tomback et al. 2001). Within the allotments, whitebark pine occurs in mixed conifer stands below the upper subalpine habitats where the majority of the ecosystem functions typically associated with whitebark pine are not likely provided. In these lower mixed conifer stands, whitebark pine functions similar to other conifer species present, with that added benefit of providing a valuable food source for wildlife in the form of large seeds.

Roughly 98% of whitebark pine range occurs on public lands in the United States (Schwandt 2006). Region I of the US Forest Service is mapped as having over 5 million acres of whitebark pine (USDA Forest Service 2010a). Data gathered by FIA (Forest Inventory and Analysis) show a reduction in the extent of live whitebark pine within the region, as well as an increase in dead whitebark pine trees (USDA Forest Service 2010a). In northern Idaho, a recent study found that 98% of whitebark pine historic range is no longer occupied (Schwandt 2006).

Several mapping systems have been utilized to estimate the number of acres occupied by whitebark pine on the Beaverhead-Deerlodge National Forest. The range between programs is quite varied as shown below.

- **TSMRS**: Map product was generated in the late 1970's to the early 1980's. This map product utilized photography and hand delineation. For the entire Beaverhead-Deerlodge NF, the TSMRS data shows 60,985 acres of whitebark pine.
- **SILC3**: Map product was generated in the mid 1990's. This map product utilized 30 meter

Table 1: Sensitive Plant Descriptions and Additional Background

satellite imagery. For the entire Beaverhead-Deerlodge NF, the SILC3 data shows 297,557 acres of whitebark pine.

- **VMap:** Map product was generated 2011. This map product utilized NAIP in conjunction with Landsat TM. For the entire Beaverhead-Deerlodge NF, VMap data shows 175,035 acres of whitebark pine (as a dominant species of 40% cover or greater).

A total of 1,143 acres of whitebark pine are mapped using VMap within the allotment. However VMap only maps dominant vegetation accounting for 40% or more cover, so smaller concentrations of whitebark pine that occur in mixed stand conditions throughout the allotment were not shown. Much of the mapped whitebark pine stands occur in high elevation areas where little grazing occurs. When livestock do travel through whitebark pine communities, it is the small seedling and sapling sized trees that are most vulnerable to livestock impacts.

Monitoring of whitebark pine stands on the Beaverhead-Deerlodge National Forest began in 2010 and is planned to expand and continue on the Forest (USDA Forest Service 2010b). Nine plots were established across the Forest and data collected included: number of seedlings; number of live trees over 4.5' tall; number of dead trees over 4.5' tall; percent live with blister rust; percent live with mountain pine beetle infection; and percent live without either blister rust or mountain pine beetle. The initial data collected showed the majority of trees at the nine monitoring plots in the seedling stage (49%), representing good regeneration, and 73% were live without mountain pine beetle or blister rust infestation (USDA Forest Service 2010b).

Several studies discuss historic grazing impacts to coniferous forest dynamics (Belsky and Blumenthal 1997) and even whitebark pine communities (Willard 1990; Johnson, Jr. 1990), but with no mention of impacts to whitebark pine itself. In the late 1800's and early 1900's, intensive grazing did occur in high elevation sites within the region. However, current grazing policy and livestock economics have led to a reduction of livestock use in the high elevation whitebark pine habitats in the region. A study of a subalpine meadow in Wind Rivers, WY found an increase in establishment of subalpine fir (*Abies lasiocarpa*), lodgepole pine (*Pinus contorta*) and whitebark pine that coincided with a reduction from heavy grazing to moderate grazing intensity (Dunwiddie 1977). It was suggested that moderate levels of livestock grazing decreased vegetation competition, while increasing soil disturbance, which provided a suitable seed bed for tree establishment in the open meadow. Thus suggesting that moderate grazing allowed for successful seedling establishment.

Whitebark pine is analyzed as if occurring in all allotments due to the mapping limitations of Vmap.

Table 2 below defines the units of measure that are used to describe the population stability, reproductive output, and risk of weed invasion for the sensitive species in the project area. These units of measure are used in the narratives below to describe the existing condition of the sensitive plants in the project area.

Table 2: Unit of Measure Definitions.		
Population Stability	**Reproductive Output**	**Risk of Weed Invation**
LOW = Few individuals, or eminent threats that will likely reduce the number of individuals. May be due to drastic changes in population numbers between years. **MODERATE** = Fluctuating population numbers. May vary between few individuals to many. Or high population numbers but eminent threat. **HIGH** = Many individuals that can withstand some disturbance and persist. Little fluctuation in the population or not to a level that would make the population vulnerable.	**LOW =** Few individuals that are reproductive, therefore little output of seed for future generations. **MODERATE =** Reduced number of reproductive individuals, may be due to yearly climate conditions or browse. **HIGH =** Large number or abundance of individuals that are reproductive and able to produce seed for future years.	**LOW =** Few weeds present in the area, lack of disturbance vectors to transport weeds, and robust vegetation that can defend against weed invasion. **MODERATE =** Some weeds present in the area, but at a distance, and/or a disturbance vector present that could potentially transport weeds. Population habitat potentially able to defend against weed invasion. **HIGH =** Weeds present in close proximity to sensitive plant population and likely to cause impact to the species in the future. Other disturbance vectors may also be present to further facilitate weed spread.

Seymour Allotment Sensitive Plant Existing Condition

Tenmile Pasture

Wavy Moonwort - Wavy moonwort was first discovered in the Tenmile pasture of the Seymour allotment in 2011, while conducting other project surveys. No historic information is available as this was a first sighting. The population occurs in a moist aspen (*Populus tremuloides*) stand, which is part of a tufted hairgrass (*Deschampsia cespitosa*)-Willow (*Salix sp.*) wet meadow. Vegetation was lush at the time of discovery (July 25, 2011) with little to no grazing impacts observed to the population. The Tenmile pasture has not been grazed since 2007. Only two individuals were found at the site (100% reproductive), and vegetation was very robust, suggesting the lack of grazing may be allowing native vegetation to overcrowd the population.

The low number of individuals may be a sign of an ephemeral population, or a declining one. A site visit was attempted late in September 2012 to reassess the population, but no individuals were found (possibly if they had been present in 2012, they had already dried up). A site visit was also made in 2013 at the same time when it was first discovered in 2011. An hour was spent scouring the ground on hands and knees, but no individuals were found.

Canada thistle was present along the road corridor as well as within the aspen stand and population area.

Additional potential habitat was identified within the allotment along road sides and within wet meadows. Specimen identification verification was done by Drake Barton and Scott Mincemoyer (2012).

Population Stability: Low - Low stability is due to the one population having only 2 plants and the robust vegetation which may outcompete wavy moonwort.
Reproductive Output – Low - Low Output is due to the lack of individuals in the last two years.
Risk of Weed Invasion – High - High risk is due to the presence of Canada thistle within the population area.
***Whitebark pine (All Pastures)* -** Whitebark pine was not mapped by VMap as occurring in the allotment; however non-dominant scattered occurrences are likely present. Infrequent trampling of seedlings and saplings may occur as livestock trail through the allotment.
Potential habitat was identified for the following sensitive plant species: California false-helleborne: habitat present in moist meadows.

Fish Trap Allotment Sensitive Plant Existing Condition

East Fork Pasture

***Lemhi penstemon* -** The population occurs on a sagebrush hillside adjacent to a FS road. The population was first found in 1992 (26 plants 100% reproductive). Surveys were conducted in 2005 and no individuals were found. Surveys in 2012 found 22 plants (32% reproductive). In 2012, the majority of individuals were young, non-reproductive individuals that occurred in a small area with little sagebrush cover. Aside from that grouping, the remaining individuals occurred either along the roadside in the roadside ditch or along a well-used cow trail. Grazing disturbance was evident within the population area, with some areas having bare soil. Conifer encroachment into the population area was also observed. Spotted knapweed was present along the road where Lemhi penstemon was co-occurring. Some browse of inflorescences was evident. Other threats to the population include roadside maintenance (see species description above for more information).
Population Stability: Moderate - Moderate stability is due to the drastic fluctuation in numbers of individuals between 1992 and 2012. However, it is common for this species to have dramatic fluctuations between years (see species description in Table 1 above.).
Reproductive Output: Moderate - Moderate reproductive Output is due to the reduction in recent years of reproductive individuals.
Risk of Weed Invasion: High - High risk of weed invasion is due to the presence of spotted knapweed in very close proximity to Lemhi penstemon and the presence of bare disturbed soils within the population polygon.
***Whitebark pine* -** Whitebark pine was not mapped by VMap as occurring in the allotment; however non-dominant scattered occurrences are likely present. Infrequent trampling of seedlings and saplings may occur as livestock trail through the allotment.
Potential habitat was identified for the following sensitive plant species: None identified at this time.

West Fork Pasture

***Lemhi penstemon – West Population* -** The population occurs on a sparsely vegetated, undisturbed, steep slope adjacent to a FS road. No livestock use was evident, likely due to the steepness of the slope. The population was first discovered in 1992, with 14 plants found (100% reproductive). A survey in 2005 found no individuals. Surveys in 2012 found 9 plants (67% reproductive). Spotted knapweed (*Centaurea stoebe*), Cheatgrass (*Bromus tectorum*), Canada thistle (*Cirsium arvense*) and bull thistle (*Cirsium vulgare*) were all present within 50 to100 feet of the population. Being that it is a roadside population with sparse vegetation, further infestation by spotted knapweed and cheatgrass is possible and likely.
Other threats to the population include roadside maintenance (see species description above for more information).
Population Stability: Moderate - Moderate stability is due to the drastic fluctuation in numbers of individuals between 1992 and 2012. However, it is common for this species to have dramatic fluctuations between years (see species description in Table 1 above.) **.**
Reproductive Output: Moderate - Moderate reproductive Output is due to the reduction in recent years of reproductive individuals
Risk of Weed Invasion: High - High risk of weed invasion is due to the presence of spotted knapweed and cheatgrass in very close proximity to Lemhi penstemon and the proximity to the disturbed roadside, which can help facilitate the spread of weeds.

***Lemhi penstemon – East Population* -** The population occurs on a steep sagebrush hillside, just above a steep road cut, and below a ridge. The population was newly discovered in 2012 during project surveys, and consisted of 6 individual (33% reproductive). In 2013, 17 individuals were recorded (41% reproductive). The increase in number of individuals may be more attributable to the increased survey intensity in 2013.The population occurs not far from the adjacent road, but the steepness of the terrain to reach the population would limit much human or livestock induced impact, though one solid cow trail was observed running through the site. Additional wildlife trailing was evident. Spotted knapweed was mapped within 50 feet of the Lemhi penstemon population. With sparse vegetation present, it is likely that spotted knapweed will continue to colonize the area. Douglas fir trees are colonizing the slope and may present conifer encroachment (over shading) issues to the population in the future.
Population Stability: Moderate - Moderate stability is due to repeated observation of individuals, but also accounts for the conifer encroachment concern.
Reproductive Output: - Moderate - Moderate Output is due to less than 50% of individuals being reproductive.
Risk of Weed Invasion: High - High weed risk is due to the presence of spotted knapweed and sparse vegetation.
***Whitebark pine* -** Whitebark pine was not mapped by VMap as occurring in the allotment; however non-dominant scattered occurrences are likely present. Infrequent trampling of seedlings and saplings may occur as livestock trail through the allotment.
Potential habitat was identified for the following sensitive plant species: Wavy moonwort: habitat present in moist meadows and along roadsides.

Mudd Creek Allotment Sensitive Plant Existing Condition

Mudd Creek Pasture

***Lemhi penstemon* -** A population occurs adjacent to an irrigation ditch in the Mudd Creek allotment. The population was reported by the Range Specialist in 2012 and assessed by the Botany Crew in 2013. A total of 44 individuals were observed (57% reproductive). Weeds (spotted knapweed, Canada thistle, and houndstongue) were present along the irrigation ditch and in places of livestock use. Livestock trailing was noted at the site. Penstemon lemhiensis was noted as occurring in safe sites under sagebrush or close by. The population lies roughly 800 feet from a two-track road.

Population Stability: unknown - Unknown stability is due to the unknown trend. Though 44 individuals may suggest a moderate stability for the population.

Reproductive Output: High - High Output due to over 50% of the population being producing seed.

Risk of Weed Invasion: High - High weed risk is due to the presence of weeds within the population area.

***Whitebark pine* -** A total of 21.5 acres of whitebark pine are mapped within the Mudd Creek allotment, all occurring at the upper north end of the unit. The populations occur in the upper elevational areas of the allotment, where little livestock use occurs (Greenwood, personal communication through e-mail dated 9.19.2013). Smaller scattered occurrences of whitebark pine likely occur within the allotment.

Potential habitat was identified for the following sensitive plant species: Wavy moonwort: habitat present in moist meadows and along roadsides.

Pintlar Creek Allotment Sensitive Plant Existing Condition

Pintlar Creek Pasture

***Lemhi penstemon* -** The population occurs adjacent to a FS road on a slightly elevated roadside. It was first located in 1993, with "more than 6 plants observed and flowering" being recorded. In 2009, 15 plants were found, and in 2011, 7 plants were found. In 2009 and 2011, the number of reproductive individuals was not recorded. In 2013, at total of 46 individuals were observed (15% reproductive). The population occurs behind and somewhat under young (20 – 30 year old) lodgepole pine. It is likely that the continued encroachment of conifers into their habitat will result in the habitat being less than suitable for this roadside population. Roadside 5 Hazard Tree Removal project has opened up the surrounding area and may allow for population expansion. The population occurs adjacent to the road where spotted knapweed and Canada thistle have been mapped, but none were observed during surveys.

Population Stability: Moderate - Moderate stability is due to the relatively stable numbers, but also accounts for the current conifer encroachment concern. Trend was up considerably in 2013.

Reproductive Output: Low - Low reproductive Output is due to the relatively low proportion of individuals that were fruiting.

Risk of Weed Invasion: Moderate - Moderate risk of weed invasion is due to the mapped presence of weeds along portions of the Pintlar Creek Road, but none noted within or by the population.

***Whitebark pine* -** A total of 0.71 acres of whitebark pine are mapped within the Pintlar Creek Allotment, all occurring in the upper north end of the unit, along the allotment boundary. Smaller scattered occurrences of whitebark pine likely occur within the allotment.
Potential habitat was identified for the following sensitive plant species: Wavy moonwort: habitat present in moist meadows and long roadsides.

Mussigbrod Allotment Sensitive Plant Existing Condition

Mussigbrod Pasture

***Lemhi penstemon – East Population* -** The population was reported by the Range Specialist in 2012 and assessed by the Botany Crew in 2013. A total of 6 individuals were found (83% reproductive). The population occurs on a steep, dry, open sagebrush hillside. Spotted knapweed and Canada thistle were present within the population area. A two-track road is roughly ¼ mile from the population.
Population Stability: Unknown - Unknown stability is due to the unknown trend. Though six individuals may suggest low stability.
Reproductive Output: High - High reproductive Output is due to the large percentage of individuals flowering.
Risk of Weed Invasion: High - High risk is due to the presence of spotted knapweed and Canada thistle within the population area. Potential for spread is high.

***Lemhi penstemon – West Population* -** The population was newly discovered in 2013 during project surveys. A total of 35 individuals were found (80% reproductive). The population occurs on a steep hillside above an old, unused road-cut. Spotted knapweed, Canada thistle and cheatgrass were all present within the population. A two-track road lies slightly less than ¼ mile from the population.
Population Stability: Unknown - Unknown stability is due to the unknown trend. Though 35 individuals may suggest moderate stability.
Reproductive Output: High - High reproductive Output is due to the large percentage of individuals flowering
Risk of Weed Invasion: High - High risk is due to the presence of spotted knapweed, Canada thistle, and cheatgrass within the population area. Potential for spread is high.
***Whitebark pine (All Pastures)* -** Whitebark pine was not mapped by VMap as occurring in the allotment; however non-dominant scattered occurrences are likely present. Infrequent trampling of seedlings and saplings may occur as livestock trail through the allotment.
Potential habitat was identified for the following sensitive plant species: California false-helleborne: habitat present within moist riparian meadows. Wavy moonwort: habitat present within moist meadows and along roadsides.

Ruby Creek Allotment Sensitive Plant Existing Condition

Lower Ruby Pasture

***Hiker's gentian* -** The population was newly discovered in 2012 during project surveys, with 4 plants being reported (100% reproductive). It occurs in a peat bog on the valley bottom slope

break. Livestock grazing was evident within the pasture, but the heaviest use was observed to be localized next to the main road. Spotted knapweed, Canada thistle, Common tansy, Oxeye daisy, bull thistle, and common mullein are all mapped along the road corridors adjacent to the population, but none were observed during surveys and habitat was reported in great condition.
Population Stability: Low - Stability is low due to the low number of individuals present at the site. Further observations of the population will need to be made.
Reproductive Output: High - Reproductive Output is high since all individuals were flowering.
Risk of Weed Invasion: Low - Low risk of weed invasion is due to weed control efforts that have reduced or eliminated the weeds in the area.
***Primrose monkey-flower* -** The population was newly discovered in 2012 during project surveys. 15 plants were reported (flowering). No percentage was given for the amount of individuals that were flowering. It occurs on the same peat bog as the hiker's gentian above (see above description). Primrose monkey-flower is a rhizomatous perennial, reproducing through either vegetative means or via seeds. Light to moderate grazing appears to be tolerable to the species, whereas heavy grazing could be detrimental. Spotted knapweed, Canada thistle, Common tansy, Oxeye daisy, bull thistle, and common mullein are all mapped along the road corridors adjacent to the population, but again no weeds were found during surveys and the habitat was reported in great condition.
Population Stability: Low - Stability is low due to the low number of individuals present at the site. Being that it is a rhizomatous plant, populations are generally much larger with individuals in the hundreds.
Reproductive Output: Unknown -
Risk of Weed Invasion: Low - Low risk of weed invasion is due to weed control efforts that have reduced or eliminated the weeds in the area.
***Primrose monkey flower* -** The population was newly discovered in 2012 during project surveys. Over 500 plants were estimated (flowering). No percentage was given for the amount of individuals that were flowering. It occurs in a marsh/bog with dense sedges and willows. Three separate groupings occur within a 2.3 acre area. No signs of livestock use were observed in the area. The population lies within a wet meadow with two adjacent roads. Bull thistle, Canada thistle, common tansy and spotted knapweed are common along the roads. The closest populations are roughly 500 feet away.
Population Stability: High - High stability due to the large number of individuals. Though further observation of this newly discovered population is needed.
Reproductive Output: Unknown - Unknown Output is due to a lack of reproductive estimate at the time of survey.
Risk of Weed Invasion: Moderate - Moderate risk of weed invasion is due to the presence of weeds within the area, though only a few species would invade primrose monkey-flower habitat. Livestock grazing nor disturbance was evident in the area.
***Whitebark pine (All Pastures)* -** Whitebark pine was not mapped by VMap as occurring in the allotment; however non-dominant scattered occurrences are likely present. Infrequent trampling of seedlings and saplings may occur as livestock trail through the allotment.
Potential habitat was identified for the following sensitive plant species: Wavy moonwort: habitat present in moist meadows and along roadsides. Idaho sedge and Hall's rush: habitat present at the margins of the moist meadows in Lower Ruby pasture. These two species are

analyzed as if present, though no individuals were found and no current population data is available.

Dry Creek Allotment Sensitive Plant Existing Condition

Upper Dry Creek Pasture

Primrose monkey flower*:* The population was newly discovered in 2012 during project surveys. "1000's" of individuals were reported (flowering). No percentage was given for the amount of individuals that were flowering. In 2013, the population was revisited and an estimate of 2000-5000 individuals was made with roughly 5% reproductive. This low percentage of reproduction is likely common as most populations include a large proportion of un-flowering rosettes. The population was robust, and occurs along the wet margins of a 5 acre meadow. The population occurs outside an existing campground exclosure. Grazing of the population was observed during the 2013 visit, though communication with Kevin Greenwood (in the field on 8.14.2013 and through e-mail dated 9.19.2013) implies grazing in this upper portion of the allotment is infrequent. Some individuals were trampled, and hoof prints dug up some individual. Spotted knapweed occurs along the campground road that runs adjacent to the primrose monkey-flower population. The road is approximately 400 feet from the population. Sheley et al. 1998 state spotted knapweed does not compete with vigorous grass communities in moist areas, so should not be a threat to the population of primrose monkey-flower occurring in the wet meadow. In addition, the road receives regular weed treatment once a year (Greenwood – personal communication through e-mail dates 11.5.2013).
Population Stability: High - High stability is due to the robust population numbers
Reproductive Output: Moderate - Moderate Output is due to the low percentage of individuals flowering (though it is thought to be normal), yet the high number of individuals.
Risk of Weed Invasion: Low - Low risk is due to the moist meadow habitat that is not suitable for knapweed invasion and the high priority for weed treatment in the campground and along the road.

***Hall's rush* -** Population occurs on the drier edges of the same wet meadow as primrose monkey-flower (see description above). In 2013, and estimate of roughly 200-400 individuals was made (30% reproductive). Grazing was observed occurring in the population area, but few individuals were thought to be grazed. As mentioned above, grazing is thought to be infrequent in this portion of the allotment (personal communication with Kevin Greenwood through e-mail dated 9.19.2012). Spotted knapweed occurs along the campground road that runs adjacent to the Hall's rush population. The road is approximately 200 feet from the population. Sheley et al. 1998 state spotted knapweed does not compete with vigorous grass communities in moist areas, so should not be a threat to the population of Hall's rush occurring in the wet meadow. In addition, the road receives regular weed treatment once a year (Greenwood – personal communication through e-mail dates 11.5.2013).
Population Stability: Unknown - Unknown stability is due to the lack of trend information. Likely stability is moderate to high with the high number of individuals present.
Reproductive Output: High - High Output is due to the large number of flowering individuals present.

Risk of Weed Invasion: Low - Low risk is due to the moist meadow habitat that is not suitable for knapweed invasion and the high priority for weed treatment in the campground and along the road.

***Whitebark pine* – All Pastures -** A total of 128.6 acres of whitebark pine are mapped within the Upper Dry Creek pasture. All of them occur on the upper west end of the pasture. Livestock were observed grazing in the upper elevations of the unit around Twin Lakes in 2013 (personal observation). Except for one small stand in the lower reach of the S. Fk. Of Big Lake Creek, there would be little to no potential for livestock use of WBP stands within the allotment. Past use of the S. Fk. Stand is estimated to be light (Greenwood – personal communication through e-mail dated 9.19.2013). Smaller scattered occurrences are likely present within the allotment. **Potential habitat was identified for the following sensitive plant species**: California false-helleborne: habitat present in moist meadows. Hiker's gentian: habitat present in moist meadow where primrose monkey-flower was found. Wavy moonwort: habitat present in moist meadows and along roadsides.

Twin Lakes Allotment Sensitive Plant Existing Condition

Upper Big Lake Pasture

Whitebark pine - A total of 195 acres of whitebark pine are mapped within the Upper Big Lake Pasture. Personal observations during a 2011 project survey along Slag-O-Melt Creek Trail found whitebark pine to be a very common component of the mixed conifer forest. Cones were prolific with squirrels tossing them down throughout the day. Very little to no blister rust or bark beetle was observed within the whitebark pine along the trail. There is potential for livestock use of WBP stands along upper Big Swamp Creek in the Upper Big Lake pasture. Cattle are known to trail up the road to access forage located in wet meadow areas. Use of WBP stands would consist mostly of cattle trailing through them to access forage elsewhere (Greenwood – personal communication through e-mail dated 9.19.2013). Smaller scattered populations are likely present within the pasture.

Upper Little Lake Pasture

Whitebark pine – All Pastures A total of 114 acres of whitebark pine are mapped within the Upper Little Lake Pasture. The majority of them occurring in the upper finger of the allotment. Livestock use of this area likely occurs infrequently. According to Kevin Greenwood, there is little to no potential for livestock use of the whitebark pine concentrations within this pasture (personal communication through e-mail dated 9.19.2013). However, smaller scattered occurrences are likely present within the allotment.

Lower Big Lake Pasture

Primrose monkey flower - The population occupies a wet marshy area dominated by dense sedges and willows located in a boundary corner of FS lands with private lands on two sides. It was first located in 1996 where "1000- 10,000 plants" were reported (flowering). In 2012, "5000 – 10,000 plants" were estimated (5% reproductive). Past and present grazing occurs within the population area. Grazing was occurring at the time of survey and plants were in flower and

appeared to be undesirable forage to livestock. Short-term disturbance impacts are occurring but not reducing reproductive success or viability. In 2012 thousands of individuals were present and in bloom within the large population area. The population boundary was greatly extended during 2012 surveys (doubled in size). Canada thistle and musk thistle are both reported to occur along the roadways that lead into the wet meadow where primrose monkey-flower occurs. Vegetation is dense in the primrose habitat and does not seem likely to be invaded by either Canada or musk thistle.
Population Stability: High - High stability is due to the robust population numbers and large population area.
Reproductive Output: High - High Output is due to the abundance of flowers.
Risk of Weed Invasion: Low - Low risk is due to robust vegetation present within the population which will likely defend against weed invasion from either of the thistle species present in the area.

Hiker's gentian - The population occurs within the same wet marshy area as the primrose monkey-flower above (see description above). The hiker's gentian population is much less dense and more sporadic than the monkey-flower. It was first located in 1996 as having 50 individuals (just beginning to flower). In 2012, the population was estimated between 15 to 30 plants (70-80% flowering and past flowering). Reproductive percentages were not recorded at either visit. Past and present grazing occurs within the population area. The rhizomatous habit of the species likely allows it to tolerate or even prefer some level of disturbance. Short-term disturbance impacts are occurring but not reducing population viability. In 2012, several healthy groupings of individuals were found. Cows were grazing in the population area at the time of revisit and plant vigor was good. Most individuals were flowering or had flowered previously. Canada thistle and musk thistle are both reported to occur along the roadways that lead into the wet meadow where hiker's gentian occurs. Vegetation is dense in the gentian habitat and does not seem likely to be invaded by either Canada or musk thistle.
Population Stability: Moderate - Moderate stability is due to the relatively stable population numbers. This population had the highest number of individuals for the species within the project area.
Reproductive Output: High - High Output is due to the high number of flowers and fruits
Risk of Weed Invasion: Low - Low risk is due to robust vegetation present within the population which will likely defend against weed invasion from either of the thistle species present in the area.
Potential habitat was identified for the following sensitive plant species: Idaho sedge and Hall's rush: habitat present at the margins of the moist meadows. These two species are analyzed as if present, though no individuals were found and no current population data is available.

Monument Creek Allotment Sensitive Plant Existing Condition

Miner Creek Pasture

Lemhi penstemon - The population occurs in a small sagebrush opening in an otherwise dense lodgepole stand. It was first discovered in 1989 and reported as having 17 plants (flowering). It was visited in 2005 and 12 plants were reported (60% reproductive). In 2012, 31 plants were

recorded (61% reproductive). The population is far enough from the main road that direct impacts from road maintenance would not occur. Some browse was evident. Spotted knapweed is mapped as occurring along the adjacent roadway, but was not observed during surveys. The road lies approximately 300 feet from the Lemhi penstemon population.
Population Stability: High - High stability is due to the relatively unchanging, yet increased population numbers.
Reproductive Output: Moderate - Moderate Output is due to the relatively abundant amount of reproductive individuals, yet also incorporates the presence of browse.
Risk of Weed Invasion: Moderate - Moderate risk is due to the presence of knapweed, which is a strong invader and is capable of invading in-tact communities such as this one.

Whitebark pine - A total of 51 acres of whitebark pine are mapped within the pasture. According to Kevin Greenwood, there is little to no potential for livestock use of these whitebark pine stands (personal communication through e-mail dated 9.19.2013). Smaller scattered occurrences are likely present within the pasture.

Hamby Creek Pasture

Primrose monkey flower - The population was newly discovered in 2012 during project surveys. "100's" of individuals were reported (5% flowering). The population was actually found en-route to an identified survey unit. It occurs in a small wet meadow dominated by tufted hairgrass. A two-track road ran through a portion of the population. Threats include vehicle travel (trampling) and changes in hydrology due to vehicle travel. No weeds were reported and none are mapped within the area.
Population Stability: Moderate - Moderate stability is due to the relatively small population size for this species.
Reproductive Output: Moderate - Moderate Output is due to the relatively abundant amount of reproductive individuals.
Risk of Weed Invasion: Moderate - Moderate risk is due to the presence of the road as a disturbance vector, yet no weeds are currently known.

Primrose monkey flower - The population was newly discovered in 2012 during project surveys. A total of 33 individuals were reported (flowering). Percent reproductive was not estimated at the time of survey. The population consists of two smaller populations within a quarter mile of one another. One of the subpopulations had only three individuals and was noted as occurring on a two-track road. Threats include trampling and/or changes in hydrological flow due to livestock and vehicle activity. No weeds were reported and none are mapped within the area.
Population Stability: Low - Low stability is due to the fragmented population with few individuals and the eminent threats. Though further observation of this newly discovered population is needed
Reproductive Output: Unknown - Unknown Output is due to the lack of a reproductive estimate at the time of survey
Risk of Weed Invasion: Moderate - Moderate risk is due to the presence of the road as a disturbance vector, yet no weeds are currently known.

***Primrose monkey flower* -** The population was newly discovered in 2012 during project surveys. "50+" individuals were reported (flowering). Percent reproductive was not estimated at the time of survey. The population consists of two smaller populations within a quarter mile of one another. One subpopulation of 15 occurred in an open trampled area within a willow stand. The remaining occurred along a roadside. Threats include trampling and/or changes in hydrological flow due to livestock and vehicle activity. No weeds were reported and none are mapped within the area.
Population Stability: Low - Low stability is due to the fragmented population with few individuals and the eminent threats. Though further observation of this newly discovered population is needed.
Reproductive Output: Unknown - Unknown Output is due to the lack of a reproductive estimate at the time of survey
Risk of Weed Invasion: Moderate - Moderate risk is due to the presence of the road as a disturbance vector, yet no weeds are currently known.

***Primrose monkey flower* -** The population is mapped as occurring along a trail adjacent to Hamby Creek at the very upper end of the pasture. It was first located in 1993 and was reported as having 8 areas along the creek composing the population. Roughly 68,000 plants were estimated with 40% reproductive). No field visits were made due to difficult access and the lack of livestock use of the area, as identified by the Range Specialist (Greenwood – personal communication through e-mail dated 10.12.12). Canada thistle is mapped along the same trail roughly 400 feet from the population.
Population Stability: High - High stability is due to the very large number of individuals in this population.
Reproductive Output: High - High Output is due to large number of reproductive individuals.
Risk of Weed Invasion: Moderate - Moderate risk is due to the presence of Canada thistle along the trail and the location of the population adjacent to the trail disturbance.

Whitebark pine - A total of 73 acres of whitebark pine are mapped within the pasture. The majority of acres occur in the upper west end of the unit where little to no use occurs, though scattered occurrences are present throughout the pasture. Two small stands, one located adjacent to Hamby Creek and the other adjacent to Englejard Meadows, have received light use in the past. These stands could be used by livestock as shading/loafing areas because of their location adjacent to primary grazing areas. Smaller scattered occurrences are likely present within the pasture.
Potential habitat was identified for the following sensitive plant species: English sundew: habitat present in Hamby Creek Swamp. Hiker's gentian: habitat present in Hamby Creek Swamp and in moist riparian meadows. Wavy moonwort: habitat present in Hamby Swamp and moist meadows. Idaho sedge and Hall's rush: habitat present in Hamby Creek Swamp. These two species are analyzed as if present, though no individuals were found and no current population data is available.

Pioneer Allotment Sensitive Plant Existing Condition

Pioneer Pasture

Whitebark pine - A total of 111 acres of whitebark pine are mapped within the pasture. All the acres are restricted to the upper western end of the pasture, where little to no use occurs (Greenwood – personal communication through e-mail dated 9.19.2013). Smaller scattered occurrences are likely present within the pastures.

Skinner Meadows Pasture

Hiker's gentian - On new population was found during 2012 surveys. Only one individual was found, occurring adjacent to a small meandering stream branch. Livestock disturbance and conifer encroachment were noted in the field notes. No weeds were identified during survey, but Canada thistle and spotted knapweed are mapped along the road.

Population Stability: Unknown - Unknown stability due to lack of trend data. However with only one individual found, stability is likely low.

Reproductive Output: Low - Low Output is due to the one individual for reproductive output.

Risk of Weed Invasion: Moderate - Moderate risk is due to the lack of weeds currently in Skinner Meadows, but the presence of them along the roads

Primrose monkey-flower - One new population was found during 2012 surveys. The populations scattered groupings occur along the same small meandering stream branch as hiker's gentian. No population count was made, but with several small groupings, there were at least 100 individuals. No weeds were identified during surveys, but Canada thistle and spotted knapweed are mapped along the road.

Population Stability: Unknown - Unknown stability due to lack of trend data.

Reproductive Output: Unknown - Unknown Output is due to the lack of a reproductive estimate at the time of survey.

Risk of Weed Invasion: Moderate - Moderate risk is due to the lack of weeds currently in Skinner Meadows, but the presence of them along the roads.

Whitebark pine - A total of 145 acres of whitebark pine are mapped within the pasture. The acres are mapped throughout the pasture. The majority of occurrences would receive little to no livestock use due to their location, though occasional trailing may occur. One location adjacent to Skinner Meadows has received light use in the past and could be used as a shading/loafing area due to its location adjacent to primary grazing areas (Greenwood – personal communication through e-mail dated 9.19.2013). Smaller scattered occurrences are likely present within the pasture.

Potential habitat was identified for the following sensitive plant species: Wavy moonwort: habitat present in Skinner Meadow. Idaho sedge and Hall's rush: habitat present at the margins of the moist meadows (Skinner Meadows). These two species are analyzed as if present, though no individuals were found and no current population data is available.

Saginaw Allotment Sensitive Plant Existing Condition

Saginaw Pasture 1 and 2

Whitebark pine - A total of 0.29 acres are mapped within the pasture 2. Little to no use is anticipated to occur in this area (Greenwood - personal communication through e-mail dated 9.19.2013). However smaller scattered occurrences are likely present within the both pastures.

Saginaw Pasture 3

Primrose monkey-flower **-** One new population was found during 2012 surveys. The population was composed of three subpopulations, each separated by ½ mile, but occurring in the same drainage. In 2013, an additional visit was made to get a more accurate population count. A rough estimate of 5000 individuals was made (10% flowering).
Population Stability: Unknown - Unknown stability due to lack of trend data
Reproductive Output: Moderate - Moderate Output is due to the relatively large number of individuals flowering within the population **.**
Risk of Weed Invasion: = Moderate - Moderate risk is due to the lack of weeds currently in Skinner Meadows, but the presence of them along the roads.

Whitebark pine - A total of 110 acres of whitebark pine are mapped within the pasture. Potential use of these areas is estimated to be low though some trailing may occur. However, small scattered occurrences are likely present within the pasture.

Saginaw Pasture 4

Whitebark pine - A total of 14 acres are mapped throughout the pasture. Past use of whitebark pine in Pasture 4 is estimated to be light; however, there is potential for livestock to use these areas as shading/loafing areas due to their location adjacent to primary grazing areas (Greenwood – personal communication through e-mail dated 9.19.2013). Small scattered occurrences are likely present within the pasture.
Potential habitat was identified for the following sensitive plant species: Hiker's gentian: habitat present in moist riparian meadows of Pastures 2 and 3. Primrose monkey-flower: habitat present in moist riparian meadows of Pasture 2.

Analysis

The Table 3 displays only those past, present and reasonably foreseeable activities which have occurred within the allotments that have had, currently are having, and will likely be having impacts on sensitive plants. These activities will be carried forward in the cumulative effects section for analysis.

Table 3: Past, Present, and Reasonably Foreseeable Activities Relevant to the Sensitive Plant Analysis.

Activity	Past	Present	Reasonably Foreseeable Future	Rational for Carrying Forward
Weed spraying			X	Roadside weed spraying is noted in Elzinga's 1997 report, as a threat to 70% of Lemhi penstemon populations, since most populations occur in roadside habitats. Lemhi penstemon and weed species do co-occur along roadsides within the project area. The main risk of inadvertent weed spraying of roadside populations of Lemhi penstemon would be on non-FS lands, where spray crews are unaware of its presence. The Beaverhead-Deerlodge Weed Management Plan (2002) protects sensitive plants by employing the following mitigation measure: • No herbicide will be applied directly on sensitive plants during spot applications and a 100' buffer will be employed around known populations of sensitive plants during broadcast applications (including aerial). All aerial treatment areas will be surveyed for sensitive plants prior to initial spraying. • The Beaverhead-Deerlodge weed spraying crews are aware of the Lemhi penstemon populations and do careful spot treatments within populations when necessary. Because of this, this perceived threat shall not pose impact to known populations.
Road Maintenance	X	X	X	Road maintenance activities that have resulted in the lack of tree cover adjacent to the road margins have provided potential habitat for moonwort species. Future road maintenance could create additional suitable habitat for future populations (Ahlenslager and Potash 2007). Standard road maintenance practices such as grading, fill slope contouring, and widening have been cited as threats to 70% of Lemhi penstemon populations (70% of which occur in roadside habitats) (Elzinga 1997).

Analysis
Sensitive Plants

Table 3: Past, Present, and Reasonably Foreseeable Activities Relevant to the Sensitive Plant Analysis.

Activity	Past	Present	Reasonably Foreseeable Future	Rational for Carrying Forward
Fire Suppression	X	X	X	Wildfire has been suppressed for much of the past 100 years. Impacts from conifer encroachment into sensitive plant habitats have occurred (Keane and Parsons 2010; Ahlenslager and Potash 2007; Moseley et al. 1990), and are currently visible in the landscape (personal observation). Future wildfires or prescribed burn, if allowed, will likely reduce conifer encroachment in sensitive plant habitats and could encourage the establishment of some sensitive species such as whitebark pine (Keane and Parsons 2010), sensitive moonworts (Ahlenslager and Potash 2007; Zika et al, 1995) Lemhi penstemon (Heidel and Shelly 2001; Mosely 1989), and possibly California false-helleborne.
Timber Projects	X		X	Past timber projects have likely played a role in shaping the existing vegetation conditions within the project area. The Pintlar Face Project has proposed activities within the Seymour, Fishtrap, Mudd Creek, and Pintlar Creek Allotments. Proposed activities are planned within the wavy moonwort population area of the Seymour allotment. Timber activities can damage undocumented sensitive plants species (Elzinga 1997), while possibly creating suitable habitat for disturbance adapted species (Beatty et al. 2003). Sensitive plant surveys have been conducted in the proposed timber units and aside from whitebark pine and wavy moonwort, no other sensitive plants were found. Mitigation will be included to reduce impacts to whitebark pine and protect the known wavy moonwort population.
Roadside 5 Hazard Tree Removal	X	X		Roadside Hazard trees were removed in areas with Lemhi Penstemon present. The population was avoided due to the young age of existing conifers within the Lemhi penstemon population. No impacts ocurred.
Recreation	X	X	X	Hall's rush and primrose monkey-flower occur in the Dry Creek allotment adjacent to a popular campground with an existing raised trail running through the wet meadow. Human activities, livestock and pet activity in the wet meadow could potentially impact individuals.

Seymour

Seymour No Action (No Grazing) Alternative

Direct/Indirect Effects:
Wavy moonwort: Since grazing has not occurred where wavy moonwort occurs in the Tenmile pasture for 5 years, impacts to wavy moonwort as a result of the no action alternative would be the continuation of no grazing at this population location. No direct impacts would occur; however, indirectly long term impacts would include reduced viability as successional changes would continue to increase vegetative cover and competition at the wavy moonwort site (See Sensitive Plant Descriptions). Reproductive output would decrease as a result of the reduced population stability and likely reduction in number of individuals, which has been observed in the past two years with no individuals being observed. Risk of weed invasion would remain high due to existing Canada thistle within the population area and its continued presence thus far in the absence of grazing.

It must be noted that yearly fluctuations in moonwort populations are common (Zika et al. 1995; Johnson-groh 1997; Beatty et al. 2003; Ahlenslager and Potash 2007). Ahlenslager and Potash (2007) suggest that the extirpation of a species should be analyzed on a time scale of 10's of years rather than years, since they can remain dormant long periods of time below ground and when favorable conditions arise, they may re-emerge.

Cumulative impacts: Road maintenance, weed spraying, continued fire suppression and the future timber project: Pintler Face, can all be expected to occur within the allotment in the future. Weed spraying would likely occur only along the roads and away from the existing wavy moonwort population, therefore not impacting population viability and reducing additional weed invasion along the road. Road maintenance has the potential to spread weed seed if present along the roads (which it is currently). Therefore road maintenance activities would increase the risk of weed invasion by spreading existing weed seed further along the road. Fire suppression and the continued conifer encroachment would likely contribute to the existing downward trend of the wavy moonwort population. Population viability may already be lost and continued encroachment would remove future available habitat.

Based on the information presented, implementation of the No Grazing Alternative will likely reduce or remove the current population of wavy moonwort within the Seymour allotment. This population is unstable currently, with only two individuals found in 2011 and none found since. The loss of this one small population would not be detrimental to the species as a whole, since this is an ephemeral species where populations are known to come and go. New populations will likely arise elsewhere where habitat conditions are favorable. Therefore, implementation of the no grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of wavy moonwort.

Whitebark pine: As discussed in the Existing Condition, small scattered occurrences of whitebark pine likely occur within the allotment, though not detected by Vmap. Some infrequent trampling of individuals (seedling and saplings) may occur as livestock trail

through mixed-conifer stands. The removal of livestock from the allotment within 2 years would eliminate any trampling and browse of individuals by livestock that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense under normal disturbance regimes.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Seymour Current Grazing Alternative

Direct/Indirect Effects:
Wavy moonwort: Since no grazing has occurred within the Tenmile pasture for the past 5 years (where wavy moonwort occurs) and no grazing is proposed in the Tenmile pasture under the current grazing alternative, impacts to the wavy moonwort population would be the same as described in the No Grazing Alternative.

Cumulative Impacts: Same as the No Grazing Alternative.

Since the implementation of the current grazing alternative would likely reduce the viability of the wavy moonwort population, implementation **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of wavy moonwort.

Whitebark pine: Whitebark pine is likely present in small scattered occurrences within the allotment, though not detected by VMap. Direct impacts from current grazing likely include occasional trampling and browse of individual seedlings and saplings. Indirect impacts may include reductions in vegetation competition as livestock likely prefer other vegetation for browse. Under the continuation of current grazing management, population stability and reproductive output would likely remain at their current levels since no management changes would be occurring.
Cumulative Impacts: Same as the No Action

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Trampling or browse of individuals is thought to be limited by the limited number of individuals susceptible to livestock impacts (seedlings and saplings). Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Seymour Proposed Action Alternative

Mitigation/Design Feature (See Proposed Action description, DEIS Chapter 2, pg. 23)

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under the proposed action alternative, the Tenmile pasture would be allocated with 75 head, increasing the number of cow/calf pairs from 323 to 398, but keeping the number of head months the same. A livestock exclosure would be constructed to protect sensitive toad breeding habitat. The location was surveyed and no sensitive plants were found, therefore causing no impacts to sensitive plants. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

Direct/Indirect Effects:

Wavy moonwort: With grazing occurring in the Tenmile pasture, direct impacts could include occasional trampling and herbivory of wavy moonwort individuals, which has shown to have little impact on the survival of the individuals (Johnson-groh 1997), while indirectly improving the potential stability of the population by reducing competition within the habitat (Beatty et al 2003; Ahlenslager and Potash 2007). With increased population stability, more individuals could potentially occur in favorable years and with more individuals, more reproductive fronds would be produced, thus increasing the reproductive output. Canada thistle is the only weed currently impacting the population area. Overtime, the risk of weed spread from livestock transport or disturbance could increase within the wavy moonwort population area and potentially lead to habitat decline.

Cumulative Impacts: Same as the No Grazing Alternative

Overall, the proposed action has the potential for **"beneficial impact"** on the current population of wavy moowort by increasing disturbance and decreasing vegetative competition, thus potentially resulting in increased population viability (as described above) in the short and long term. If Canada thistle continues to encroach on the wavy moonwort population, declines in population viability may be observed. This could occur regardless of whether livestock grazing occurs due to its current presence in the population area.

Whitebark pine: Impacts to whitebark pine would be similar to the current grazing alternative, though with additional trampling and browse of whitebark pine occurring in the Tenmile pasture.

Cumulative Impacts: Same as the No Grazing Alternative

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of the proposed alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Seymour Alternative 4

Mitigation/Design Feature (See Alternative 4 description, DEIS Chapter 2, pg. 26)

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under Alternative 4, grazing would remain at the current head month numbers and days as the current grazing alternative. The 75 head that are unallocated in the Tenmile pasture would not be reallocated, but grazing would be allowed in Tenmile pasture one in every three years in the late season. The livestock exclosure to protect sensitive toad breeding habitat would also be constructed. As mentioned above, the site was surveyed and no sensitive plants were found, and therefore causing no impacts to sensitive plants. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and

overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

Direct/Indirect Effects:

Wavy moonwort: Alternative 4 would allow regular (one in three years), yet infrequent grazing to occur within the wavy moonwort population area. The late season grazing would occur after the development and reproductive stages of the moonwort lifecycle and likely have little impact on that years' population stability or reproductive output. The year following the late season grazing may see more opportunity for increased population numbers and therefore increased reproductive output due to the reduction in overstory vegetation cover or what will become that year's vegetation litter (dead vegetation from the previous years' growth). Direct impacts could include occasional trampling and browsing of individuals, but would occur late enough in the season that most individuals would already have released spores and would therefore have no impact on the population stability or reproductive output (see Species Description). Risk of weed invasion would increase slightly due to increased soil disturbance and potential weed seed transfer by livestock.

Though there is a potential for the population viability to stabilize or increase, it is not known whether grazing one in three years will be enough to prevent overcrowding by native vegetation. Further observations would be needed.

Cumulative Impacts: Same as the No Grazing Alternative.

Overall, implementation of alternative 4 has the potential for **"beneficial impact"** on the current population of wavy moowort by increasing disturbance and decreasing vegetative competition, thus potentially resulting in increased population viability (as described above) in the short and long term. If Canada thistle continues to encroach on the wavy moonwort population, declines in population viability may be observed. This could occur regardless of whether livestock grazing occurs due to its current presence in the population area.

Whitebark pine: Resting the allotment one in three years would allow a reduction in trampling and browse of whitebark pine seedlings and saplings in those years. Population stability and reproductive output may improve slightly. However the direct, indirect and cumulative impacts discussed under the current grazing management would continue.

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Fishtrap

Fishetrap No Action (No Grazing) Alternative

Direct/Indirect Effects:

Lemhi penstemon: In association with the No Grazing Alternative, the removal of livestock within the two years of transition would allow native vegetation to flourish. Lemhi penstemon population stability would increase as new seedlings establish in existing "safe sites" and persist in the absence of grazing disturbance. Reproductive output would increase with the increase of individuals and with the lack of livestock herbivory. After livestock are removed and native vegetation flourishes, weed invasion would be reduced due to the lack of frequent disturbance and the lack of livestock transporting weed seed into the allotment. However, whether or not grazing continues within the population, the aggressive nature of spotted knapweed may allow it to continue to invade in the long-term even without further disturbance (Lacey et al. 1990).

Cumulative Impacts: Inadvertent weed spraying would not be a threat to these populations as the FS weed spraying crew is aware of their presence and does careful spot treatments within populations. Road maintenance activities would continue to pose threats to the roadside populations, reducing population stability and reproductive output if damaged by equipment. However, few individuals occur in close enough proximity to the road where impacts from road maintenance activities would occur. Fire suppression and subsequent conifer encroachment will likely continue and result in long-term habitat alteration in some areas that could result in loss of habitat and therefore loss of population viability. In the long-term, beyond ten years, interactions between wildfire, fire suppression and natural succession could all play key roles in determining whether existing Lemhi penstemon populations remain viable in the allotment.

Since livestock trampling and browse would be removed after two years, implementation of the No Grazing Alternative would likely have beneficial impacts for the Lemhi penstemon populations. Therefore implementation of the No Grazing Alternative would have a **"beneficial impact"** on Lemhi penstemon.

Whitebark pine: As discussed in the Existing Condition, small scattered occurrences of whitebark pine likely occur within the allotment, though not detected by Vmap. Some infrequent trampling of individuals (seedling and saplings) may occur as livestock trail through mixed-conifer stands. The removal of livestock from the allotment within 2 years would eliminate any trampling and browse of individuals by livestock that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Fishtrap Current Grazing Alternative

Direct/Indirect Effects:

Lemhi penstemon: Current grazing has caused some impact to existing Lemhi penstemon populations within the allotment (see Existing Condition, Table 3). Direct impacts from livestock grazing have included and would continue to include trampling and browsing. Population stability and reproductive output would remain the same as no changes are being made to the current management. Indirect impacts, such as habitat disturbance from livestock would continue and risk of weed invasion would remain high, as spotted knapweed and several other weeds already co-occur in these populations.

Cumulative Impacts: Same as the No Grazing Alternative.

Since impacts from livestock grazing have been observed within the population, yet population stability is moderate, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: Whitebark pine is likely present in small scattered occurrences within the allotment, though not detected by Vmap. Direct impacts from current grazing likely include occasional trampling and browse of individual seedlings and saplings. Indirect impacts may include reductions in vegetation competition as livestock likely prefer other vegetation for browse. Under the continuation of current grazing management, population stability and reproductive output would likely remain at their current levels since no management changes would be occurring.

Cumulative Impacts: Same as the No Action

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should

not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Fishtrap Proposed Action Alternative

Mitigation/Design Feature

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

The proposed action calls for the same level of use as the current grazing proposal. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts. Therefore, impacts to sensitive plants should be the same as the current grazing alternative (see above).

Fishtrap Alternative 4

Mitigation/Design Feature

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under Alternative 4, the entire pasture would be rested one in every 3 years. Direct, indirect and cumulative impacts to sensitive plants would still exist and be similar to the current and proposed grazing alternative. The one year of rest every three years would allow vegetation, including sensitive plants, a full season of recovery, allow seedlings to get well established, and allow for any short term impacts from grazing to recover. Risk of weed invasion would likely remain the same or have a slight reduction due to the year of rest and recovery. With the additional mitigation measures that further protect sensitive plants from future range

improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

Penstemon lemhiensis: Population stability and reproductive output would likely increase as more seedlings are able to establish during rest years and more seed is able to be produced from the lack of livestock browse.

Cumulative Impacts: Same as the current grazing alternative.

Though impacts would be reduced from the current grazing alternative, direct and indirect impacts would still occur, therefore, implementation of the Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: Resting the allotment one in three years would allow a reduction in trampling and browse of whitebark pine seedlings and saplings in those years. Population stability and reproductive output may improve slightly. However the direct, indirect and cumulative impacts discussed under the current grazing management would all continue. Therefore implementation of Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine."

Mudd Creek

Mudd Creek No Action (No Grazing) Alternative

Direct/Indirect Effects:

Lemhi penstemon: In association with the No Grazing Alternative, the removal of livestock within the two years of transition would allow native vegetation to flourish. Lemhi penstemon population stability would likely increase as new seedlings establish in existing "safe sites" and persist in the absence of grazing disturbance. Reproductive output would likely increase with the increase of individuals and with the lack of livestock herbivory. After livestock are removed and native vegetation flourishes, weed invasion would be reduced due to the lack of frequent disturbance and the lack of livestock transporting weed seed into the allotment. However the aggressive nature of spotted knapweed may allow it to continue to invade even without further disturbance (Lacey et al. 1990).

Cumulative Impacts: Inadvertent weed spraying would not be a threat to this population as the FS weed spraying crew is aware of its presence and does careful spot treatments if needed. The population occurs roughly 800 feet from a two-track road, so road maintenance activities are not a threat. Fire suppression and subsequent conifer encroachment will likely continue and result in long-term habitat alteration in some areas that could result in loss of habitat and therefore loss of population viability. In the long-term, beyond ten years, interactions

between wildfire, fire suppression and natural succession could all play key roles in determining whether existing Lemhi penstemon populations remain viable in the allotment.

Since livestock trampling and browse would be removed after two years, implementation of the No Grazing Alternative would likely have beneficial impacts for the Lemhi penstemon populations. Therefore implementation of the No Grazing Alternative would have a **"beneficial impact"** on Lemhi penstemon.

Whitebark pine: As discussed in the Existing Condition, little to no livestock use occurs in the upper elevations of the Mudd Creek allotment where whitebark pine stands (minimum 40% dominant species) occur (Greenwood – personal communication through e-mail dated 9.19.2013). The removal of livestock from the allotment within 2 years would eliminate livestock trampling and brows of young seedlings and saplings that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since the removal of livestock would likely remove trampling and browse of seedling and sapling individuals, it is anticipated that implementation of the no action alternative would have a **"beneficial impact"** on whitebark pine

Mudd Creek Current Grazing Alternative

Under the Current Grazing alternative, livestock grazing would continue at the same stocking rate and season of use as is occurring.

Direct/Indirect Effects:

Lemhi penstemon: Direct impacts from livestock grazing have included and would continue to include trampling and browsing. Stability would likely exhibit moderate to high levels and reproductive output would likely remain in high as no changes are being made to the current management (See Table 1 above for existing condition). Indirect impacts, such as habitat

disturbance from livestock would continue and risk of weed invasion would remain high, as spotted knapweed, Canada thistle, and houndstongue already co-occurs in this population.

Cumulative Impacts: Same as the No Grazing Alternative.

Population trend is unknown for this newly documented population. Other allotments with similar management are showing Lemhi penstemon populations to have relatively stable population trends, with fluctuations being mostly attributed to yearly climatic conditions (See Existing Condition Table). However, since impacts from livestock grazing have been observed within the population, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: Little if any livestock use is occurring in the whitebark pine stands within the allotment under the current grazing alternative, as stated in the no action alternative. Cows may occasionally make it up into the whitebark pine stands and some direct trampling and browse of young seedlings and saplings could occur within the allotment at large. Indirect impacts may include reductions in vegetation competition as livestock likely prefer other vegetation for browse. Under the continuation of current grazing management, population stability and reproductive output would likely remain at their current levels since no management changes would be occurring.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Same as the No Action

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** for whitebark pine.

Mudd Creek Proposed Action Alternative

Mitigation/Design Feature

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water

troughs 200 feet or grater from known populations, routing water pipe around known populations, etc).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

The proposed action calls for the same level of use as the current grazing proposal. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts. Therefore, impacts to sensitive plants should be the same as the current grazing alternative (see above).

Mudd Creek Alternative 4

Mitigation/Design Feature
- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under Alternative 4, the entire pasture would be rested one in every 3 years, and an addition of 0.1 miles of piping would be installed for a spring development.

No impacts to sensitive plants are anticipated with the addition of 0.1 miles of piping for the spring development since the location is within dense timber which is not suitable for sensitive plants. Direct, indirect and cumulative impacts to sensitive plants would still exist and be similar to the current and proposed grazing alternative. The one year of rest every three years would allow vegetation, including sensitive plants, a full season of recovery, allow seedlings to get well established, and allow for any short term impacts from grazing to recover. Risk of weed invasion would likely remain the same or have a slight reduction due to the year of rest and recovery. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

Lemhi penstemon: Population stability and reproductive output would likely increase as more seedlings are able to establish during rest years and more seed is able to be produced from the lack of livestock browse.

Cumulative Impacts: Same as the current grazing alternative.

Though impacts would be reduced under Alternative 4, direct and indirect impacts would still occur, therefore, implementation of the Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of Lemhi penstemon."

Whitebark pine: Impacts would be similar to the current grazing alternative. The spring development occurs outside mapped whitebark pine locations; reducing the likelihood of impact. Resting the allotment every one in three years would allow seedling establishment to occur without trampling or browse. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Cumulative Impacts: Same as the No Grazing Alternative

Since the direct, indirect and cumulative impacts discussed under the current grazing management would all continue, implementation of Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine."

Pintlar Creek

Pintlar Creek No Action (No Grazing) Alternative

Direct/Indirect Effects:

Lemhi penstemon: In association with the No Grazing Alternative, the removal of livestock within the two years of transition would allow native vegetation to flourish. Lemhi penstemon population stability would increase as new seedlings establish in existing "safe sites" and persist in the absence of grazing disturbance. Reproductive output would increase with the increase of individuals and with the lack of livestock herbivory. After livestock are removed and native vegetation flourishes, weed invasion would be reduced due to the lack of frequent disturbance and the lack of livestock transporting weed seed into the allotment. No weeds were reported at the site.

Cumulative Impacts: Inadvertent weed spraying would not be a threat to this population as the FS weed spraying crew is aware of its presence and does careful spot treatments if needed. Road maintenance activities would continue to pose threats to the population, reducing population stability and reproductive output if damaged by equipment. However, few, if any, individuals occur in close enough proximity to the road where impacts from road maintenance activities would occur. Fire suppression and subsequent conifer encroachment will likely continue and result in long-term habitat alteration in some areas that could result in loss of habitat and therefore loss of population viability. In the long-term, beyond ten years, interactions between wildfire, fire suppression and natural succession could all play key roles in determining whether existing Lemhi penstemon populations remain viable in the allotment.

Since livestock trampling and browse would be removed after two years, implementation of the No Grazing Alternative would likely have beneficial impacts for the Lemhi penstemon populations. Therefore implementation of the No Grazing Alternative would have a **"beneficial impact"** on Lemhi penstemon.

Whitebark pine: As discussed in the Existing Condition, little to no livestock use occurs in the upper elevations of the Pintlar Creek allotment where whitebark pine stands occur (Greenwood – personal communication through e-mail dated 9.19.2013). The removal of livestock from the allotment within 2 years would eliminate any livestock trampling and browse of young seedlings and saplings that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Pintlar Creek Current Grazing Alternative

Under the Current Grazing alternative, livestock grazing would continue at the same stocking rate and season of use as is occurring.

Direct/Indirect Effects:

Lemhi penstemon: Direct impacts from livestock grazing such as trampling and browsing would continue. Stability and reproductive output would remain the same as no changes are being made to the current management. Indirect impacts, such as habitat disturbance from livestock would continue and risk of weed invasion would remain moderate, as no weeds were found within or near the population, but have been mapped along the Pintlar Creek Road.

Cumulative Impacts: Same as the No Grazing Alternative.

Since impacts from livestock grazing have been observed within the population, yet population stability is moderate, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: Little if any livestock use is occurring in the whitebark pine stands within the allotment under the current grazing alternative, as stated in the no action alternative. Cows may occasionally make it up into the whitebark pine stands and some direct trampling and browse of young seedlings and saplings could occur within the allotment at large. Indirect impacts may include reductions in vegetation competition as livestock likely prefer other vegetation for browse. Under the continuation of current grazing management, population stability and reproductive output would likely remain at their current levels since no management changes would be occurring.

Cumulative Impacts: Same as the No Action

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Pintlar Creek Proposed Action Alternative

Mitigation/Design Feature

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

The proposed action alternative calls for the same number of head months and days (53) within the grazing season, but allows them to graze later in the season, to September 30. A deferred entry (delayed entry), will be implemented within the pasture every other year. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

Lemhi penstemon: The proposed alternative would allow for the same level of grazing, but allow for a later season entry every other year. Direct and indirect impacts would include trampling, herbivory and weed spread, the same as in the proposed action. Population stability could be slightly increased as seedling establishment is provided a longer time before livestock trampling occurs during the year of deferment. Late season entry could provide Lemhi penstemon a greater chance of successful reproduction since seed capsule formation and seed distribution may already have occurred by the time the livestock are grazing within the population. Risk of weed invasion would be the same as the current grazing alternative.

Cumulative Impacts: Same as the current grazing alternative.

Though impacts may be slightly reduced from the current grazing alternative, direct and indirect impacts would still occur, therefore, implementation of the proposed action **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: Since whitebark pine is a slow growing species, a deferred entry every other year would cause no change in the impacts to whitebark pine. Impacts would be the same as in the current grazing system. Therefore, implementation of the proposed action **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine.

Pintlar Creek Alternative 4

Mitigation/Design Feature

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Alternative 4 calls for a reduced number of head months (less 32) and a reduced number of days (less 4) within the grazing season, but allows them to graze later in the season, to September 30. A deferred entry every other year (late entry), will be implemented within the pasture every other year. In addition, the Pintlar Meadows portion of the allotment would be rested for a minimum of 10 years. A fence will be constructed to fence out this portion of the allotment. Surveys were conducted in 2012 and no sensitive plants were identified within the area.

A special grazing area in section 18 will be designated for grazing one in three years with up to 20 head months for up to 14 days with variable entry dates. A permanent fence will be constructed. Surveys were conducted in portions of the area during 2012 field surveys for

sensitive plants. No individuals were found. Habitat along the dry hillside is reported to not be Lemhi penstemon habitat (Greenwood – personal communication through e-mail dated 9.19.2013), so further surveys were not conducted. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

No sensitive plants occur within the Pintlar Meadows section of the allotment, or the special grazing area. The addition of fencing would have no impact on sensitive plants since none occur in the area. The reduction in the number of head months and days is designed to reduce the level of impacts within the allotment. Likely fewer cows grazing for less days would cause less disturbance and herbivory.

Lemhi penstemon: Direct and indirect impacts to Lemhi penstemon would be the same as in the current and prosed alternatives. The reduction in disturbance and herbivory could increase the population stability, by causing less trampling of seedlings and mature individuals. Reproductive output could increase with less herbivory and with the late season entry every other year (see proposed action). Risk of weed invasion could be reduced slightly due to reduced disturbance.

Though impacts may be slightly reduced from the current grazing alternative, direct and indirect impacts would still occur, therefore, implementation of the Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: A deferred entry would have no change in impacts to whitebark pine since it is a slow growing species. A reduction in grazing intensity may reduce the amount of livestock trampling and browse of seedling and saplings within the allotment. This could potentially increase population stability and reproductive output in the long term if surviving individuals were able to reach maturity and reproduce.

Cumulative Impacts: Same as the No Grazing Alternative.

Though impacts may be reduced slightly, livestock trampling and browse of seedlings and saplings would still occur within the allotment, therefore implementation of alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine.

Mussigbrod

Mussigbrod No Action (No Grazing) Alternative

The no action alternative provides a means for evaluating current habitat conditions and discloses by species the direct, indirect and cumulative effects to sensitive plants. Under this alternative, livestock would be removed from Forest Service lands within 2 years (See No Action description, DEIS Chapter 2, pg. 19).

Direct/Indirect Effects:

Lemhi penstemon: In association with the No Grazing Alternative, the removal of livestock within the two years of transition would allow native vegetation to flourish. Lemhi penstemon population stability would increase as new seedlings establish in existing "safe sites" and persist in the absence of grazing disturbance. Reproductive output would increase with the increase of individuals and with the lack of livestock herbivory. After livestock are removed and native vegetation flourishes, weed invasion would be reduced due to the lack of frequent disturbance and the lack of livestock transporting weed seed into the allotment. However the aggressive nature of spotted knapweed may allow it to continue to invade even without further disturbance (Lacey et al. 1990).

Cumulative Impacts: Inadvertent weed spraying would not be a threat to these populations as the FS weed spraying crew is aware of their presence and does careful spot treatments within populations if needed. The populations occur over 300 meters from roads, so road maintenance activities are not a threat. Fire suppression and subsequent conifer encroachment will likely continue and result in long-term habitat alteration in some areas that could result in loss of habitat and therefore loss of population viability. In the long-term, beyond ten years, interactions between wildfire, fire suppression and natural succession could all play key roles in determining whether existing Lemhi penstemon populations remain viable in the allotment.

Since livestock trampling and browse would be removed after two years, implementation of the No Grazing Alternative would likely have beneficial impacts for the Lemhi penstemon populations. Therefore implementation of the No Grazing Alternative would have a **"beneficial impact"** on Lemhi penstemon.

Whitebark pine: As discussed in the Existing Condition, small scattered occurrences of whitebark pine likely occur within the allotment, though not mapped by Vmap. Some infrequent trampling of individuals (seedlings and saplings) may occur as livestock trail through mixed-conifer stands. The removal of livestock from the allotment within 2 years would eliminate any trampling and browse of individuals by livestock that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions)

identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Mussigbrod Current Grazing Alternative

Under the Current Grazing alternative, livestock grazing would continue at the same stocking rate and season of use as is occurring. (See Current Grazing description, DEIS Chapter 2, pg. 20).

Direct/Indirect Effects:

Lemhi penstemon: Direct impacts from livestock grazing have included and would continue to include trampling and browsing. Population stability would likely remain relatively constant under the same management, though no trend data is available. Reproductive output for both populations would likely remain high, as no changes are being made to the current management. Indirect impacts, such as habitat disturbance from livestock would continue and risk of weed invasion would remain high, as spotted knapweed, Canada thistle and cheatgrass are present within the populations.

Cumulative Impacts: Same as the No Grazing Alternative.

Population trend is unknown for this newly documented population. Other allotments with similar management are showing Lemhi penstemon populations to have relatively stable population trends, with fluctuations being mostly attributed to yearly climatic conditions (See Table 1 for existing condition). However, since impacts from livestock grazing are likely to occur within the population, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: Whitebark pine is likely present in small scattered occurrences within the allotment, though not mapped by Vmap. Direct impacts from current grazing likely include occasional trampling and browse of individual seedlings and saplings. Indirect impacts may include reductions in vegetation competition as livestock likely prefer other vegetation for browse. Under the continuation of current grazing management, population stability and reproductive output would likely remain at their current levels since no management changes would be occurring.

Cumulative Impacts: Same as the No Grazing Alternative

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See

description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Mussigbrod Proposed Action Alternative

Mitigation/Design Feature (See Proposed Action description, DEIS Chapter 2, pg. 23):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

The proposed action maintains the same number of cow/calf pairs, but reduces the number of days permitted in the allotment from 75 to 59, with complete rest one in three years. This reduction in head months from 413 to 325 as well as the complete rest of the pasture one in three years would likely cause a reduction in the amount of disturbance and herbivory caused by domestic livestock. One mile of fence is proposed for construction. Surveys were conducted in 2013 and no sensitive plants were found. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

Lemhi penstemon: A reduction in disturbance and herbivory as a result of fewer cows and complete rest of the allotment periodically would likely allow more seedlings to successfully establish in both populations, thus increasing population stability. It would also increase reproductive output, since with fewer cows, less flower structures will be browsed and with complete rest, there will be years when no Lemhi penstemon are browsed by domestic livestock, thus increasing the potential for seed output. Risk of weed invasion would be reduced at both sites, as fewer cows and complete rest allow the native vegetation opportunity to heal and reduces the amount disturbance habitat - ideal for weed establishment.
Cumulative Impacts: Same as the current grazing alternative.

Though impacts would be reduced from the current grazing alternative, direct and indirect impacts would still occur, therefore, implementation of the proposed action **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: Reducing the head months and resting the allotment one in three years would allow a reduction in trampling and browse of whitebark pine seedlings and saplings.

This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense. However the direct, indirect and cumulative impacts discussed under the current grazing management would all continue. Therefore implementation of the proposed action **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine."

Mussigbrod Creek Alternative 4

Mitigation/Design Feature (See Alternative 4 description, DEIS Chapter 2, pg. 26):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.
-

Under this alternative, Bender Pasture would be rested for a minimum of 10 years. 150 dead trees would be used to construct an exclosure fence along House Draw in Mussigbrod Pasture. This area has been surveyed and no sensitive plants were found. The number of head months would be reduced by 77 to compensate the loss of the Bender Pasture. The Season of use would be reduced from 59 days to 45. The Mussigbrod Pasture would be rested one in three years. One new spring development and water tank would be added with 0.1 miles of fencing and 0.14 miles of piping (as described in the proposed action). The exclosures and water development sites were surveyed and no sensitive plants found. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

Lemhi penstemon: Since the two Lemhi penstemon populations occur in Mussigbrod pasture, the rest of Bender Pasture would have no impact on these populations. Resting Mussigbrod Pasture one in three years would increase the chances for seedling establishment and seed maturity, thus increasing population stability and reproductive output. The year of rest would allow native vegetation a chance to flourish and potentially reduce weed invasion.

Cumulative effects would be the same as in the current grazing alternative. Though impacts would be reduced under the proposed alternative, direct and indirect impacts would still occur, therefore, implementation of Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: Resting bender pasture would eliminate any livestock and trampling impacts to whitebark seedlings and saplings that may be occurring within the pasture for a

minimum of 10 years. A reduction in the season of use and a rest of Mussigbrod pasture one in three years would also reduce trampling and browse impacts to whitebark pine in Mussigbrod pasture. These reductions in grazing intensity could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense (if other disturbances occurred). However the direct, indirect and cumulative impacts discussed under the current grazing management would all continue. Therefore implementation of Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine."

Ruby Creek

Ruby Creek No Action (No Grazing) Alternative

The no action alternative provides a means for evaluating current habitat conditions and discloses by species the direct, indirect and cumulative effects to sensitive plants. Under this alternative, livestock would be removed from Forest Service lands within 2 years (See No Action description, DEIS Chapter 2, pg. 19).

Direct/Indirect Effects:

Due to the similar species habitats and growth forms (co-occurring in the same habitats and both rhizomatous), effects to Hiker's gentian and primrose monkey-flower will be discussed together.

Hiker's Gentian and **Primrose Monkey-Flower**: With a lack of grazing disturbance, no direct impacts would occur to either hiker's gentian or primrose monkey-flower. Indirectly, the populations could potentially thrive for some time. Population stability could increase as individuals are no longer trampled or browsed by domestic livestock. With an increase in individuals, reproductive output could increase as more plants would produce more flowers, and with a lack of trampling and browsing of flowering structures. The risk of weed invasion would decrease since the lack of livestock would decrease disturbance habitats for weed seed establishment and spread.

Cumulative Impacts: In the long-term, fire suppression practices that lead to conifer encroachment and vegetation succession could change the hydrology of the site and vegetation cover, which could eventually choke out the populations. Primrose monkey-flower has shown to respond well after fire (Debenedetti and Parsons 1984), likely linking it to a natural process in the life history of primrose monkey-flower.

Overall, since a lack of grazing is anticipated to increase population viability and reduce weed invasion, implementation of the no grazing alternative would have a **"beneficial impact"** on hiker's gentian and primrose monkey-flower.

Whitebark pine: As discussed in the Existing Condition, small scattered occurrences of whitebark pine likely occur within the allotment, though not mapped by Vmap. Some

infrequent trampling of individuals (seedling and saplings) may occur as livestock trail through mixed-conifer stands. The removal of livestock from the allotment within 2 years would eliminate any trampling and browse of individuals by livestock that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Idaho sedge and Hall's rush: No individuals were identified, but inadequate training may be the cause. Suitable habitat was identified and therefore Idaho sedge and/or Hall's rush may occur within the allotment. With a lack of grazing, no direct impacts would occur. Indirectly, population stability may increase as a result of increase reproductive output (lack of flowering stems being browsed and increase in seed output), and lack of rhizomatous mat disturbance. Risk of weed invasion would decrease as native vegetation flourishes and is more able to compete with invasive species, and as a result of the lack of weed seed spread from livestock.

Based on this information, implementation of the no action alternative would likely have "**beneficial impacts**" on Idaho sedge and Hall's rush.

Ruby Creek Current Grazing Alternative

Under the Current Grazing alternative, livestock grazing would continue at the same stocking rate and season of use as is occurring. (See Current Grazing description, DEIS Chapter 2, pg. 20).

<u>Direct/Indirect Effects:</u>

Hiker's Gentian and Primrose Monkey-Flower: Under the current grazing management, direct impacts to the populations of Hiker's gentian and Primrose monkey-flower would include trampling and herbivory of individuals within the allotment by permitted cattle and

horses. Population stability and reproductive output for these populations would likely remain at the current levels since grazing has been occurring for some time and no changes in management are proposed under this alternative. Risk of weed invasion would remain the same as livestock will be grazing at the current levels and season of use.

Cumulative Impacts: Same as the No Grazing Alternative.

Due to the continuation of livestock trampling and browsing of individuals, the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of hiker's gentian and primrose monkey-flower.

Whitebark pine: Whitebark pine is likely present in small scattered occurrences within the allotment, though unmapped by Vmap. Direct impacts from current grazing likely include occasional trampling and browse of individual seedlings and saplings. Indirect impacts may include reductions in vegetation competition as livestock likely prefer other vegetation for browse. Under the current grazing management, population stability and reproductive output would likely remain at their current levels since no management changes would be occurring.

Cumulative Impacts: Same as the No Action

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Idaho sedge and Hall's rush: Potential habitat is present within the allotment. Assuming individuals are present, the continuation of current grazing would directly impact Idaho sedge and Hall's rush through browsing of individuals and trampling of rhizomatous mats. If present, population stability, reproductive output, and risk of weed invasion would all remain in their current state as no changes in management would be made. Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of Idaho sedge and Hall's rush.

Ruby Creek Proposed Action Alternative

Mitigation/Design Feature (See Proposed Action description, DEIS Chapter 2, pg. 23):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.

- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under the proposed alternative, Butler pasture would be rested from horses one in three years and three hardened crossing would be installed. The hardened crossings would be constructed in highly impacted areas not suitable for sensitive plants. The sites were visited in 2012, with no sensitive plants found. The same use levels would be implemented (with the addition of horse rest in Butler pasture). Since the populations of hiker's gentian and primrose monkey-flower occur in the Lower Ruby Creek pasture, the rest of Butler pasture would have no impact on these populations. Because of this, effects to hiker's gentian, primrose monkey-flower, Idaho sedge and Hall's rush would be the same as in the current grazing alternative. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

Whitebark pine: Resting Butler pasture from horse use one in three years would allow a reduction in trampling and browse of whitebark pine seedling and saplings in those years. Population stability and reproductive output may improve slightly in that pasture. However the direct, indirect and cumulative impacts discussed under the current grazing management would all continue. Therefore implementation of the proposed action **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine."

Ruby Creek Alternative 4

Mitigation/Design Feature (See Alternative 4 description, DEIS Chapter 2, pg. 26):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under Alternative 4, the Butler Creek pasture would be rested from horse grazing one in three years. Grazing intensity would be reduced by reducing the number of head months for both cattle and horses (from 714 cattle to 613 cattle and from 85 horses to 72 horses). The season of use is also reduced by 14 days. Cow Creek pasture would have a deferred (late) entry every other year. A drift fence of ¼ miles would be installed in Cow Creek pasture, but

occurs in dense timber where sensitive plant species do not occur (other than whitebark pine potentially). Three hardened crossings would be installed. As mentioned above, they will be constructed in three highly disturbed areas where sensitive plants would not occur, and a site visit was made in 2012 and found no sensitive plants. Since the populations of hiker's gentian and primrose monkey-flower do not occur in the Butler Creek or Cow Creek pastures, there would be no new impacts to these species. A reduction in grazing intensity could reduce trampling and browse impacts for all sensitive plants within the allotment. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts

Hiker's gentian and primrose monkey-flower: A reduction in grazing intensity could reduce trampling and browse impacts for both hiker's gentian and primrose monkey-flower. Population stability and reproductive output could increase due to reduced livestock damage. Risk of weed invasion would likely reduce slightly as less livestock would be present and therefore fewer vectors for transporting weeds and creating disturbed soils. Cumulative impacts would be the same as under the current grazing management (above).

Though population viability and risk of weed invasion may be reduced, impacts to both hiker's gentian and primrose monkey-flower would still occur, implementation of alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Whitebark pine: Reducing grazing intensity and resting the Butler allotment from horse use one in three years would allow a reduction in trampling and browse of whitebark pine seedling and saplings. Population stability and reproductive output may improve slightly. However the direct, indirect and cumulative impacts discussed under the current grazing management would all continue. Therefore implementation of Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine."

Idaho sedge and Hall's rush: A reduction in grazing intensity would reduce trampling and browse impacts to Idaho sedge and Hall's rush individuals. This could potentially increase population stability and reproductive output. Risk of weed invasion would likely reduce slightly as less livestock would be present and therefore fewer vectors for transporting weeds and creating disturbed soils. Cumulative impacts would be the same as under the current grazing alternative. Since impacts to Idaho sedge and Hall's rush would still occur, implementation of alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Dry Creek

Dry Creek No Action (No Grazing) Alternative

The no action alternative provides a means for evaluating current habitat conditions and discloses by species the direct, indirect and cumulative effects to sensitive plants. Under this alternative, livestock would be removed from Forest Service lands within 2 years (See No Action description, DEIS Chapter 2, pg. 19).

Direct/Indirect Effects:

Hall's rush: With a lack of grazing, Hall's rush would continue to occur within the wet meadow it currently occupies. Little grazing is currently known to occur within the wet meadow, though it was observed during a site visit (2013). Population stability and reproductive output would likely increase slightly due to a lack of browse by livestock. With a lack of grazing, risk of weed invasion may decrease (though it is currently low) as there would be less disturbance habitats created in adjacent areas for weeds to colonize and spread from, and no livestock to transport seed.

Cumulative Impacts: With the current Hall's rush population occurring within a wet meadow adjacent to a popular campground with a raised trial running through the wet meadow, impacts from human, stock, and pets could include direct trampling and indirect weed spread. No impacts from recreation were observed during the site visit. If impacts were to occur, they would likely be short-term as the moist environment could heal itself within a year from minor impacts.

Since removing livestock within 2 years would increase population viability and reduce the risk of weed invasion, implementation of the no action alternative would have a **"beneficial impact"** on Hall's rush.

Primrose monkey-flower: Primrose monkey-flower occurs within the same wet meadow as the Hall's rush population. The lack of grazing would reduce direct trampling and herbivory impacts from occurring. Direct and indirect impacts would be removed. Population stability and reproductive output would likely increase, as less trampling and herbivory could result in more individuals and more successful seed production. Risk of weed invasion would likely decrease as there would be less disturbances for weed seed to colonize and less spread from livestock.

Cumulative Impacts: With the current primrose monkey-flower population occurring within a wet meadow adjacent to a popular campground with a raised trial running through the wet meadow, impacts from human, stock, and pets could include direct trampling and indirect weed spread. No impacts from recreation were observed during the site visit. If impacts were to occur, they would likely be short-term as the moist environment could heal itself within a year from minor impacts.

In the long-term, fire suppression practices that lead to conifer encroachment and vegetation succession could change the hydrology of the site and vegetation cover, which could eventually choke out the populations. Primrose monkey-flower has been shown to respond well after fire (Debenedetti and Parsons 1984), likely linking it to a natural process in the life history of primrose monkey-flower.

Since removing livestock within 2 years would increase population viability and reduce the risk of weed invasion, implementation of the no action alternative would have a **"beneficial impact"** on primrose monkey-flower.

Whitebark pine: Some light grazing occurs in the upper elevation whitebark pine habitats of the Dry Creek Allotment. The removal of livestock from the allotment within 2 years would eliminate any direct trampling and browse of young seedlings and saplings that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Dry Creek Current Grazing Alternative

Under the Current Grazing alternative, livestock grazing would continue at the same stocking rate and season of use as is occurring. (See Current Grazing description, DEIS Chapter 2, pg. 20).

Direct/Indirect Effects:

Hall's Rush: Under the Current Grazing alternative, Hall's rush individuals would continue to occupy their current habitat with occasional direct impacts such as grazing and trampling occurring. Indirectly weed seed transport and spread could reduce the populations' habitat in the future. However, since no management changes are proposed under this alternative and

population and habitat is currently in great condition, it is anticipated that the population stability, reproductive output, risk of weed invasion and potential habitat would all remain the same since the population and habitat is currently in great condition.

Cumulative Impacts: Same as the No Grazing Alternative.

Since indirect impacts from herbivory, trampling, and weed spread could occur, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of Hall's rush.

Primrose Monkey-Flower: Under the current grazing alternative, primrose monkey flower could be directly trampled or browsed by livestock. Indirectly weed seed transport and spread could reduce the population in the future. However, since no management changes are proposed under this alternative and population and habitat are currently in great condition, it is anticipated that population stability, reproductive output, risk of weed invasion and potential habitat would all remain the same.

Cumulative Impacts: Same as the No Grazing Alternative.

Since direct and indirect impacts are anticipated, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of primrose monkey-flower.

Whitebark pine: Some light grazing occurs in the upper elevation whitebark pine stands within the Dry Creek Allotment. Direct impacts from current grazing likely include occasional trampling and browse of individual seedlings and saplings. Indirect impacts may include reductions in vegetation competition as livestock likely prefer other vegetation for browse. Under the continuation of current grazing management, population stability and reproductive output would likely remain at their current levels since no management changes would be occurring.

Cumulative Impacts: Same as the No Action

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Dry Creek Proposed Action Alternative

Mitigation/Design Feature (See Proposed Action description,DEIS Chapter 2, pg. 23):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under this alternative, the use levels and season of use would be the same as in the current grazing alternative. The only change would be the implementation of complete rest of the allotment one in three years. Rest of the allotment one in three years would allow native vegetation to flourish. With the additional mitigation measures that further protect sensitive plants from future range improvement disturbances and overgrazing, sensitive plant populations will likely have stable or upward population trends, barring any other outside impacts.

Direct/Indirect Effects:

Hall's Rush: Direct impacts would still occur as described in the current grazing alternative. The rest of the allotment would allow native vegetation to flourish and allow Hall's rush to maintain or increase current population numbers, as well as increase reproductive potential due to lack of browse and trampling during the rest years. Risk of weed invasion would remain low, yet decrease slightly due to the rest one in three years which would reduce disturbance and weed seed spread.

Cumulative Impact would be the same as in the current grazing alternative. Though increases to population viability and reduction in weed spread may occur, impacts would still occur, therefore implementation of the proposed grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of Hall's rush.

Primrose Monkey-Flower: Direct impacts would still occur as described in the current grazing alternative. The rest of the allotment would allow native vegetation and primrose monkey-flower to flourish and increase their reproductive potential in that one year of three. Population stability may increase as a result of increased reproductive output. Reproductive output would increase since no livestock would be browsing flowers or seed heads. Risk of weed invasion may decrease slightly as a result of native vegetation establishing in bare sites and potentially out-competing invasive weeds.

Cumulative Impacts would be the same as in the current grazing alternative. Though increases to population viability and reduction in weed spread may occur, impacts would still

occur, therefore implementation of the proposed grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of primrose monkey-flower.

Whitebark pine: Resting the allotment one year in three could potentially allow an increase in seedling establishment, boosting population stability during that year. In the long-term, this could increase reproductive output, if these individuals survive to cone-bearing age. Infrequent and isolated trampling of seedlings could still occur within the allotment. Therefore, implementation of the proposed action **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Dry Creek Alternative 4

Mitigation/Design Feature (See Alternative 4 description, DEIS Chapter 2, pg. 26):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under Alternative 4, management would be the same as in the proposed action. Therefore impacts to Hall's rush, primrose monkey-flower, and whitebark pine would be the same as in the proposed action (see above).

Twin Lakes

Twin Lakes No Action (No Grazing) Alternative

The no action alternative provides a means for evaluating current habitat conditions and discloses by species the direct, indirect and cumulative effects to sensitive plants. Under this alternative, livestock would be removed from Forest Service lands within 2 years (See No Action description, DEIS Chapter 2, pg. 19).

<u>Direct/Indirect Effects:</u>

Due to the similar species habitats and growth forms (co-occurring in the same habitats and both rhizomatous), effects to Hiker's gentian and primrose monkey-flower will be discussed together.

Hiker's Gentian and **Primrose Monkey-Flower**: With a lack of grazing disturbance, no direct impacts would occur to either hiker's gentian or primrose monkey-flower. Indirectly,

the populations could potentially thrive for some time. Population stability could increase as individuals are no longer trampled or browsed by domestic livestock. With an increase in individuals, reproductive output could increase as more plants would produce more flowers, and with a lack of trampling and browsing of flowering structures. The risk of weed invasion would decrease since the lack of livestock would decrease disturbance habitats for weed seed establishment and spread.

Cumulative Impacts: In the long-term, fire suppression practices that lead to conifer encroachment and vegetation succession could change the hydrology of the site and vegetation cover, which could eventually choke out the populations. Primrose monkey-flower has shown to respond well after fire (Debenedetti and Parsons 1984), likely linking it to a natural process in the life history of primrose monkey-flower.

Overall, since a lack of grazing is anticipated to increase population viability and reduce weed invasion, implementation of the no grazing alternative would have a **"beneficial impact"** on hiker's gentian and primrose monkey-flower.

Whitebark pine: Livestock trailing in whitebark pine stands is known to occur in the Upper Big Lake pastures. Small scattered populations/individuals likely occur elsewhere in the allotment. The removal of livestock from the allotment within 2 years would eliminate any direct trampling and browsing of young seedlings and saplings that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.
Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Idaho sedge and Hall's rush: No individuals were identified, but inadequate training may be the cause. Suitable habitat was identified and therefore Idaho sedge and Hall's rush may occur within the allotment. With a lack of grazing, no direct impacts would occur. Indirectly, population stability may increase as a result of increase reproductive output (lack of flowering stems being browsed and increase in seed output), and lack of rhizomatous mat disturbance.

Risk of weed invasion would decrease as native vegetation flourishes and is more able to compete with invasive species, and as a result of the lack of weed seed spread from livestock.

Based on this information, implementation of the no action alternative would likely have "**beneficial impacts**" on Idaho sedge and Hall's rush.

Twin Lakes Current Grazing Alternative

Under the Current Grazing alternative, livestock grazing would continue at the same stocking rate and season of use as is occurring. (See Current Grazing description, DEIS Chapter 2, pg. 20).

Direct/Indirect Effects:

Hiker's Gentian and Primrose Monkey-Flower: Under the current grazing management, direct impacts to the populations of Hiker's gentian and Primrose monkey-flower would include trampling and herbivory of individuals within the allotment by permitted livestock. Population stability and reproductive output for these populations would likely remain at the current levels since grazing has been occurring for some time and no changes in management are proposed under this alternative. Risk of weed invasion would remain the same as livestock will be grazing at the current levels and season of use.
Cumulative Impacts: Same as the No Grazing Alternative.

Due to the continuation of livestock trampling and browsing of individuals, the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of hiker's gentian and primrose monkey-flower.

Whitebark pine: Some light grazing may occur in the upper elevation whitebark pine habitats of the Twin Lakes Allotment, as well in small scattered populations. Direct impacts from current grazing likely include occasional trampling and browse of individual seedlings and saplings. Indirect impacts may include reductions in vegetation competition as livestock likely prefer other vegetation for browse. Under the continuation of current grazing management, population stability and reproductive output would likely remain at their current levels since no management changes would be occurring.

Cumulative Impacts: Same as the No Action

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Though due to the likelihood of occasional trampling and browse, implementation of the current grazing alternative **"may impact individuals or habitat, but**

will not likely contribute to a trend towards federal listing or loss of viability to the population or species" of whitebark pine.

Idaho sedge and Hall's rush: Potential habitat is present within the allotment. Assuming individuals are present, the continuation of current grazing would directly impact Idaho sedge and Hall's rush through browsing of individuals and trampling of rhizomatous mats. If present, population stability, reproductive output, and risk of weed invasion would all remain in their current state as no changes in management would be made. Based on this information, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of Idaho sedge and Hall's rush.

Twin Lakes Proposed Action Alternative

Mitigation/Design Feature

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under the proposed alternative, the same use levels and season of use would be implemented. However the proposed action would incorporate rest two years out of six on the Upper and Lower Big Lakes pastures of the allotment, and deferred entry of approximately Aug. 1 every other year.

Direct/Indirect Effects:

Hiker's gentian and primrose monkey-flower: Both hiker's gentian and primrose monkey flower occur in the Lower Big Lake pasture and would receive rest two years out of six and have the late entry every other year. Since the flowering period for both species is July to August, it is unlikely the 16 day delayed grazing every other year will have too much effect on the populations. With the rest rotation being implemented, population stability and reproductive output may increase due to full seasons with no browse or trampling. New individuals could establish in safe sites. Risk of weed invasion would likely decrease due to periods of rest and opportunity for native vegetation to recover from grazing impacts. Cumulative Impacts would be the same as in the No Grazing Alternative.

Though population viability would likely increase and risk of weed invasion would decrease, impacts would still occur to both hiker's gentian and primrose monkey-flower. Therefore, implementation of the proposed alternative **"may impact individuals or habitat, but will**

not likely contribute to a trend towards federal listing or loss of viability to the population or species" of hiker's gentian and primrose monkey-flower**.**

Whitebark pine: Resting the Upper and Lower Big Lakes pastures every two in six years would allow a reduction in trampling and browse of whitebark pine seedlings and saplings in those years. Population stability and reproductive output may improve slightly. However the direct, indirect and cumulative impacts discussed under the current grazing management would all continue. Therefore implementation of Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine."

Idaho sedge and Hall's rush: Resting of the allotment every two out of six years would allow Idaho sedge and Hall's rush, if present, a greater chance at increasing population stability through increased reproductive output (lack of flowering stems being browsed and subsequent increase in seed output), and from a lack of rhizomatous mat disturbance during rest years. Risk of weed invasion would be reduced as native vegetation is allowed to flourish in rest years and be more competitive against invasives, and by the reduction in weed seed transfer from livestock. Direct impacts to potential Idaho sedge and Hall's rush individuals as a result of grazing would still occur, and therefore, implementation of the proposed alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of Idaho sedge and Hall's rush.

Twin Lakes Alternative 4

Mitigation/Design Feature (See Alternative 4 description, DEIS Chapter 2, pg. 26):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Under Alternative 4, management would be the same as in the proposed action. Therefore impacts to Hiker's gentian, primrose monkey-flower, whitebark pine and Idaho sedge would be the same as in the proposed action (see above).

Monument

Monument No Action (No Grazing) Alternative

The no action alternative provides a means for evaluating current habitat conditions and discloses by species the direct, indirect and cumulative effects to sensitive plants. Under this

alternative, livestock would be removed from Forest Service lands within 2 years (See No Action description, DEIS Chapter 2, pg. 19).

Direct/Indirect Effects:

Lemhi penstemon: In association with the No Grazing Alternative, the removal of livestock within the two years of transition would allow native vegetation to flourish. Lemhi penstemon population stability would increase as new seedlings establish in existing "safe sites" and persist in the absence of grazing disturbance. Reproductive output would increase with the increase of individuals and with the lack of livestock herbivory. With more robust native vegetation, the native communities may be more able to out-compete weed species. Weed invasion would be reduced due to the lack of frequent disturbance and the lack of livestock transporting weed seed into the allotment. No weeds were reported at the site.

Cumulative Impacts: Inadvertent weed spraying would not be a threat to this population as the FS weed spraying crew is aware of its presence and does careful spot treatments if needed. The population occurs over 300 feet from the road with dense timber in between, so road maintenance activities are not a threat. Fire suppression and subsequent conifer encroachment will likely continue and result in long-term habitat alteration in some areas that could result in loss of habitat and subsequent loss of population viability. In the long-term, beyond ten years, interactions between wildfire, fire suppression and natural succession could all play key roles in determining whether existing Lemhi penstemon populations remain viable in the allotment.

Since livestock trampling and browse would be removed after two years, implementation of the No Grazing Alternative would likely have beneficial impacts for the Lemhi penstemon populations. Therefore implementation of the No Grazing Alternative would have a **"beneficial impact"** on Lemhi penstemon.

Primrose monkey-flower: With a lack of grazing disturbance, no direct impacts would occur to primrose monkey-flower. Indirectly, the populations could potentially thrive for some time. Population stability could increase as individuals are no longer trampled or browsed by domestic livestock. With an increase in individuals, reproductive output could increase as more plants would produce more flowers, and with a lack of trampling and browsing of flowering structures. The risk of weed invasion as mentioned above for Lemhi penstemon.

Cumulative Impacts: In the long-term, fire suppression practices that lead to conifer encroachment and vegetation succession could change the hydrology of the site and vegetation cover, which could eventually choke out the populations. Primrose monkey-flower has shown to respond well after fire (Debenedetti and Parsons 1984), likely linking it to a natural process in the life history of primrose monkey-flower.

Overall, since a lack of grazing is anticipated to increase population viability and reduce weed invasion, implementation of the no grazing alternative would have a **"beneficial impact"** on primrose monkey-flower.

Whitebark pine: As discussed in the existing condition, little use of whitebark pine stands occurs, aside from a couple shading and loafing areas that receive light use. The removal of livestock from the allotment within 2 years would eliminate livestock trampling and brows of young seedlings and saplings that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Idaho sedge and Hall's rush: No individuals were identified, but inadequate training may be the cause. Suitable habitat was identified and therefore Idaho sedge and Hall's rush may occur in the allotment. With a lack of grazing, no direct impacts would occur. Indirectly, population stability may increase as a result of increased reproductive output (lack of flowering stems being browsed and increase in seed output), and lack of rhizomatous mat disturbance. Risk of weed invasion would decrease as native vegetation flourishes and is more able to compete with invasive species, and as a result of the lack of weed seed spread from livestock.

Based on this information, implementation of the no action alternative would likely have "**beneficial impacts**" on Idaho sedge and Hall's rush.

Monument Current Grazing Alternative

Under the Current Grazing alternative, livestock grazing would continue at the same stocking rate and season of use as is occurring. (See Current Grazing description, DEIS Chapter 2, pg. 20).

Direct/Indirect Effects:

Lemhi penstemon: Direct impacts from livestock grazing such as trampling and browsing would continue. Stability and reproductive output would remain the same as no changes are

being made to the current management. Indirect impacts, such as habitat disturbance from livestock would continue and risk of weed invasion would remain moderate, as no weeds were found within or near the population, but have been mapped along the Miner Lakes Road.

Cumulative Impacts: Same as the No Grazing Alternative.

Since impacts from livestock grazing would continue, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Primrose monkey-flower: Under the current grazing management, direct impacts to the populations of Primrose monkey-flower include trampling and herbivory of individuals. Under continued management, population stability and reproductive output for these populations would likely remain at the current levels since grazing has been occurring for some time and no changes in management are proposed under this alternative. Risk of weed invasion would remain the same as livestock will be grazing at the current levels and season of use.

Cumulative Impacts: Same as the No Grazing Alternative.

Due to the continuation of livestock trampling and browsing of individuals, the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of primrose monkey-flower.

Whitebark pine: As discussed in the existing condition, little use of whitebark pine stands occurs, aside from a couple shading and loafing areas that receive light use under the current grazing management. Cows may occasionally use the whitebark pine stands and some direct trampling and browse of young seedlings and saplings could occur within the allotment at large. Population stability and reproductive output would all remain in their current state due to the continuation of current management.

Cumulative Impacts: Same as the No Grazing Alternative.

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Idaho sedge and Hall's rush: Assuming individuals are present, based on potential habitat and lack of adequate identification training, the continuation of current grazing would directly

impact Idaho sedge and Hall's rush through browsing of individuals and trampling of rhizomatous mats. If present, population stability, reproductive output, and risk of weed invasion would all remain in their current state as no changes in management would be made. Based on this information, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of Idaho sedge and Hall's rush.

Monument Proposed Action Alternative

Mitigation/Design Feature (See Proposed Action description, DEIS Chapter 2, pg. 23):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

The proposed action calls for the same level of use as the current grazing proposal. The only change is the addition of mitigation measures that further protect sensitive plants from disturbances caused by range improvements, which are not being proposed at this time. Therefore impacts to sensitive plants should be the same as the current grazing alternative (see above).

Monument Allotment Alternative 4

Mitigation/Design Feature (See Alternative 4 description, DEIS Chapter 2, pg. 26):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Alternative 4 incorporates the same mitigation measures as the proposed alternative, as well as implements a rest rotation of the allotment one year in four. Direct, indirect and cumulative impacts to sensitive plants would still exist and be similar to the current and proposed grazing alternatives. The one year of rest every four years would allow vegetation, including sensitive plants, a full season of recovery, allow seedlings to get well established, and allow for any short term impacts from grazing to recover. Risk of weed invasion would likely remain the same or have a slight reduction due to the year of rest and recovery.

Lemhi penstemon: Population stability and reproductive output would likely increase as more seedlings are able to establish during rest years and more seed is able to be produced from the lack of livestock browse.

Cumulative Impact would be the same as in the current grazing alternative. Though impacts would be reduced under Alternative 4, direct and indirect impacts would still occur, therefore, implementation of the Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species."**

Primrose monkey-flower: Direct impacts would still occur as described in the current grazing alternative. The rest of the allotment would allow native vegetation and primrose monkey-flower to flourish and increase their reproductive potential in that one year of three. Population stability may increase as a result of increased reproductive output. Reproductive output would increase since no livestock would be browsing flowers or seed heads. Risk of weed invasion may decrease slightly as a result of native vegetation establishing in bare sites and potentially out-competing invasive weeds.

Cumulative Impacts would be the same as in the current grazing alternative. Based on this information and the direct and indirect impacts associated with the proposed grazing alternative, implementation **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of primrose monkey-flower.

Whitebark pine: Impacts would be similar to the current grazing alternative. Resting the allotment every one in four years would allow seedling establishment to occur without trampling and reduce browse. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense. **Cumulative effects** would be the same as in the current grazing alternative.

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of Alternative 4**"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Idaho sedge and Hall's rush: Resting of the allotment every one year in four would allow Idaho sedge and Hall's rush, if present, a greater chance at increasing population stability through increased reproductive output (lack of flowering stems being browsed and subsequent increase in seed output), and from a lack of rhizomatous mat disturbance during rest years. Risk of weed invasion would be reduced as native vegetation is allowed to flourish in rest

years and be more competitive again invasives, and by the reduction in weed seed transfer from livestock.

Impacts to Idaho sedge and Hall's rush individuals as a result of grazing would still occur, as described in the current grazing alternative, and therefore, implementation of the Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of Idaho sedge and Hall's rush.

Pioneer

Pioneer No Action (No Grazing) Alternative

The no action alternative provides a means for evaluating current habitat conditions and discloses by species the direct, indirect and cumulative effects to sensitive plants. Under this alternative, livestock would be removed from Forest Service lands within 2 years (See No Action description, DEIS Chapter 2, pg. 19).

Direct/Indirect Effects:

Due to the similar species habitats and growth forms (co-occurring in the same habitats (same location) and both rhizomatous), effects to Hiker's gentian and primrose monkey-flower will be discussed together.

Hiker's Gentian and **Primrose Monkey-Flower**: With a lack of grazing disturbance, no direct impacts would occur to either hiker's gentian or primrose monkey-flower. Indirectly, the populations could potentially thrive for some time. Population stability could increase as individuals are no longer trampled or browsed by domestic livestock. With an increase in individuals, reproductive output could increase as more plants would produce more flowers, and with a lack of trampling and browsing of flowering structures. The risk of weed invasion would decrease since the lack of livestock would decrease disturbance habitats for weed seed establishment and spread.

Cumulative Impacts: In the long-term, fire suppression practices that lead to conifer encroachment and vegetation succession could change the hydrology of the site and vegetation cover, which could eventually choke out the populations. Primrose monkey-flower has shown to respond well after fire (Debenedetti and Parsons 1984), likely linking it to a natural process in the life history of primrose monkey-flower.

Overall, since a lack of grazing is anticipated to increase population viability and reduce weed invasion, implementation of the no grazing alternative would have a **"beneficial impact"** on hiker's gentian and primrose monkey-flower.

Whitebark pine: As discussed in the existing condition, little use of whitebark pine stands occurs, aside from shading and loafing areas adjacent to Skinner Meadows that receives light use. The removal of livestock from the allotment within 2 years would eliminate livestock

trampling and brows of young seedlings and saplings that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Idaho sedge and Hall's rush: No individuals were identified, but inadequate training may be the cause. Suitable habitat was identified and therefore Idaho sedge and Hall's rush may occur in the allotment. With a lack of grazing, no direct impacts would occur. Indirectly, population stability may increase as a result of increased reproductive output (lack of flowering stems being browsed and increase in seed output), and lack of rhizomatous mat disturbance. Risk of weed invasion would decrease as native vegetation flourishes and is more able to compete with invasive species, and as a result of the lack of weed seed spread from livestock.

Based on this information, implementation of the no action alternative would likely have "**beneficial impacts**" on Idaho sedge and Hall's rush.

Pioneer Current Grazing Alternative

Under the Current Grazing alternative, livestock grazing would continue at the same stocking rate and season of use as is occurring.

Direct/Indirect Effects:

Hiker's Gentian and Primrose Monkey-Flower: Under the current grazing management, direct impacts to the populations of Hiker's gentian and Primrose monkey-flower would include trampling and herbivory of individuals within the allotment by permitted livestock. Population stability and reproductive output for these populations would likely remain at the current levels since grazing has been occurring for some time and no changes in management

are proposed under this alternative. Risk of weed invasion would remain the same as livestock will be grazing at the current levels and season of use.

Cumulative Impacts: Same as the No Grazing Alternative

Due to the continuation of livestock trampling and browsing of individuals, the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of hiker's gentian and primrose monkey-flower.

Whitebark pine: Little if any livestock use is occurring in the whitebark pine stands within the allotment under the current grazing alternative, as stated in the no action alternative. Cows may occasionally use the whitebark pine stands and some direct trampling and browse of young seedlings and saplings could occur within the allotment at large. Population stability and reproductive output would all remain in their current state due to the continuation of current management.

Cumulative Impacts: Same as the No Grazing Alternative.

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Idaho sedge and Hall's rush: Assuming individuals are present, based on potential habitat and lack of adequate identification training, the continuation of current grazing would directly impact Idaho sedge and Hall's rush through browsing of individuals and trampling of rhizomatous mats. If present, population stability, reproductive output, and risk of weed invasion would all remain in their current state as no changes in management would be made. Based on this information, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of Idaho sedge and Hall's rush.

Pioneer Proposed Action Alternative

Mitigation/Design Feature

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water

troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

The proposed action calls for the same use levels and season of grazing as the current grazing alternative. The only change is the addition of mitigation measures that further protect sensitive plants from disturbances caused by range improvements, which are not being proposed at this time. Therefore impacts to sensitive plants should be the same as the current grazing alternative (see above).

Pioneer Allotment Alternative 4

Mitigation/Design Feature (See Alternative 4 description, DEIS Chapter 2, pg. 26):
- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Alternative 4 incorporates the same mitigation measures as the proposed alternative, as well as implements a rest rotation of the allotment one year in four. Direct, indirect and cumulative impacts to sensitive plants would still exist and be similar to the current and proposed grazing alternatives. The one year of rest every four years would allow vegetation, including sensitive plants, a full season of recovery, allow seedlings to get well established, and allow for any short term impacts from grazing to recover. Risk of weed invasion would likely remain the same or have a slight reduction due to the year of rest and recovery.

Hiker's gentian and primrose monkey-flower: Direct impacts to both species would still occur as described in the current grazing alternative. The rest of the allotment one year in four would allow native vegetation and both sensitive species a chance to flourish in the absence of grazing and increase their reproductive potential. Population stability may increase as a result of increased reproductive output. Reproductive output would increase since no livestock would be browsing flowers or seed heads. Risk of weed invasion may decrease slightly as a result of native vegetation establishing in bare sites and potentially out-competing invasive weeds.

Cumulative effects would be the same as in the current grazing alternative. Based on this information and the direct and indirect impacts associated with Alternative 4, implementation **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of hiker's gentian and primrose monkey-flower.

Whitebark pine: Impacts would be similar to the current grazing alternative. Resting the allotment every one in four years would allow seedling establishment to occur without trampling and reduce browse. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Cumulative effects would be the same as in the current grazing alternative.

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of Alternative 4**"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Idaho sedge and Hall's rush: Resting of the allotment every one year in four would allow Idaho sedge and Hall's rush, a greater chance at increasing population stability through increased reproductive output (lack of flowering stems being browsed and subsequent increase in seed output), and from a lack of rhizomatous mat disturbance during rest years. Risk of weed invasion would be reduced as native vegetation is allowed to flourish in rest years and be more competitive again invasives, and by the reduction in weed seed transfer from livestock.

Impacts to Idaho sedge and Hall's rush individuals as a result of grazing would still occur, as described in the current grazing alternative, and therefore, implementation of the Alternative 4 **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of Idaho sedge and Hall's rush.

Saginaw

Saginaw No Action (No Grazing) Alternative

The no action alternative provides a means for evaluating current habitat conditions and discloses by species the direct, indirect and cumulative effects to sensitive plants. Under this alternative, livestock would be removed from Forest Service lands within 2 years (see the No Action description, DEIS Chapter 2, pg. 19).

Direct/Indirect Effects:

Primrose monkey-flower: With a lack of grazing disturbance, no direct impacts would occur to primrose monkey-flower. Indirectly, the populations could potentially thrive for some time. Population stability could increase as individuals are no longer trampled or browsed by

domestic livestock. With an increase in individuals, reproductive output could increase as more plants would produce more flowers, and with a lack of trampling and browsing of flowering structures. The risk of weed invasion would be reduced as there are less vectors to transport weeds and less disturbance created for weed see establishment.

Cumulative Impacts: In the long-term, fire suppression practices that lead to conifer encroachment and vegetation succession could change the hydrology of the site and vegetation cover, which could eventually choke out the populations. Primrose monkey-flower has shown to respond well after fire (Debenedetti and Parsons 1984), likely linking it to a natural process in the life history of primrose monkey-flower.
Overall, since a lack of grazing is anticipated to increase population viability and reduce weed invasion, implementation of the no grazing alternative would have a **"beneficial impact"** on primrose monkey-flower.

Whitebark pine: As discussed in the existing condition, whitebark pine stands within the allotment receive low use levels by livestock. Some infrequent trampling and browse of individuals (seedling and saplings) may occur as livestock trail through mixed-conifer stands. The removal of livestock from the allotment within 2 years would eliminate any trampling and browse of individuals by livestock that may be occurring. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Cumulative Impacts: Continued fire suppression within whitebark pine habitats has been shown to lead to dominance by shade tolerant species which out-compete whitebark pine (Keane and Parsons 2010). Once established, these habitats are lost to whitebark pine until fire once again opens the habitat for early seral species such as whitebark pine. Population stability and reproductive output could both be reduced if fire or natural disturbances were not allowed to occur. In addition to fire suppression, the other four factors (non-actions) identified by the USDI Fish and Wildlife Service (2011a) will determine the long-term fate of whitebark pine within the allotment.

Since livestock can cause impacts to whitebark pine seedling and saplings, the removal of livestock from the allotment could have **"beneficial impacts"** for whitebark pine by reducing trampling and browse.

Saginaw Current Grazing Alternative

Under the Current Grazing alternative, livestock grazing would continue at the same stocking rate and season of use as is occurring. (See Current Grazing description, DEIS Chapter 2, pg. 20).

Direct/Indirect Effects:

Primrose monkey-flower: Under the current grazing management, direct impacts to the populations of Primrose monkey-flower include trampling and herbivory of individuals. Under continued management, population stability and reproductive output for these populations would likely remain at the current levels since grazing has been occurring for some time and no changes in management are proposed under this alternative. Risk of weed invasion would remain the same as livestock will be grazing at the current levels and season of use.

Cumulative Impacts: Same as the No Grazing Alternative.

Due to the continuation of livestock trampling and browsing of individuals, the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of primrose monkey-flower.

Whitebark pine: Direct impacts from current grazing likely include occasional trampling and browse of individual seedlings and saplings. Indirect impacts may include reductions in vegetation competition as livestock likely prefer other vegetation for browse. Under the continuation of current grazing management, population stability and reproductive output would likely remain at their current levels since no management changes would be occurring.

Declines in whitebark pine would likely occur within the allotment as a result of fire suppression, climate change, white pine blister rust, and mountain pine beetle as discussed in Table 5 (USDI Fish and Wildlife Service 2011a).

Within mixed conifer stands, whitebark pine does not exhibit the keystone functions it is most valued for in subalpine habitats, rather it performs much like other conifer species within the community, with the addition of providing an excellent seed source for wildlife (See description in Table 5). The occasional loss of some individual seedlings and saplings should not further the need for listing. Grazing was not identified by the USDI Fish and Wildlife Service's 12-month finding (2011a) as one of the five factors contributing to the decline in whitebark pine. Therefore, implementation of the current grazing alternative **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species"** of whitebark pine.

Saginaw Proposed Action Alternative

Mitigation/Design Feature (See Proposed Action description, DEIS Chapter 2, pg. 23):

- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water

troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

The proposed action calls for the same use levels and season of grazing as the current grazing alternative. The only change is the addition of mitigation measures that further protect sensitive plants from disturbances caused by range improvements, which are not being proposed at this time. Therefore impacts to sensitive plants should be the same as the current grazing alternative (see above).

Saginaw Alternative 4

Mitigation/Design Feature (See Alternative 4 description, DEIS Chapter 2, pg. 26):
- When any one of the Allowable Use Level metrics is reached, livestock would be removed.
- All new range improvements (fences and water developments) will be designed to avoid or reduce impacts to known sensitive plant populations (i.e. constructing riparian or spring exclosure fences to include plant populations, placement of water troughs 200 feet or grater from known populations, routing water pipe around known populations, etc.).
- Sensitive plant population protection measures would be added to all appropriate surface disturbing actions.

Alternative 4 incorporates the same mitigation measures as the proposed alternative. The number of head months is reduced from 690 to 620. The seasons of use are adjusted, with Pastures 1-3 starting seven days later in the season and being seven days shorter. Pasture 4 is restricted to no more than 150 cow/calf pairs and grazing begins 47 days later in the season and is 47 days shorter.

Overall, these changes should allow for reduced livestock impacts to native vegetation and sensitive plants.

Primrose monkey-flower: Primrose monkey-flower occurs in Pasture 3 and would have the seven day later start date and slightly shorter season of use. Seven days would not likely cause a change in impacts from the current grazing alternative. Therefore impacts should be the same as in the current grazing alternative.

Whitebark pine: A reduction in grazing intensity would allow a reduction in trampling and browse of whitebark pine. This could potentially increase population stability and reproductive output if seedlings and saplings were allowed to mature and competition by other vegetation did not become too dense. However the direct, indirect and cumulative impacts discussed under the current grazing management would all continue. Therefore implementation of the proposed action **"may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species** of whitebark pine."

Comparison of Alternatives

Table 4: Summary of Effects by Alternative

Allotment	Sensitive Plant Species	No Grazing Alternative	Current Grazing Alternative	Proposed Action Alternative	Alternative 4
Seymour	Wavy moonwort	May Impact…	May Impact…	Beneficial Impact	Beneficial Impact
	Whitebark pine	Beneficial Impact	May Impact…	May Impact…	May Impact…
Fishtrap	Lemhi penstemon	Beneficial Impact	May Impact…	May Impact…	May Impact…
	Whitebark pine	Beneficial Impact	May Impact…	May Impact…	May Impact…
Mudd Creek	Lemhi penstemon	Beneficial Impact	May Impact…	May Impact…	May Impact…
	Whitebark pine	Beneficial Impact	May Impact…	May Impact…	May Impact…
Pintlar Creek	Lemhi penstemon	Beneficial Impact	May Impact…	May Impact…	May Impact…
	Whitebark pine	Beneficial Impact	May Impact…	May Impact…	May Impact…
Mussigbrod	Lemhi penstemon	Beneficial Impact	May Impact…	May Impact…	May Impact…
	Whitebark pine	Beneficial Impact	May Impact…	May Impact…	May Impact…
Ruby Creek	Hiker's gentian	Beneficial Impact	May Impact…	May Impact…	May impact…
	Primrose monkey-flower	Beneficial Impact	May Impact…	May Impact…	May impact…
	Idaho sedge	Beneficial Impact	May Impact…	May Impact…	May impact…
	Hall's rush	Beneficial Impact	May Impact…	May Impact…	May impact…
Dry Creek	Hall's rush	Beneficial Impact	May Impact…	May Impact…	May impact…
	Primrose monkey-flower	Beneficial Impact	May Impact…	May Impact…	May impact…
	Whitebark pine	Beneficial Impact	May Impact…	May Impact	May Impact
Twin Lakes	Hiker's gentian	Beneficial Impact	May Impact…	May Impact…	May impact…
	Primrose monkey-flower	Beneficial Impact	May Impact…	May Impact…	May impact…
	Whitebark pine	Beneficial Impact	May Impact…	May Impact…	May impact…
	Idaho sedge	Beneficial Impact	May Impact….	May Impact…	May Impact…
	Hall's rush	Beneficial Impact	May Impact….	May Impact…	May Impact…

Table 5: Summary of Effects by Alternative

Allotment	Sensitive Plant Species	No Grazing Alternative	Current Grazing Alternative	Proposed Action Alternative	Alternative 4
Monument	Lemhi penstemon	Beneficial Impact	May Impact…	May Impact…	May impact…
	Primrose monkey-flower	Beneficial Impact	May Impact…	May Impact…	May impact…
	Whitebark pine	Beneficial Impact	May Impact…	May Impact…	May impact…
	Idaho sedge	Beneficial Impact	May Impact…	May Impact…	May Impact…
	Hall's rush	Beneficial Impact	May Impact…	May Impact…	May Impact…
Pioneer	Hiker's gentian	Beneficial Impact	May Impact…	May Impact…	May impact…
	Primrose monkey-flower	Beneficial Impact	May Impact…	May Impact…	May impact…
	Whitebark pine	Beneficial Impact	May Impact…	May Impact…	May impact…
	Idaho sedge	Beneficial Impact	May Impact…	May Impact…	May Impact…
	Hall's rush	Beneficial Impact	May Impact…	May Impact…	May Impact…
Saginaw	Primrose monkey-flower	Beneficial Impact	May Impact…	May Impact…	May impact…
	Whitebark pine	Beneficial Impact	May Impact…	May Impact…	May impact…

Soil

Existing Condition

Regulatory Framework

Laws and Executive Orders

Organic Administration Act of 1897 – Provides that no national forest may be established except to improve and protect the forest, or to secure favorable conditions of water flows, and to furnish a continuous supply of timber. The act is not intended to authorize the inclusion, within national forests, of lands that are more valuable for mineral or agricultural purposes.
Multiple-Use Sustained-Yield Act of 1960 – Sets forth the secondary purpose of the establishment "for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." It also states that management of the National Forests must provide "sustained yields in perpetuity without impairment of the productivity of the land."
National Environmental Policy Act of 1969 – Requires agencies to analyze the physical, social, and economic effects associated with proposed plans and decisions, to consider alternatives to the action proposed, and to document the results of the analysis.
Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) – Requires an assessment of the present and potential productivity of the land. Regulations are to specify guidelines for land management plans developed to achieve the goals of the program that . . . ensure that timber will be harvested from NFS lands only where soil, slope, or other watershed conditions will not be irreversibly damaged.
National Forest Management Act of 1976 (NFMA) – This act amended the 1974 act by the addition of a section stressing maintenance of productivity and the need to protect and improve soil and water resources, and avoid permanent impairment of land productivity.

Regulation and Policy

Forest Service Manual 2550 – Soil Management, WO Amendment 2500-90-2 – Provides the policy to manage forest and rangelands in a manner that will improve soil productivity, and to use appropriate soils information systems in support of all management activities affecting, or influenced by, the soil resource. It provides overall direction for soil management which includes inventories, support services, improvement, monitoring, and data management and analysis.

Forest Service Manual 2554, R-1 Supplement 2500-99-1 – Provides the objectives to meet direction in the National Forest Management Act of 1976 and other legal mandates, and to manage National Forest System lands under ecosystem management principles without permanent impairment of land productivity and to maintain or improve soil quality. It updates and defines Regional Soil Quality Standards.

Forest Service Handbook 2509.22, Soil and Water Conservation Handbook: - provides a non-point Source Management Strategy to develop site-specific conservation practices for

activities on National Forest System lands to minimize effects on soil and water resources and protect water-related beneficial uses.

Soil Forest Plan Standards

Standard 1: The most current Region 1 Soil Quality Standards are adopted as forest plan standards.

Standard 2: Ground based yarding shall not be allowed on slopes exceeding 35% without site-specific environmental analysis that shows damage is unlikely and soil goals and objectives can be met.

Existing Condition Introduction

Geology, landforms and soils provide the physical setting for this analysis. Actually soils have both physical and biological attributes and are a bridge between the physical and biological site attributes.

The Forest Landtype survey map units are delineated and described by integrating landform, geology, and vegetation components with soil components as map unit design criteria. As a result the surveys can be used to describe the physical setting in terms of landforms, geology, and soil as a context for evaluating the vegetative component so important for range management within the project area. This context, the physical setting, provides a basis for evaluating vegetative conditions as they exist today relative to the potential. It is also a basis for estimating how the land responds to grazing.

The analysis area, the entire area within all allotment boundaries, has 161 unique landtypes mapped with multiple soil components and habitat types for each landtype. This number is impossible to describe in an understandable manner. However, the landtypes can be logically grouped for description by their geologic and landform components since they are used as map unit criteria and describe soil parent material and topography, 2 of the 5 soil forming factors. Geologic and landform components also infer the time for soil to develop, a third soil forming factor. Glacial deposits and alluvium, for example, are younger and have had less time for soil development than unglaciated areas and Tertiary sediments.

The Geologic Map of the Dillon (Ruppel et al 1993) and the Butte (Lewis 1998) 1 degree by 2 degree quadrangles, at a scale of 1:250,000, provides a good general overview of the physical site conditions for the entire analysis area**.** Some of the geologic map unit names infer, or, are landforms: landslide deposits, glacial outwash, till and alluviums are examples. The names also infer soil attributes, especially texture, in a geologically young landscape like the analysis area. Soils in granitic areas usually have coarse sandy textures while those in the Bozeman Group of valley fill deposits have much finer textures.

Allotments can be grouped based on the distribution of geologic map units within them – similar geologic unit distribution infers that distribution of other physical site features, including soils, will occur also.

Table 1: Areal Distribution of Geologic Units as Percentages of Allotment Area

Allotments	Alluvium	Landslides	Till	Outwash	Gravel	Granitic Rock	Bozeman Group Tertiary Sediments	Challis Volcanic Rock	Volcanic Rock	Lemhi and Missoula Group Belt Rocks
Twin Lakes			96.6	2.1						1.2
Dry Creek			90.2	7.0						2.3
Monument			84.5	13.6						1.5
Pioneer			81.8	6.6						11.5
Saginaw			42.2	0.3			14.1			43.3
Mussigbrod			41.3	1.2		57.3				
Pintlar Creek	6.3	1.1	34.4	0.2	4.7	13.5	39.3			
Seymour	1.8	0.6	31.7	1.1	0.7	0.0	62.5		0.2	1.2
Mudd Creek		1.6	30.9	4.6	0.0	3.7	58.7		0.3	
Fishtrap	0.4	5.6	27.4	0.1	6.6	1.9	13.3	1.8	5.5	37.4
Ruby Creek	3.6	4.9	6.1	3.6		28.6	18.4			34.8

The table illustrates some obvious patterns. The darkly shaded cells indicate two groups of allotments with striking similarities in the geologic units found within the allotment boundaries. The allotments in the top four rows are almost 100 percent glacial deposits, either till or outwash.

The three allotments in the second darkly shaded group are dominated by till, 31 to 34 percent, and Bozeman Group Tertiary Sediments, 39 to 62 percent.

The lightly shaded allotments have a variety of different patterns of geologic units. Dominant percentages for these units are also shaded to enhance similarities and differences among these four allotments.

The Saginaw and Mussigbrod allotments, on opposite ends of the valley, have similar amounts of till but bedrock units are dominantly Belt rocks and granitic rock, respectively.

The Fishtrap and Ruby Creek allotments have an even more heterogeneous group of geologic units. The dominant units in Fishtrap are Belt rocks, till and Bozeman Group Tertiary Sediments; in Ruby Creek they are Belt rocks, granitic rock and Bozeman Group Tertiary Sediments.

The following information provides an allotment-specific description of existing soil conditions below. Geology, landform and soil attributes and interpretations from the Landtype survey; plot data; and soil detrimental disturbance estimates are used to describe and evaluate existing soil conditions. See *Analysis Methods and Assumptions* section below

for a discussion on Landtype, sutiable range, interpertations, plot data and Soil Quality Standards (SQS), see pgs. 470-530 in the Soil analysis of the DEIS.

Seymour Allotment

Table 4, below, displays the dominant landtypes for suitable range in the Seymour Allotment and associated soil characteristics and vegetation. Landtype maps for this allotment can be found in Appendix A-4.

Table 2: Seymour Allotment Soil Series Families – General Descriptive Attributes.

Dominant Landtypes	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
613Ua	**Bata**	Very deep	Well drained	Gravelly ashy silt loam	11 inches	Gravelly loam and very gravelly clay loam	Forest
643G	**Dunkleber**	Deep	Wet	Thick Dark Organic	60 inches	NA	Grass/shrub
533P	**Elve**	Very deep	Somewhat excessively drained	Very cobbly loam	18 inches	Extremely cobbly loam	Forest
676B, 776B	**Finn**	Very deep	wet	Dark gravelly loam	12 inches	Very gravelly loam	Grass/shrub
54C, 54D, 54E	**Libeg**	Very deep	Well drained	Dark stony loam	6 inches	Very gravelly & stony clay loam	Grass/shrub
533E, 533X	**Maciver**	Very deep	Well drained	Dark loam	7 inches	Very gravelly clay loam	Grass/shrub
50C	**Monad**	Very deep	Well drained	Dark gravelly loam	14 inches	Loam	Grass/shrub
414A	**Mooseflat**	Very deep	Wet	Dark Loam	10 inches	Silt loam over loamy fine sand	Grass/shrub
683E	**Philipsburg**	Very deep	Well drained	Dark silt loam	14 inches	Silty clay loam	Grass/shrub
45D	**Redchief**	Very deep	Well drained	Dark gravelly loam	10 inches	Very gravelly clay loam	Grass/shrub
76B	**Tibson**	Very deep	Well drained	Dark cobbly loam	8 inches	Very cobbly clay loam	Grass/shrub
348Sa, 648Ua	**Upsata**	Very deep	Excessively drained	Ashy loam and sandy loam	15 inches	Extremely gravelly loamy coarse sand	Forest

Existing Condition
Soil

Dominant Landtypes	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
648G	**Wichup**	Deep	Wet	Dark Organic	10 inches	Gravelly to very gravelly Loam	Grass/shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction. Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high– those that are saturated early but become dry during the grazing season are rated moderate.

Interpretations for the Seymour Allotment are summarized in Appendix B-5. Total acreage for each of the combinations is also provided. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high.

Acres of high erosion, compaction, and hummocking risk are all soils that are normally saturated during the entire grazing season and they are mostly in flood plains, also referred to as riparian areas.

Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

All remaining interpretations are moderate or lower. The moderate rating infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 57, 1 foot square plots were taken in the Seymour allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded and shallow soil pits were opened to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions,* pg. 472 - 477 below for a discussion about the relationship of cover to

erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-15%, 20-30%, 57-64% and 82-96%. The data for these ranges with comments as appropriate is summarized in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

None of the plots meet the criteria for detrimental disturbance. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. Strong, coarse platy structure was observed on one plot, but it had 1-5 roots per square centimeter so was not considered root limiting and therefore not detrimentally compacted. Eighteen other plots had weak and moderate platy structure but were not considered detrimentally compacted.

The presence of root mats that qualified as turf on all but 9 plots was impressive. These are surface layers with so many roots that it is difficult to break apart and makes a ripping sound when torn apart. Presence of these layers is considered to eliminate erosion and to act as a shock absorber to prevent compaction.

Rooting depth on almost all plots extended to the depth examined and were present throughout the depth of the A horizon. Depth ranges for A horizons with a plus sign indicate that the A horizon continued below the depth examined.

The Range Specialist Report documents findings in agreement with the soils plot data. While important grass species were found to be below desired amounts, the grassland sites in the Seymour allotment were considered to be functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds (Greenwood 2013). Vegetation in riparian areas is in a desirable condition, with ground cover being slightly below desired rangeland health conditions for the site (Greenwood 2013).
In summary, plot data demonstrate:

- No detrimental soil disturbance
- Overall high ground cover
- A (surface) horizons occupied with roots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Seymour Allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences and Water developments

The Seymour allotment has 19 miles of fence and 1 water development. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. The soil within a 200 foot circle centered on the water development is considered detrimentally disturbed. The 200 foot diameter is exaggerated to account for heavily used trails that lead to the water development. Both values are liberal estimates because, for example, cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally disturbed.

Using the assumptions above, the detrimental soil disturbance along fence lines is 46 acres and the water development is 0.7 acres, for a total of 2.4 percent of the 1,993 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 2.4%, since it overestimates the effects as explained in the paragraph above. The existing detrimental disturbance of 2.4% is well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Seymour Allotment is in compliance with the SQS.

Fishtrap Allotment

Table 5 below displays the dominant landtypes for suitable range in the Fishtrap Allotment and associated soil characteristics and vegetation. Landtype maps for this allotment can be found in Appendix A-4.

Table 3: Fishtrap Allotment Soil Series Families – General Descriptive Attributes.

Dominant Landtypes	Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
683Sa, 708Ua	**Bata**	Very deep	Well drained	Gravelly ashy silt loam	11 inches	Gravelly loam and very gravelly clay loam	Forest
27C, 348X	**Bearmouth**	Very deep	Excessively Well drained	Dark cobbly and very gravelly loam	14 inches	Extremely cobbly sand	Grass/shrub
618G, 643G	**Dunkleber**	Deep	Wet	Thick Dark Organic	60 inches	na	Grass/shrub
617G	**Libeg**	Very deep	Well drained	Dark stony loam	6 inches	Very gravelly & stony clay loam	Grass/shrub
463E, 683E	**Philipsburg**	Very deep	Well drained	Dark silt loam	14 inches	Silty clay loam	Grass/shrub

Existing Condition
Soil

Dominant Landtypes	Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
145E, 45D	**Redchief**	Very deep	Well drained	Dark gravelly loam	10 inches	Very gravelly clay loam	Grass/shrub
523E	**Rooset**	Very deep	Well drained	Dark gravelly loam	11 inches	Very gravelly clay loam	Grass/shrub
648G	**Wichup**	Deep	Wet	Dark Organic	10 inches	Gravelly to very gravelly Loam	Grass/shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction.

Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

A summary of the interpretations for the Fishtrap Allotment can be found in Appendix B-5. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high. Acres of high erosion, compaction, and hummocking risk are all soils that are normally saturated during the entire grazing season and they are mostly in flood plains, also referred to as riparian areas. Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

All remaining interpretations are moderate or lower. The moderate rating infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 37, 1 foot square plots were taken in the Fishtrap allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded and shallow soil pits were opened to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-20%, 21-50%, 51-80% and 81-100%. The data for these ranges with comments as appropriate are summarized in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

None of the plots meet the criteria for detrimental disturbance. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. Strong, coarse platy structure was observed on 5 plots, but all had 1-5 roots per square centimeter so they were not considered root limiting and therefore not detrimentally compacted. One other plot had weak platy structure but was not considered detrimentally compacted.

Twenty plots had root mats from 3 to 7 cm thick that qualified as turf. These are surface layers with so many roots that it is difficult to break apart and makes a ripping sound when torn apart. Presence of these layers is considered to eliminate erosion and to act as a shock absorber to prevent compaction.

Rooting depth on most plots extended to the depth examined and were present throughout the depth of the A horizon. Depth ranges for A horizons with a plus sign indicate that the A horizon continued below the depth examined.

The Range Specialist Report documents findings in agreement with the soils plot data. The grassland and sagebrush-grassland sites monitored in the Fishtrap allotment were considered to be meeting desired rangeland health objectives for species composition and functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds (Greenwood 2013). Vegetation in riparian areas is trending towards desired rangeland health conditions for species composition, shrub and ground cover (Greenwood 2013). There are 23 acres of inventoried noxious weed infestations within the Fishtrap Alltoment. Due to the presence of spotted knapweed infestations, rangeland plant communities within the allotment are thought to be at moderate risk of invasion by weeds. Due to high ground cover present in the allotment, however, these sites are thought to be functioning in a manner that would resist but not prevent invasion by noxious weeds (Greenwood 2013).

In summary, plot data demonstrate:

- No detrimental soil disturbance
- Overall high ground cover
- A (surface) horizons occupied with roots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Fishtrap Allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences and Water developments
The Fishtrap allotment has 6 miles of fence and no water developments. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.

Using the assumptions above, the detrimental soil disturbance along fence lines is 14.6 acres, for a total of 2.8 percent of the 529 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 2.8%, since it overestimates the effects as explained in the paragraph above. The existing detrimental disturbance of 2.8% is well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Fishtrap Allotment is in compliance with the SQS.

Mudd Creek Allotment

Table 6 below displays the dominant landtypes for suitable range in the Mudd Creek Allotment and associated soil characteristics and vegetation. Landtype maps for this allotment can be found in Appendix A-4.

Table 4: Mudd Creek Allotment Soil Series Families – General Descriptive Attributes.

Dominant Landtypes	Soil Series Families	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
643G	Dunkleber	Deep	Wet	Thick Dark Organic	60 inches		Grass/shrub
348P	Howardsville	Very deep	Somewhat excessively drained	Very gravelly sandy loam	10 inches	Extremely cobbly loamy sand	Forest
354D, 454F, 54E	Libeg	Very deep	Well drained	Dark stony loam	6 inches	Very gravelly & stony clay loam	Grass/shrub
533E	Maciver	Very deep	Well drained	Dark loam	7 inches	Very gravelly clay loam	Grass/shrub
48C	Mollet	Very deep	Well drained	Dark loam	12 inches	Clay loam	Grass/shrub
463E,683E	Philipsburg	Very deep	Well drained	Dark silt loam	14 inches	Silty clay loam	Grass/shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction. Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

Interpretations for the Mudd Creek Allotment can be found in Appendix B-5. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high.

Acres of high erosion, compaction, and hummocking risk are all soils that are normally saturated during the entire grazing season and they are mostly in flood plains, also referred to as riparian areas. Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

All remaining interpretations are moderate or lower. The moderate rating infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 23, 1 foot square plots were taken in the Mudd Creek allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded and shallow soil pits were opened to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-20%, 21-50%, 51-80% and 81-100%. The data for these ranges with comments as appropriate can be found in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

None of the plots meet the criteria for detrimental disturbance. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. Seventeen of the 23 plots have platy structure. Strong platy structure was observed on 7 plots, but all plots had 1-5 roots per square centimeter so they were not considered root limiting and therefore not detrimentally compacted. The same was true for the other 16 plots with weaker platy structure. It is possible that soils on these plots are recovering from relic compacted layers. If so, it is consistent with some of the observations made inside and outside of exclosures and other locations where root density seems to be increasing within soil layers with platy structure.

The presence of root mats that qualified as turf 1 to 8 cm thick on all but 3 plots was impressive. These are surface layers with so many roots that it is difficult to break apart and makes a ripping sound when torn apart. Presence of these layers is considered to eliminate erosion and to act as a shock absorber to prevent compaction.

Rooting depth on all extended to the depth examined and were present throughout the depth of the A horizon. Depth ranges for A horizons with a plus sign indicate that the A horizon continued below the depth examined.

The Range Specialist Report documents findings in agreement with the soils plot data. The grassland and sagebrush-grassland sites monitored in the Mudd Creek Allotment were considered to be meeting desired rangeland health objectives for species composition and functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds, though the ground cover is currently lower than averages expected for this habitat type and currently not meeting desired conditions (Greenwood 2013). Vegetation in riparian areas is trending towards desired rangeland health conditions for species composition, shrub and ground cover (Greenwood 2013). There are 10 acres of inventoried noxious weed infestations within the Mudd Creek Allotment. Due to the presence of spotted knapweed infestations, rangeland plant communities within the allotment are thought to be at moderate risk of invasion by weeds. In regards to the Mudd Creek riparian site, the apparent increase in willow and ground cover suggests that this plant community may be increasing its resistance to invasion by noxious weeds (Greenwood 2013).

In summary, plot data demonstrate:

- No detrimental soil disturbance
- Ground cover adequate to prevent soil erosion
- A (surface) horizons occupied with roots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Mudd Creek Allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences and Water developments
The Mudd Creek allotment has 12 miles of fence and 2 water developments. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.
The soil within a 200 foot circle centered on the water development is considered detrimentally disturbed. The 200 foot diameter is exaggerated to account for heavily used trails that lead to the water development.

Using the assumptions above, the detrimental soil disturbance along fence lines is 29.1 acres, for a total of 4.1 percent of the 739 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 4.1%, since this is an overestimation of the effects as explained in the paragraph above. The existing detrimental disturbance of 4.1% is well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Mudd Creek Allotment is in compliance with the SQS.

Pintlar Creek Allotment

Table 7 below displays the dominant landtypes for suitable range in the Pintlar Creek Allotment and associated soil characteristics and vegetation. Landtype maps for this allotment can be found in Appendix A-4.

Table 5: **Pintlar Creek Allotment Soil Series Families – General Descriptive Attributes.**

Dominate Landtype	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
348E, 348X	Bearmouth	Very deep	Excessively Well drained	Dark cobbly and very gravelly loam	14 inches	Extremely cobbly sand	Grass/shrub
618G	Dunkleber	Deep	Wet	Thick Dark Organic	60 inches		Grass/shrub
348P	Howardsville	Very deep	Somewhat excessively drained	Very gravelly sandy loam	10 inches	Extremely cobbly loamy sand	Forest

Table 5: **Pintlar Creek Allotment Soil Series Families – General Descriptive Attributes.**

Dominate Landtype	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
914A	Kilgore	Very deep	Wet	Dark silt loam	25 inches	Very gravelly sandy loam	Grass/shrub
454D	Libeg	Very deep	Well drained	Dark stony loam	6 inches	Very gravelly & stony clay loam	Grass/shrub
228Sra	Littlesalmon	Deep	Somewhat excessively drained	Ashy loam	16 inches	Cobbly sandy loam	Forest
533X, 683P	Maciver	Very deep	Well drained	Dark loam	7 inches	Very gravelly clay loam	Grass/shrub
48D	Mollet	Very deep	Well drained	Dark loam	12 inches	Clay loam	Grass/shrub
414A	Mooseflat	Very deep	Wet	Dark Loam	10 inches	Silt loam over loamy fine sand	Grass/shrub
683E	Philipsburg	Very deep	Well drained	Dark silt loam	14 inches	Silty clay loam	Grass/shrub
45D	Redchief	Very deep	Well drained	Dark gravelly loam	10 inches	Very gravelly clay loam	Grass/shrub
648G	Wichup	Deep	Wet	Dark Organic	10 inches	Gravelly to very gravelly Loam	Grass/shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction. Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

A summary of the interpretations for the Pintlar Creek Allotment can be found in Appendix B-5. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high.

Acres of high erosion, compaction, and hummocking risk are all soils that are normally saturated during the entire grazing season and they are mostly in flood plains, also referred to as riparian areas.

Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

All remaining interpretations are moderate or lower. The moderate rating infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 234 1 foot square plots were taken in the Pintlar Creek allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded and shallow soil pits were opened in a small subset (14 plots) to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-20%, 21-50%, 51-80% and 81-100%. The data for these ranges with comments as appropriate can be found in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

The cells for soil pit data are shaded in this table because soil pits were opened on only 14 of the 234 plots in this allotment. Many more plots were thought to be necessary in this allotment because of concern about the apparent surface disturbance and the need to portray it. Therefore, fewer soil pits were opened to allow time to collect the surface data. This decision was reached in part because soil conditions have tended to be positively correlated with surface conditions on plots with both sets of data collected elsewhere.

None of the plots meet the criteria for detrimental disturbance. Only 28 of 234 plots had more than 20 percent bare soil. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. Strong platy structure was observed on 1 plot and a second plot had moderate platy structure. Neither limited root growth so they were not considered detrimentally compacted.

Rooting depth generally extended to the depth examined and were present throughout the depth of the A horizon. Depth ranges for A horizons with a plus sign indicate that the A horizon continued below the depth examined.

The Range Specialist Report documents that grassland and sagebrush-grassland sites were considered to be functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds, though the species composition in upland sites and riparian areas is below desired rangeland health objectives for species composition. Also, ground cover is currently lower than averages expected in riparian areas and currently is not meeting desired conditions (Greenwood 2013). There are 10 acres of inventoried noxious weed infestations within the Pintlar Creek Allotment. Due to the presence of spotted knapweed infestations, rangeland plant communities within the allotment are thought to be at moderate risk of invasion by weeds. In regards to the Pintlar Creek riparian site, existing low ground cover suggests that this plant community is at increased risk of invasion by noxious weeds (Greenwood 2013).

In summary, plot data demonstrate:

- No detrimental soil disturbance
- Ground cover adequate to prevent soil erosion
- A (surface) horizons occupied with roots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Pintlar Creek allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences and Water developments
The Pintlar Creek allotment has 10 miles of fence and 4 water developments. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.
The soil within a 200 foot circle centered on the water development is considered detrimentally disturbed. The 200 foot diameter is exaggerated to account for heavily used trails that lead to the water development.

Using the assumptions above, the detrimental soil disturbance along fence lines is 24.2 acres and the detrimental disturbance associated with the 4 water developments is 2.9 acres, for a total of 2.8 percent of the 981 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 2.8%, since this is an overestimation of the effects as explained in the paragraph above. The existing detrimental disturbance of 2.8% is

well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Pintlar Creek Allotment is in compliance with the SQS.

Mussigbrod Allotment

Table 8 below displays the dominant landtypes for suitable range in the Mussigbrod Allotment and associated soil characteristics and vegetation. Landtype maps for this allotment can be found in Appendix A-4.

Table 6: **Mussigbrod Allotment Soil Series Families – General Descriptive Attributes**.

Dominant Landtype	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
538E	Bearmouth	Very deep	Excessively Well drained	Dark cobbly and very gravelly loam	14 inches	Extremely cobbly sand	Grass /shrub
528X	Beeftrail	Moderately deep	Somewhat excessively drained	Dark coarse sandy loam	8 inches	gravelly coarse sandy loam	Grass /shrub
618G	Dunkleber	Deep	Wet	Thick Dark Organic	60 inches		Grass/ shrub
50E	Libeg	Very deep	Well drained	Dark stony loam	6 inches	Very gravelly & stony clay loam	Grass /shrub
40B	Mooseflat	Very deep	Wet	Dark Loam	10 inches	Silt loam over loamy fine sand	Grass shrub
528P	Tepecreek	Moderately deep	Well drained	Very gravelly sandy clay loam	18 inches	Very gravelly sandy loam	Forest
648G	Wichup	Deep	Wet	Dark Organic	10 inches	Gravelly to very gravelly Loam	Grass/ shrub
49A	Wisdom	Very deep	Wet (irrigation)	Dark silt loam	14 inches	Loam	Grass /shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction. Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

Summary of interpretations for the Mussigbrod Allotment can be found in Appendix B-5. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high. Acres of high erosion, compaction, and hummocking risk are all soils that are normally saturated during the entire grazing and they are mostly in flood plains, also referred to as riparian areas. Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

All remaining interpretations are moderate or lower. The moderate rating infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 43, 1 foot square plots were taken in the Mussigbrod allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded and shallow soil pits were opened to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-20%, 21-50%, 51-80% and 81-100%. A summary of the data for these ranges with comments as appropriate can be found in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

The 2000 Mussigbrod wildfire burned about 87% of the Mussigbrod allotment. Many of the plots were burned in the fire, and shrub cover is still recovering. None of the plots meet the

criteria for detrimental disturbance. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. One plot had moderate platy structure, but also had 1-5 roots per square centimeter so was not considered root limiting and therefore not detrimentally compacted.

Root mats that qualified as turf were measured on 27 plots and were 2 to 15 cm thick. These are surface layers with so many roots that it is difficult to break apart and makes a ripping sound when torn apart. Presence of these layers is considered to eliminate erosion and to act as a shock absorber to prevent compaction.

Rooting depth generally extended to the depth examined and were present throughout the depth of the A horizon, except the 3 plots in the lowest cover class (0-19%). Depth ranges for A horizons with a plus sign indicate that the A horizon continued below the depth examined.

Soils in some areas near the East Fork Bender Creek have lower water tables since fire burned out the willows and the stream entrenched itself by eroding deeply into the substrate. Vegetation is slowly recovering but much bare soil is still exposed. Recovery will continue slowly and will likely convert to more upland vegetation unless the water tables are re-established by beaver activity or some other method.

The Range Specialist Report documents that grassland and sagebrush-grassland sites were considered to be functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds, though the ground cover and species composition in upland sites and some riparian areas is below desired rangeland health objectives, especially in the Bender pasture. Riparian conditions are highly variable, especially on those streams affected by the 2000 Mussigbrod wildfire (Greenwood 2013). There are 53 acres of inventoried noxious weed infestations within the Mussigbrod allotment. Although most native plant communities have high ground cover that would help them resist invasion, existing weed populations are likely to expand if they are not actively controlled (Greenwood 2013).

In summary, plot data demonstrate:

- No detrimental soil disturbance
- Ground cover adequate to prevent soil erosion
- A (surface) horizons occupied with roots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Mussigbrod allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences and Water developments

The Mussigbrod allotment has 7 miles of fence and 5 water developments. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.
The soil within a 200 foot circle centered on the water development is considered detrimentally disturbed. The 200 foot diameter is exaggerated to account for heavily used trails that lead to the water development.

Using the assumptions above, the detrimental soil disturbance along fence lines is 17 acres and the detrimental disturbance associated with the 5 water developments is 3.6 acres, for a total of 3.3 percent of the 624 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 3.3%, since this is an overestimation of the effects as explained in the paragraph above. The existing detrimental disturbance of 3.3% is well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Mussigbrod Allotment is in compliance with the SQS.

Ruby Creek Allotment

Table 9 below displays the dominant landtypes and associated soil characteristics and vegetation for suitable range in the Ruby Creek Allotment. Landtype maps for this allotment can be found in Appendix A-4.

Table 7: Ruby Creek Allotment Soil Series Families – General Descriptive Attributes.

Dominant Landtypes	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
538E	Bearmouth	Very deep	Excessively Well drained	Dark cobbly and very gravelly loam	14 inches	Extremely cobbly sand	Grass/shrub
538Pr	Comad	Very deep	Excessively drained	Extremely stony sandy loam	8 inches	Extremely stony loamy sand	Forest
60A	Cowcamp	Very deep	Wet (irrigation)	Dark silt loam	18 inches	Very cobbly clay loam	Grass/shrub
613G	Dunkleber	Deep	Wet	Thick Dark Organic	60 inches		Grass/shrub

Table 7: Ruby Creek Allotment Soil Series Families – General Descriptive Attributes.

Dominant Landtypes	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
548E	Ellena	Moderately deep	Somewhat excessively drained	Very cobbly sandy loam	7 inches	Very cobbly coarse sandy loam	Forest
647G	Finn	Very deep	wet	Dark gravelly loam	12 inches	Very gravelly loam	Grass/shrub
47C, 47D, 537E	Libeg	Very deep	Well drained	Dark stony loam	6 inches	Very gravelly & stony clay loam	Grass/shrub
40B	Mooseflat	Very deep	Wet	Dark Loam	10 inches	Silt loam over loamy fine sand	Grass/shrub
683E	Philipsburg	Very deep	Well drained	Dark silt loam	14 inches	Silty clay loam	Grass/shrub
31F	Sebud	Very deep	Well drained	Dark loam	10 inches	Very stony clay loam	Grass/shrub
16A	Tepete	Very deep	Wet	Thick Dark Organic	30 inches	Silty clay loam	Grass/shrub
347Sa	Waldbillig	Very deep	Well drained	Ashy silt loam	12 inches	Very gravelly fine sandy loam	Forest
648G	Wichup	Deep	Wet	Dark Organic	10 inches	Gravelly to very gravelly Loam	Grass/shrub
37Bbh	Wisdom	Very deep	Wet (irrigation)	Dark silt loam	14 inches	Loam	Grass/shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction.

Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

A summary of the interpretations for the Ruby Creek Allotment can be found in Appendix B-5. Three classes, slight, moderate and high are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high.

Acres of high compaction and hummocking risk are all soils that are normally saturated during the entire grazing season and they are mostly in flood plains, also referred to as riparian areas. Soil saturation explains the high risk for compaction and rutting. Some areas of high and high moderate erosion risk are in flood plains also. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance. Another component of high and high moderate erosion risk occurs on steep uplands with granitic soils. The risk ratings reflect the greater energy of overland flow on steep slopes and the low erosion resistance of granitic soils. Vigorous vegetative cover and root systems are necessary to prevent accelerated erosion on these sites.

All remaining interpretations are moderate or lower. The moderate rating infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 47, 1 foot square plots were taken in the Ruby Creek allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded and shallow soil pits were opened to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-20%, 21-50%, 51-80% and 81-100%. A summary of the data for these ranges with comments as appropriate can be found in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

None of the plots meet the criteria for detrimental disturbance. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. Two plots had platy structure, but also had 1-5 roots per square centimeter so was not considered root limiting and therefore not detrimentally compacted.

Root mats that qualified as turf were measured on 26 plots and were 1 to 9 cm thick. These are surface layers with so many roots that it is difficult to break apart and makes a ripping sound when torn apart.

Rooting depth extended to the depth examined and were present throughout the depth of the A horizon. Depth ranges for A horizons with a plus sign indicate that the A horizon continued below the depth examined.

The Range Specialist Report documents that grassland and sagebrush-grassland sites were considered to be functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds, though the ground cover and species composition in upland sites is below desired rangeland health objectives. Riparian areas are meeting desired rangeland health conditions for species composition and ground cover, though there is a need for increased cover of some important grass species such as tufted hairgrass (Greenwood 2013). There are approximately 433 acres of inventoried noxious weed infestations within the Ruby Creek allotment. Inventoried infestations are predominately small and large area infestations of spotted knapweed that are located within old timber harvest units. Other infestations are found along Forest roads, and in sagebrush-grassland plant communities within the allotment. The size and extent of these existing weed infestations creates a high invasion risk to rangeland plant communities, and other native plant habitats, that are currently free of weeds. Existing weed populations are likely to expand if they are not controlled. (Greenwood 2013).

In summary, plot data demonstrate:

- No detrimental soil disturbance
- Ground cover adequate to prevent soil erosion
- A (surface) horizons occupied with roots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Ruby Creek allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences and Water developments
The Ruby Creek allotment has 14 miles of fence and 1 water development. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.
The soil within a 200 foot circle centered on the water development is considered detrimentally disturbed. The 200 foot diameter is exaggerated to account for heavily used trails that lead to the water development.

Using the assumptions above, the detrimental soil disturbance along fence lines is 33.9 acres and the detrimental disturbance associated with the water development is 0.7 acres, for a total of 1.9 percent of the 1,821 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 1.9%, since this is an overestimation of the effects as explained in the paragraph above. The existing detrimental disturbance of 1.9% is well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Ruby Creek allotment is in compliance with the SQS.

Dry Creek Allotment

Table 10 below displays the dominant landtypes and associated soil characteristics and vegetation for suitable range in the Dry Creek Allotment. Landtype maps for this allotment can be found in Appendix A-4.

Table 8: **Dry Creek Allotment Soil Series Families – General Descriptive Attributes.**

Dominant Landtype	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
27C	Bearmouth	Very deep	Excessively Well drained	Dark cobbly and very gravelly loam	14 inches	Extremely cobbly sand	Grass/shrub
467P	Elve	Very deep	Somewhat excessively drained	Very cobbly loam	18 inches	Extremely cobbly loam	Forest
40B	Mooseflat	Very deep	Wet	Dark Loam	10 inches	Silt loam over loamy fine sand	Grass/shrub
23B	Wisdom	Very deep	Wet (irrigation)	Dark silt loam	14 inches	Loam	Grass/shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction. Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

A summary of the interpretations for the Dry Creek Allotment can be found in Appendix B-5. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high.

Acres of high erosion, compaction, and hummocking risk are all soils that are normally saturated during the entire grazing season and they are mostly in flood plains, also referred to as riparian areas. Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

All remaining interpretations are moderate or lower. The moderate rating infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 10, 1 foot square plots were taken in the Dry Creek allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded and shallow soil pits were opened in 7 of the plots to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-20%, 21-50%, 51-80% and 81-100%. Summary data for these ranges with comments as appropriate can be found in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

None of the plots meet the criteria for detrimental disturbance. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. Two plots had platy structure, but also had 1-5 roots per square centimeter so was not considered root limiting and therefore not detrimentally compacted.

Root mats that qualified as turf were measured on 4 of the 7 plots with soil pits and were 3 to 8 cm thick. These are surface layers with so many roots that it is difficult to break apart and makes a ripping sound when torn apart. All were located on plots with 0 to 20 percent bare soil.

Rooting depth extended to the depth examined and were present throughout the depth of the A horizon. Depth ranges for A horizons with a plus sign indicate that the A horizon continued below the depth examined.

The Range Specialist Report documents that grassland and sagebrush-grassland sites have improved in recent years in species composition and ground cover and were considered to be functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds, though the ground cover in upland sites is below desired rangeland health objectives. Riparian areas are not currently meeting desired rangeland health conditions for species composition and ground cover (Greenwood 2013). There are approximately 26 acres of inventoried noxious weed infestations within the Dry Creek allotment. Inventoried infestations are predominately small, low density infestations of spotted knapweed along allotment roads and trails. Although the size and extent of these existing weed infestations is not large, the location of these weed populations near, or within, rangeland plant communities would create a moderate risk for invasion if they are not actively controlled (Greenwood 2013).

In summary, plot data demonstrate:

- No detrimental soil disturbance
- Ground cover adequate to prevent soil erosion
- A (surface) horizons occupied with roots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Dry Creek allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences and Water developments
The Dry Creek allotment has 8 miles of fence and 1 water development. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.

The soil within a 200 foot circle centered on the water development is considered detrimentally disturbed. The 200 foot diameter is exaggerated to account for heavily used trails that lead to the water development.

Using the assumptions above, the detrimental soil disturbance along fence lines is 19.4 acres and the detrimental disturbance associated with the water development is 0.7 acres, for a total of 5.4 percent of the 373 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are

assumed to be included in the 5.4%, since this is an overestimation of the effects as explained in the paragraph above. The existing detrimental disturbance of 5.4% is well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Dry Creek allotment is in compliance with the SQS.

Twin Lakes Allotment

Table 11 below displays the dominant landtypes and associated soil characteristics and vegetation for suitable range in the Twin Lakes Allotment. Landtype maps for this allotment can be found in Appendix A-4.

Table 9: Twin Lakes Allotment Soil Series Families – General Descriptive Attributes.

Dominant Landtype	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
27C	Bearmouth	Very deep	Excessively Well drained	Dark cobbly and very gravelly loam	14 inches	Extremely cobbly sand	Grass /shrub
347X	Elve	Very deep	Somewhat excessively drained	Very cobbly loam	18 inches	Extremely cobbly loam	Forest
647G	Finn	Very deep	Wet	Dark gravelly loam	12 inches	Very gravelly loam	Grass /shrub
217Vra	Jeru	Very deep	Well drained	Very stony loam	24 inches	Very cobbly sandy loam	Forest
40B	Mooseflat	Very deep	Wet	Dark Loam	10 inches	Silt loam over loamy fine sand	Grass/ shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction.

Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

A summary of the interpretations for the Twin Lakes allotment can be found in Appendix B-5. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high.

Acres of high and high moderate erosion, and high compaction, and hummocking risk are all soils that are normally saturated during the entire grazing season and most are in flood plains, also referred to as riparian areas. Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

Soil rated moderate for erosion risk are also saturated during the grazing season but are rated moderate because they have standing water and have little potential for flood waters from a stream to affect them.

All remaining interpretations are moderate slight or slight which infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 17, 1 foot square plots were taken in the Twin Lakes allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded and shallow soil pits were opened in 7 of the plots to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-20%, 21-50%, 51-80% and 81-100%. Summary data for these ranges with comments as appropriate can be found in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

None of the plots meet the criteria for detrimental disturbance. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. One plot had natural, weak platy structure from alluvial deposition and was not considered detrimental compaction.

Root mats that qualified as turf were measured on 6 of the 7 plots with soil pits and were 2 to 8 cm thick. These are surface layers with so many roots that it is difficult to break apart and makes a ripping sound when torn apart.

Rooting depth extended to the depth examined and were present throughout the depth of the A horizon.

The Range Specialist Report documents that upland and riparian sites are considered to be meeting desired conditions for ground cover and functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds, though the species composition in upland sites and riparian areas in isolated stream reaches is below desired rangeland health objectives. (Greenwood 2013). There are approximately 72 acres of inventoried noxious weed infestations within the Twin Lakes allotment. Inventoried infestations are predominately medium-sized area infestations of Canada thistle, and other nonnative thistle species. There are also small, low density infestations of spotted knapweed along roads and trails. The location of these weed populations near, or within, these plant communities creates a moderate risk for invasion, or expansion, if they are not actively controlled (Greenwood 2013).

In summary, plot data demonstrate:

- No detrimental soil disturbance
- Ground cover adequate to prevent soil erosion
- A (surface) horizons occupied with roots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Twin Lakes allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences and Water developments
The Twin Lakes allotment has 8 miles of fence and no water developments. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.

Using the assumptions above, the detrimental soil disturbance along fence lines is 19.4 acres for a total of 2.7 percent of the 725 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 5.4%, since this is an overestimation of the effects as explained in the paragraph above. The existing detrimental disturbance of 2.7% is

well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Twin Lakes allotment is in compliance with the SQS.

Monument Allotment

Table 12 below displays the dominant landtypes and associated soil characteristics and vegetation for suitable range in the Monument Allotment. Landtype maps for this allotment can be found in Appendix A-4.

Table 10: Monument Allotment Soil Series Families – General Descriptive Attributes.

Dominate Landtype	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
27C	Bearmouth	Very deep	Excessivel y Well drained	Dark cobbly and very gravelly loam	14 inches	Extremely cobbly sand	Grass/ shrub
347X	Elve	Very deep	Somewhat excessivel y drained	Very cobbly loam	18 inches	Extremely cobbly loam	Forest
647G	Finn	Very deep	wet	Dark gravelly loam	12 inches	Very gravelly loam	Grass/ shrub
40B	Mooseflat	Very deep	Wet	Dark Loam	10 inches	Silt loam over loamy fine sand	Grass/ shrub
43Bbh	Redfish	Very deep	Wet	Dark gravelly sandy loam	7 inches	Very gravelly sandy loam	Grass /shrub
16A	Tepete	Very deep	Wet	Thick Dark Organic	30 inches	Silty clay loam	Grass /shrub
23B	Wisdom	Very deep	Wet (irrigation)	Dark silt loam	14 inches	Loam	Grass /shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction.

Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

A summary of the interpretations for the Monument Allotment can be found in Appendix B-5. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high.

Acres of high and high moderate erosion, and high compaction, and hummocking risk are all soils that are normally saturated during the entire grazing season and most are in flood plains, also referred to as riparian areas. Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

Soil rated moderate for erosion risk are also saturated during the grazing season but are rated moderate because they have standing water and have little potential for flood waters from a stream to affect them.

All remaining interpretations are moderate slight or slight which infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A 1 day reconnaissance of part of the Monument allotment was accomplished before snow prevented any plot work. No plot data have been taken since. The Landforms and soils mapped in this allotment are similar to those in the Dry Creek, Twin Lakes and Pioneer allotments where plots had been taken. The recon traverse reinforced the similarities identified by the Landtype mapping.

Extrapolating plot data from allotments with similar soil attributes is risky but the conclusions are very general and seem to be reasonable. The conclusions are that the vegetation in the Monument allotment appeared to be adequate to protect the soil from grazing disturbance given the information gleaned from plots in the 3 allotments listed above. Once again, more vigorous vegetative growth and root systems are desirable to protect the soils from long term degradation. The Bearmouth series family is the dominant upland soil and is not very productive which presents a challenge when more vegetative vigor is desired. However the soil has a cobbly loam and sandy loam surface with increasing rock content and sandier textures in subsurface layers. These characteristics and the overall low relief means that the soil is resistant to erosion and is usually not exposed to high energy erosive forces from running water. It is also resistant to compaction and hummocking.

The risk of soil effects on riparian and wetland soils and their ability to recover from disturbance are discussed above in the section on interpretations.

The conclusions drawn from the above discussion is that overall soil productive potential is intact and that increased vegetative vigor, where needed, will maintain soil productivity. The low inherent productivity of the dominant upland soil will make improved plant vigor difficult to achieve on these upland sites. Detrimental soil disturbance in dispersed grazing areas will affect very little area if any.

The Range Specialist Report documents that upland sites have ground cover of 79% and riparian sites have ground cover of 86% (Greenwood 2013). These values are below desirable levels, but are still generally considered adequate for preventing erosion (see *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion). While riparian areas are considered to be functioning in a manner that protects the soil resource from erosion and invasion by noxious weeds, upland areas have higher than desirable amounts of bare ground, probably due to naturally low soil productivity and past drought conditions (Greenwood 2013).

There are approximately 8 acres of inventoried noxious weed infestations within the Monument allotment. Inventoried infestations are predominately small, widely scattered populations of spotted knapweed. These existing populations are not currently creating a high risk for invasion to allotment rangelands. However, the high amounts of bare ground recorded on sagebrush-grassland sites is of concern; therefore, there is at least a moderate risk of these populations expanding, especially if they are not actively controlled (Greenwood 2013).

In summary, the discussion above supports:

- Very little if any areas of detrimental soil disturbance are expected in dispersed grazing areas
- Ground cover is below desired amounts, especially in the uplands, but generally adequate to prevent soil erosion

This and the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Monument allotment.

Soil Quality Standards

Fences and Water developments

The Monument allotment has 20 miles of fence and no water developments. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.

Using the assumptions above, the detrimental soil disturbance along fence lines is 48.5 acres for a total of 3.2 percent of the 1,521 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from

developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 3.2%, since this is an overestimation of the effects as explained in the paragraph above. The existing detrimental disturbance of 3.2% is well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Monument allotment is in compliance with the SQS.

Pioneer Allotment

Table 13 below displays the dominant landtypes and associated soil characteristics and vegetation for suitable range in the Pioneer Allotment. Landtype maps for this allotment can be found in Appendix A-4.

Table 11: **Pioneer Allotment Soil Series Families – General Descriptive Attributes**.

Dominate Landtype	Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
27C	Bearmouth	Very deep	Excessively Well drained	Dark cobbly and very gravelly loam	14 inches	Extremely cobbly sand	Grass/shrub
347X	Elve	Very deep	Somewhat excessively drained	Very cobbly loam	18 inches	Extremely cobbly loam	Forest
647G	Finn	Very deep	wet	Dark gravelly loam	12 inches	Very gravelly loam	Grass/shrub
217Vra	Jeru	Very deep	Well drained	Very stony loam	24 inches	Very cobbly sandy loam	Forest
40B	Mooseflat	Very deep	Wet	Dark Loam	10 inches	Silt loam over loamy fine sand	Grass/shrub

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction. Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

A summary of the interpretations for the Pioneer allotment can be found in Appendix B-5. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high.

Acres of high and high moderate erosion, and high compaction, and hummocking risk are all soils that are normally saturated during the entire grazing season and most are in flood plains, also referred to as riparian areas. Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high and high moderate because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

All remaining interpretations are moderate slight or slight. These ratings infer that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 17, 1 foot square plots were taken in the Pioneer allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded and shallow soil pits were opened in 8 of the plots to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-20%, 21-50%, 51-80% and 81-100%. A summary of the data for these ranges with comments as appropriate can be found in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

None of the plots meet the criteria for detrimental disturbance. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. One plot had platy structure with few roots oriented horizontally. However the plot was located on patterned ground which infers active frost heaving. Therefore, this was not considered detrimentally compacted.

Root mats that qualified as turf were measured on 6 of the 8 plots with soil pits and were 2.5 to 8 cm thick. These are surface layers with so many roots that it is difficult to break apart and makes a ripping sound when torn apart.

Rooting depth extended to the depth examined and were present throughout the depth of the A horizon on 6 of the 8 plots. Depth ranges for A horizons with a plus sign indicate that the A horizon continued below the depth examined.

The Range Specialist Report documents that upland and riparian sites are considered to be meeting desired conditions for vegetation and ground cover and functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds. (Greenwood 2013). There are approximately 4 acres of inventoried noxious weed infestations within the Pioneer allotment, consisting mostly of very small, widely scattered populations of spotted knapweed. These existing populations are not currently creating a high risk for invasion to allotment rangelands, but the risk is still considered moderate due to the aggressive nature of knapweed. Overall, the high amounts of ground cover recorded on upland and riparian sites is desirable for resisting invasion by weeds, or other nonnative plant species, but high ground cover would not prevent establishment by aggressive invaders such as spotted knapweed (Greenwood 2013).

In summary, plot data demonstrate:

- No detrimental soil disturbance
- Ground cover adequate to prevent soil erosion
- A (surface) horizons occupied with roots in 6 of 8 plots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Pioneer allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences and Water developments
The Pioneer allotment has 17 miles of fence and no water developments. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.

Using the assumptions above, the detrimental soil disturbance along fence lines is 41.2 acres for a total of 3.3 percent of the 1,259 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 3.3%, since this is an overestimation of the effects as explained in the paragraph above. The existing detrimental disturbance of 3.3% is well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Pioneer allotment is in compliance with the SQS.

Saginaw Allotment

Table 14 below displays the dominant landtypes and associated soil characteristics and vegetation for suitable range in the SaginawAllotment. Landtype maps for this allotment can be found in Appendix A-4.

Table 12**:** Saginaw Allotment Soil Series Families – General Descriptive Attributes

Dominate Landtypes	Soil Series Family	Depth	Drainage	Surface Texture	Surface Thickness	Subsurface Texture	Vegetation
27C	Bearmouth	Very deep	Excessively Well drained	Dark cobbly and very gravelly loam	14 inches	Extremely cobbly sand	Grass/ shrub
613E	Bridger	Very deep	Well drained	Dark loam	9 inches	Clay	Grass /shrub
527X	Elve	Very deep	Somewhat excessively drained	Very cobbly loam	18 inches	Extremely cobbly loam	Forest
647G	Finn	Very deep	wet	Dark gravelly loam	12 inches	Very gravelly loam	Grass /shrub
5C, 6D	Hairpin	Very deep	Well drained	Dark silt loam and cobbly silt loam	12 inches	Clay loam	Grass/ shrub
537E, 617E	Libeg	Very deep	Well drained	Dark stony loam	6 inches	Very gravelly & stony clay loam	Grass/ shrub
347E, 527E	Sebud	Very deep	Well drained	Dark loam	10 inches	Very stony clay loam	Grass/ shrub
347Sa	Waldbillig	Very deep	Well drained	Ashy silt loam	12 inches	Very gravelly fine sandy loam	Forest

Soil Interpretations

Erosion, compaction, and hummocking are detrimental disturbances defined by soil quality standards that are likely to be caused by cattle. Soil interpretations are estimates of the risk that soil effects will occur. Erosion risk evaluates the inherent soil characteristics that resist erosion and the potential erosive forces that are likely to occur on bare soil. Compaction risk is based on soil characteristics that resist compaction such as rock content, texture and low soil water. Moist, rock free, medium textured soil is susceptible to compaction. Hummocking, a cattle version of rutting, is largely a function of saturated soil. Soil saturated

during the entire grazing period is rated high risk – those that are saturated early but become dry during the grazing season are rated moderate.

A summary of the interpretations for the Saginaw allotment can be found in Appendix B-5. Three classes, slight, moderate and high, are used for compaction and hummocking. Five classes are used for erosion risk: slight, moderate-slight, moderate, high-moderate, and high. Acres of high moderate erosion, and high compaction, and hummocking risk are all soils that are normally saturated during the entire grazing season and they are mostly in flood plains, also referred to as riparian areas. Soil saturation explains the high risk for compaction and rutting. Although flood plains are flat, erosion risk is rated high because flood waters are effective erosive forces on bare soil. A point to remember, however, is that the interpretation is based on bare soil. Ground water presence makes these soils very productive and bare soil should be rare unless these sites are improperly managed. They are also resilient and recover rapidly after disturbance.

All remaining interpretations are moderate or lower. The moderate rating infers that normal precautions or mitigation will prevent detrimental soil effects. That in turn infers that range vegetation in good condition, above and below ground, will maintain soil productivity.

Plot Data

A total of 15, 1 foot square plots were taken in the Saginaw allotment. The plots are used to estimate detrimental soil effects for the dispersed grazing areas. In this allotment percentages of soil cover were recorded on 15 plots and shallow soil pits were opened in 10 of the plots to determine turf thickness, root amounts and orientation, A horizon depth, and presence of platy structure.

Soil cover of 50 to 70 percent protects soil from accelerated erosion. See *Analysis Methods and Assumptions* section below for a discussion about the relationship of cover to erosion. Given these general guidelines, the cover present is adequate to prevent accelerated erosion. Bare soil data from the plots cluster over 4 ranges of percentages: 0-20%, 21-50%, 51-80% and 81-100%. A summary of the data for these ranges with comments as appropriate can be found in Appendix B-5. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground compared to methods that include these parameters.

None of the plots meet the criteria for detrimental disturbance. Some plots with high percentages of bare ground have evidence of erosion but none exceeded the SQS of 1-2 tons/acre/year. The plots cover a small area (1 square foot); bare ground observed with these plots was not continuous but the plots do represent areas where vegetation is below desired conditions. No detrimental hummocking or compaction was observed on the plots. Platy structure was not observed in any of the plots.

Root mats that qualified as turf were measured on 5 of the 10 plots with soil pits and were 2.5 to 5 cm thick. These are surface layers with so many roots that it is difficult to break apart and makes a ripping sound when torn apart.

Rooting depth extended to the depth examined and were present throughout the depth of the A horizon. Depth ranges for A horizons with a plus sign indicate that the A horizon continued below the depth examined.

The Range Specialist Report documents that upland sites are considered to be meeting desired conditions for vegetation and ground cover and functioning in a manner that protects the soil resource from erosion and resists invasion by noxious weeds. Riparian sites are considered to bet meeting desired rangeland health conditions for species composition, however, on two sites monitoring reports identified a need for increased cover of willow and/or important sedge and grass species. In regards to ground cover, monitoring reports identified a need to reduce the amount of bare ground through reduced livestock trampling damage to stream banks. Currently, some riparian areas within the allotment are not meeting desired rangeland health conditions for ground cover (Greenwood 2013). There are approximately 17 acres of inventoried noxious weed infestations within the Pioneer allotment, consisting mostly small to medium sized populations of Canada thistle. There are also widely scattered populations of spotted knapweed, and other nonnative thistle species such as bull thistle. Due to the presence of spotted knapweed, there would automatically be a moderate invasion risk to allotment rangelands. (Greenwood 2013).

In summary, plot data demonstrate:

- No detrimental soil disturbance
- Ground cover adequate to prevent soil erosion
- A (surface) horizons occupied with roots

These data along with the findings of the Range Specialist Report support the conclusion that soil productivity is currently being maintained in the Saginaw allotment.

Soil Quality Standards

Plot Data
As stated above, no plots meet the criteria for detrimental soil disturbance.

Fences, Water Developments, and Rainbow Family Gathering Impacts
The Saginaw allotment has 24 miles of fence and 6 water developments. The soil within a 20 foot distance centered on the fence line, 10 feet on either side, is considered detrimentally disturbed, assuming that cattle trailing along the fences cause detrimental soil disturbance. This value is a liberal estimate because cattle do not trail the full length of all fence lines and, where they do trail, 10 feet of soil is not detrimentally compacted.
The soil within a 200 foot circle centered on the water development is considered detrimentally disturbed. The 200 foot diameter is exaggerated to account for heavily used trails that lead to the water development.

The Rainbow Family had its annual gathering in the Saginaw Allotment in the summers of 2000 and 2013. In 2000, the gathering was about 23,000 people while in 2013 it was much smaller at about 6,000 people. Prior to the 2013 gathering, the area had recovered from detrimental soil impacts from the 2000 gathering, partly because the Rainbow Family did

hand treatments of areas that were compacted before disassembling their camp. Decompaction treatments were also done in the summer of 2013; however, it is estimated that about 5 acres of detrimental soil compaction exist currently in areas that were heavily used for parking and gathering. These heavily impacted areas are expected to recover in 10-15 years based on observations of recovery after the 2000 gathering.

Using the assumptions above, the detrimental soil disturbance along fence lines is 58.2 acres, the detrimental disturbance associated with the water development is 4.3 acres, and the detrimental disturbance associated with the Rainbow Family gathering is about 5 acres, for a total of 3.4 percent of the 1,960 suitable acres in the allotment. As discussed earlier, there are other heavily used areas with detrimental disturbance: heavily used trails away from developments, riparian areas, and salt grounds are examples. These areas are very limited in extent and are assumed to be included in the 3.4%, since this is an overestimation of the effects as explained in the paragraph above. The existing detrimental disturbance of 3.4% is well within the SQS of no more than 15% of the areal extent of the activity in detrimental condition; therefore, the Saginaw allotment is in compliance with the SQS.

Analysis

Methodology

Spatial Scale

Two spatial scales are used in this analysis. The land within the aggregated allotment boundaries is the spatial scale to characterize geologic and landtype patterns and to provide a context for more detailed landtype descriptions of suitable range. See pgs. 431-469 above.

Suitable range within the allotment boundaries is the spatial scale to analyze soil effects from grazing. Direct, indirect, and cumulative soil effects from livestock grazing only occur on areas grazed by livestock. Northern Region Soil Quality Standards (SQS) address NFMA by requiring that a minimum of 85% of each activity area be in satisfactory condition (free of detrimental disturbance), to maintain soil productivity (USDA Forest Service, 1999). Suitable range acreage within the aggregated allotment boundaries is the activity area for the SQS and the area used to analyze direct, indirect, and cumulative effects from grazing. Detrimental disturbance, activity area and the SQS are further described in the "Methods" section below.

Primary range within the allotments receive most of the effects from grazing, but other management effects (e.g., trailing and grazing secondary and transitory range) elsewhere within the allotments are also considered in this soil quality analysis. Primary range is that part of the suitable livestock range that livestock naturally prefer, or will use first, as it is readily accessible and has available water within close (1/4 mile) proximity. Riparian areas are included within primary range because livestock use them extensively. Secondary range is often grazed after the primary range has been fully utilized. Secondary range may be further from water and on steeper slopes compared to primary range. Transitory range characterizes forage made available from timber harvest operations. These areas have less than 60% conifer cover and were harvested after 1994 (Greenwood 2013).

The 3 pastures on Forest Service land within the Seymour Allotment grazing system are included as part of the analysis area and are within the spatial scale for soil effects analysis. Direct, indirect and cumulative soil effects from grazing occur only when they affect the same physical location. No direct, indirect or cumulative soil effects from grazing on Forest Service land affect the 6 Montana Fish, Wildlife and Parks (MTFWP) pastures that are part of the Seymour Allotment grazing system. Therefore they are not included as part of the analysis area and are outside of the spatial scale for soil effects analysis.

Temporal Scale

The temporal scale for soil impacts is the life of the allotment management plan, approximately 10 years. This time frame was chosen because detrimental soil disturbance from erosion, compaction, and hummocking (rutting) in heavily used areas along fences and near water developments is not likely to recover in 10 years, even if grazing is eliminated. However, remarkable recovery has been observed within 9 years when grazing pressure is reduced in areas that do not have this concentrated use. These statements are based on field observations made inside and outside of grazing exclosures, and in areas where grazing pressure has been reduced.

Resource Indicators to be Analyzed and Units of Measure

Region 1 Soil Quality Standards (SQS) will be applied to activity areas, defined as suitable range on NFS lands, for each of the allotments and will be used to help describe the existing condition for them. They will also be used as part of the effects analysis for the proposed alternatives for each allotment. The Standards define thresholds for 6 types of detrimental disturbance but only those for erosion, compaction, and rutting apply to range analysis.

Hummocking is used as a synonym for rutting because both involve soil shearing from weight placed on soil when the bearing strength is greatly reduced because of high water content and other soil attributes. Ruts are continuous while hummocks tend to be discontinuous because they are produced by hoof action.

Plot data and traverses through each allotment are used to estimate soil effects from grazing livestock. Heavily used trails along fences and around water developments were observed to have compacted soil layers and bare soil subject to erosion. Hummocks were also observed on heavily used areas with saturated soil. In most cases, these disturbances meet the criteria for detrimental soil disturbance as defined in Region One Soil Quality Standards (USDA Forest Service 1999). They are not expected to recover during the 10 year time frame of this analysis. All but bare ground, address the Soil Quality Standards (SQS).

Soil plots and traverses elsewhere in the allotments demonstrate that soils not subject to such heavy use are in good condition even though soil cover may be less than desirable or inadequate. Data collected on these plots demonstrate that the surface soil layer is darkened by accumulations of organic matter typical of A horizons and in most cases meet the criteria for Mollic epipedons. The data also demonstrate a positive correlation between the amount of basal vegetation and litter on the surface with root depth and density in the soil. Root depth and density are important because roots provide most of the organic matter that maintains the quality and productivity of this layer. Therefore, ground cover percentages in relation to expected potential are taken from the Range Specialist Report (Greenwood 2013). The expected responses of ground cover to each alternative presented in the Range Specialist Report is used to infer potential changes to soil quality and productivity over time based on these concepts.

The SQS and the relationship between root depth and root density, basal vegetation and litter, and soil organic matter are discussed in more detail in the following section.

Table 15 below lists the soil resource indicators that are affected by grazing and will be used in the analysis to display effects of the four alternatives.

Table 13: Soil resource indicators affected by grazing

Indicator	Unit of Measure	Data Collected
Detrimental soil erosion	Soil loss more than 1 ton per acre per year.	Estimated based on soil cover, pedestals and erosion pavement observed on plots and along traverses.

Table 13: Soil resource indicators affected by grazing

Indicator	Unit of Measure	Data Collected
Detrimental soil compaction	Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Root distribution limited by platy structure on soil plots.
Detrimental soil hummocks	Hummocks 2 inches high.	Observations on soil plots and along traverses.
Soil Quality Standard Areal Extent	85 percent of an activity area must have soil free of detrimental disturbance.	Estimated based on miles of fence, number of water developments, and aggregated detrimental disturbance from plot and traverse data for each allotment.[1]
Ground Cover	Percentage of bare ground in relation to expected potential.	Taken from the Range Specialist Report (Greenwood 2013)

[1]Detrimental soil disturbance for heavily impacted areas associated with fences and water developments was determined by assuming a width of 10 feet of detrimental disturbance on each side of a fence and circular detrimental disturbance 200 feet in diameter centered on each water development. See explanation in the *Analysis Methods and Assumptions* section below.

Analysis Methods and Assumptions

Physical Site Characteristics

Geology, landforms and soils provide the physical setting for this analysis. Actually soils have both physical and biological attributes and are a bridge between the physical and biological site attributes.

A soil survey of the project area was completed in 2007 as part of the Beaverhead National Forests soil survey. This survey incorporated concepts of Landtypes, as defined in the National Hierarchical Framework of Ecological Units (Cleland et al 1997). They identify landform and topography (elevation, aspect, slope gradient, and position); phases of soil subgroups, families, or series; rock type, geomorphic process; and potential natural plant associations as the principle map unit design criteria for Landtype mapping. These attributes were used to design and describe map units for the Forest survey.

The Terrestrial Ecological Unit Inventory Technical Guide (Winthers et al 2005) defines Landtypes much the same as Cleland but provides a more detailed discussion of the rationale for integrating the listed components and methods for designing Landtype map units and mapping them. This process was used to survey the Beaverhead National Forest so it is appropriate to refer to the survey as a Landtype survey for this document.

Range analysis is evolving toward more ecosystem based procedures that demand an ecosystem database. Interpreting Indicators of Rangeland Health (Pellant et al 2005) requires the use of a classification system for land that divides landscapes based on the potential of the land as determined by soils, climate, and topography. The Landtype survey that covers the North and West Big Hole Range Allotments does this.

Suitable Range and the Landtype Survey

Suitable Range areas for these allotments have been mapped and the procedure is described as part of the range analysis in this document (Greenwood 2013). They are the activity areas for evaluating the SQS and are used to describe the soil affected environment and environmental effects. Landtype attributes for suitable range areas are needed for this analysis. Geographic Information System (GIS) mapping was used to intersect, or overlay, the Landtype map on the suitable range map. The results revealed the apparent differences in the detail of the two maps.

Scale and map unit, or polygon, size can be used to infer mapping intensity or accuracy. The Landtype survey was designed at the Landtype level which implies a map scale between 1:63,360 and 1:24,000 with map unit polygons that range from 100's to 1000's of acres (Cleland et al 1997).

This level is suitable for describing the analysis area and for evaluating the larger grazing areas within it. However, suitable range has been mapped at a more detailed level using a modeling process. The result is that small areas of suitable range are either not mapped, or inadequately mapped at the Landtype level. Consequently, the Landtype map units subdivide many of the suitable range polygons with varying levels of accuracy. Another consequence is that small suitable range polygons cookie cutter, or subdivides Landtype polygons which do not accurately portray the Landtype data for the suitable polygon. One example, small 1 to 10 acre wet meadows mapped as suitable range units within larger Landtype units on glacial moraine are considered map unit inclusions at the Landtype level and described as minor components if at all.

The suitable range map for this project has a total of 12,525 acres in 2195 polygons ranging in size from less than 1 acre to 362 acres. When the Landtype map and geology map are intersected with the suitable range map in a GIS, the result is 12,525 acres in 3849 polygons or map units, ranging from less than 1 acre to 319 acres. (The geology maps were added to aid in the evaluation process described below.) Evaluating the accuracy of this number of map units is a formidable task at best. Therefore, suitable range polygons larger than 10 acres on the intersected map were treated as samples and were evaluated for accuracy and the results extrapolated to those not sampled. This seemed reasonable since many of the Landtype map units and their attributes are repeated in the smaller polygons. A total of 10,155 acres in 1070 polygons within 251 suitable range polygons were sampled. As a result, 81 percent of the suitable range area was reviewed during this sampling process.

The evaluation consisted of reviewing each sampled suitable range polygon on a GIS layer overlaying the Landtype layer, geology layer and NAIP color aerial photography. The geology and landtype delineations within the suitable polygon were compared to the photo base to determine if the geology, landform and landtype were correct for most of the area within the delineation. The reviewer was a soil scientist with 43 years of experience interpreting and mapping Landtypes on aerial photos on the Beaverhead-Deerlodge National Forest. No polygon boundaries were edited. The map unit label for geology and Landtype was corrected as necessary. A multiplier representing the ratio of the total acreage to the sampled acreage was used to expand the sampled area so it matched the suitable range area.

The results were summarized and soil productivity and the risk of erosion, compaction, and hummocking from grazing were developed for each of the 85 unique landtype map units.

Soil Interpretation Attributes

The regulatory framework documented at the beginning of this section is focused on maintaining or improving soil productivity. Some soils are at higher risk of effects from disturbance than others. Therefore, risk of soil erosion, compaction and hummocking interpretations were developed for each of the Landtypes identified for suitable range. Interpretations are used to help describe the existing condition of each allotment.

Table 14: Soil interpretations and associated measurements

Interpretation	Measurement
Erosion risk	Five qualitative classes based on Landtype attributes that resist erosion and erosive forces likely to occur.
Compaction risk	Three qualitative classes based on presence of soil water and soil texture and structure.
Hummocking risk	Three qualitative classes based on presence of soil water and soil texture and structure.

Erosion, compaction, and hummocking (rutting) risk ratings have been developed for the Landtype survey (Ruppert and Fletcher 2010). Some Beaverhead County soil survey map units were extended into the Forest survey during the process of matching the two surveys to provide a seamless map. Interpretations for these units were developed following the same procedure used for the Forest survey. Compaction ratings for soils with heavy textured subsurface horizons were reduced from moderate to low for grazing analysis because compacted layers in rangelands are usually less than 6 inches below the soil surface (Pellant et al, 2005). Most heavy textured subsurface layers are deeper than 6 inches. Erosion ratings were based on bare soil exposed by disturbance so there was no need to edit them. Rutting and hummocking from hoof action are considered synonymous so the rutting ratings were not edited either.

Soil Plots

Surface indicators selected for evaluation on plots are estimates of basal vegetation, litter, rock, mosses and other biological crusts, and bare soil as a percentage of 1 foot square plots. Basal vegetation is the cover provided by plant bases. It was selected instead of canopy cover because it could be consistently measured before, during, and after grazing. Bare soil was the area remaining after accounting for basal vegetation, litter, rock, and mosses and biological crusts. The indicator list above includes 5 of the 17 indicators of rangeland health, and 1 optional indicator, biological crusts, as described by Pellant et al (2005). They state that the amount and distribution of bare ground is one of the most important contributors to site stability relative to the site potential; therefore it is a direct indication of site susceptibility to accelerated wind or water erosion. The Draft Interagency Ecological Site Handbook for Rangelands requires measurement of soil surface cover for Ecological Site Descriptions. It

states "Soil Surface Cover is the percentage of the soil surface actually occupied by bare soil, basal vegetation, litter, gravel, rock, or soil biological crust, including mosses and lichens" Caudle, Dan et al, (2010, p47). Packer (1963) found that 70% cover is necessary to stabilize the soil and prevent accelerated erosion. Similarly, previous work in burned forest soils by Noble (1965) and Orr (1970), as cited in Robichaud et al (2000) found that 30% cover reduces erosion by half compared to bare soil, and 60% cover reduced sediment movement to negligible amounts. Dadkhah and Gifford (1980) found that adequate watershed protection was provided by maintaining at least 50% cover. Estimates of bare ground do not account for canopy cover or standing dead vegetation and therefore overestimate the amount of bare ground as discussed in Pellant et al (2005). Data from range plots are used to supplement soil plot data.

More casual observations of the indicators described above were made along traverses.

The A horizon is a mineral surface soil layer darkened by organic matter. The mollic epipedon is the term used in soil classification for an A horizon that meets the thickness and color requirements of Soil Taxonomy. Organic matter provides recycled nutrients and increases nutrient and water storage within the A horizon. Most of the organic matter comes from decaying roots so the A horizon provides a record of the long term rooting depth in the soil. Thickness of a mollic epipedon is largely determined by depth and amount of root growth by Grasses (Hole and Nielsen 1968) as reported in Cannon and Nielsen 1984. The mollic epipedon therefore may be viewed as a "fossil record" of past root growth and predictor of future production (Cannon and Nielsen, 1984). Munn et al (1978) quantified this relationship by regressing thickness of mollic epipedons against 2 years production data from 27 sites in western Montana. They suggested that thickness of molilic epiedons is a pedologic record of average long-term production as reported in Cannon and Nielsen (1984). Johnson et al (1994) stated that "most of the organic material in the upper horizons of Mollisols is due to *in situ* decomposition of roots. In grasslands, Mollisols short-lived grass roots turnover annually contributing to the store of organic matter."

Vigorous range vegetation is more likely to have roots that fully occupy the A horizon, exploit the nutrients and water stored there, and provide root material for decomposition to maintain the A horizon. Surface measurements listed above are indicators of range vegetation vigor and infer subsurface conditions including root status within the A horizon.
Shallow soil pits were opened on selected plots to measure A horizon thickness, turf thickness, presence of root limiting platy or massive structure, and orientation, distribution and amount of very fine and fine roots. Turf is a surface mineral soil layer with so many roots that it makes a ripping sound when pulled apart. Pellant et al (2005) state that compacted layers are detected by digging a small hole (generally less than 1 foot deep) and describing the soil structure and root morphology.

Orientation of very fine and fine roots is defined as vertical, horizontal or both. Horizontal root orientation, especially on platy structural units, may be an indication of root limiting soil compaction (Herrick et al 2009). Vertical or vertical and horizontal orientations are indicators that root limiting compacted layers are absent.

The amount and distribution of very fine and fine roots are described using standard NRCS criteria. Soil is classified as having many roots when there are 5 or more very fine and fine roots per square centimeter. Common is the classification when there are 1-5 very fine and fine roots per square centimeter. Few is the classification when there is less than 1 root per square centimeter. The depth at which the classification for very fine and fine roots changes from many to common to few is recorded.

Soil Quality Standards

Region 1 Soil Quality Standards (SQS) are used to help describe soil existing condition and to evaluate grazing effects on soils on NFS lands for the North and West Big Hole Allotments Management Plan EIS.

SQS apply to lands where vegetation and water resource management are the principal objectives, that is, timber sales, grazing pastures or allotments, wildlife habitat, and riparian areas (USDA Forest Service 1999). For range analysis, SQS are applied to activity areas defined as "grazing areas within pastures or allotments". Suitable range, as defined in the Range Specialist Report meets the definition of "grazing areas". Therefore, the aggregated areas identified as suitable range within each allotment are defined as activity areas and SQS are applied to them. Pastures and allotments typically include large areas not affected by grazing because there is no forage, they are too far from water or for other reasons. SQS are not evaluated for grazing in these areas.

At least 85 percent of an activity area must have soil that is in satisfactory condition in order to meet SQS (USDA Forest Service 1999). This means that no more than 15 percent of the activity area can have detrimental soil disturbance as defined in the Resource Indicators section below.

Soil areas that exceed thresholds for detrimental soil disturbance are not in good condition. SQS define detrimental soil disturbance criteria for compaction, rutting, displacement, severely burned soil, surface erosion and soil mass movement (USDA Forest Service 1999). Hummocks caused by grazing cattle affect soils much the same way that rutting does and are used here as a synonym for rutting. Detrimental soil disturbance likely to be caused by grazing cattle consists of compaction, hummocks, and surface erosion. Definitions for detrimental disturbance are:

- A 15 percent increase in bulk density is detrimental compaction. Root limiting soil physical conditions are used as a surrogate for a 15 percent increase in bulk density. Our plot data address this indicator.
- Hummocks 2 inches high are detrimental. Plot data and other field observations address this indicator.
- Soil loss of 1 to 2 tons per acre is considered detrimental erosion (USDA Forest Service 1999). Plot data measuring soil cover and other field observations address this indicator.

Experience and monitoring have demonstrated that water developments, and fences concentrate cattle use which results in detrimental compaction and bare soil susceptible to

erosion. Detrimental hummocks are found where cattle concentrate on wet soils near these developments. These areas are assumed to have detrimental soil disturbance from compaction and sometimes detrimental hummocks and erosion.

- A distance of 20 feet, 10 feet from fences on both sides, is considered the width affected by trails from cattle concentration along fences. So 20 feet is multiplied times the fence length to calculate detrimental disturbance from fence trails.
- Water developments usually have a circular disturbance around them so a circular area with a diameter of 200 feet is used for each of these features. The diameter is exaggerated to account for heavily used trails that lead to the water development.
- The areas are totaled for each allotment to estimate detrimental soil disturbance from these uses.
- These assumptions are an overestimation of effects. In most areas, soil is not detrimentally disturbed to the extent of 10 feet on either side of a fence, nor does a water development have a 200 foot circle of detrimental disturbance associated with it. These overestimations were done to account for other detrimental disturbance associated with cattle trailing that is not possible to measure. Plot data and traverses across the allotments indicate these areas are of very small extent.

The remaining areas of suitable range generally receive more dispersed cattle use and soils are not detrimentally impacted. Exceptions to this are some riparian areas, heavily used trails away from developments discussed above, and bedding grounds. Observations at plot locations and along traverses away from the developments discussed above were used to evaluate SQS in the dispersed area.

Ground Cover

Ground cover, as it relates to expected potential ground cover, is used as an indicator because it is one of the most important contributors to site stability relative to site potential (Pellant et al 2005) and measureable changes are expected within the life of the decision (10 years). While cover can vary seasonally due to a number of factors including vegetation use and climate, it is readily measured and also contributes to productivity by adding to soil organic matter, as the original source of soil organic matter is plant tissue. Soil organic matter is the seat of soil productivity. It provides nutrients to plants, provides a vital role in soil structure (and thus stability), and enhances soil water holding capacity.

While ground cover (using basal vegetation, litter, rock etc.) was included in soil plot data collected to describe current conditions, we rely on the Range Specialist's Report for predictions of how ground cover would change in the future as a result of implementing each particular alternative.

Past, Present, and Future activities used in the Analysis

Past and ongoing activities within the NWBH project area have directly and indirectly affected soil quality. Land management activities such as timber harvest, prescribed fire, fire suppression, recreation, mining, noxious weed control, and livestock grazing have had effects on soil productivity. These practices will likely continue to impact soil quality in the future.

Seymour

Seymour No Action (No Grazing) Alternative

Direct/Indirect Effects

Livestock removal from the Seymour Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks

Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent

Detrimental disturbance is expected to begin to recover from the existing 2.4% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover

Sampled upland and riparian sites within the allotment currently have high ground cover. However, it is expected that removal of livestock may result in increased ground cover on both upland and riparian sites with improved composition of desirable grass and sedge species (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects

Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Seymour allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Seymour Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue, or improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.4 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Although sampled rangeland sites currently have high ground cover, an improving trend in species composition on upland sites would suggest that current grazing management could lead to increased ground cover on some sites. On riparian sites, it is expected that ground cover would remain mostly static over the long term due to expected trampling impacts during early and late grazing treatments, or two out of every three years each pasture is grazed (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and an improving trend in ground cover would reduce the risk of weed establishment. (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Seymour Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
The proposed action alternative will result in a slight improvement in soil productivity and quality compared to the current grazing alternative assuming that allowable use levels are achieved.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue, or improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.4 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Although sampled rangeland sites currently have high ground cover, an improving trend in species composition on upland sites would suggest that current grazing management could lead to increased ground cover on some sites. On riparian sites, it is expected that ground cover would remain mostly static over the long term due to expected trampling impacts during early and late grazing treatments, or two out of every three years each pasture is grazed (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and an improving trend in ground cover would reduce the risk of weed establishment. (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Seymour Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.
- All allotments would have Range Implementation Monitoring annually.

Direct/Indirect Effects
The proposed action alternative will result in a slight improvement in soil productivity and quality compared to the current grazing alternative assuming that allowable use levels are achieved.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue, or improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.4 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Although sampled rangeland sites currently have high ground cover, an improving trend in species composition on upland sites would suggest that current grazing management could lead to increased ground cover on some sites. On riparian sites, it is expected that ground cover would remain mostly static over the long term due to expected trampling impacts during early and late grazing treatments, or two out of every three years each pasture is grazed (Greenwood 2013).

Proposed actions under this alternative would result in less livestock use within the Tenmile Pasture and may result in improved species composition and ground cover, where needed, on riparian sites within this pasture (Greenwood 2013). Improved species composition and ground cover in these areas would translate over time to improved soil productivity in these areas.

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and an improving trend in ground cover would reduce the risk of weed establishment. (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Fishtrap Allotment

Fishtrap No Action (No Grazing) Alternative

Direct/Indirect Effects
Livestock removal from the Fishtrap Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 2.8% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
It is expected that removal of livestock may result in increased ground cover on both upland and riparian sites with improved composition of desirable grass on upland sites (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Fishtrap allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Fishtrap Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue, or improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.8 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland and riparian sites is expected to remain static for the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative

Fishtrap Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality. See discussion below under *Indirect Effects*.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
The proposed action alternative could result in a slight improvement in soil productivity and quality compared to the current grazing alternative from the application of proposed allowable use levels.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue, or improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.8 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland and riparian sites is expected to remain static for the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Fishtrap Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.
- All allotments would have Range Implementation Monitoring annually.
- During construction of new water developments, minimize ground disturbance to that area needed to accomplish the work.

Direct/Indirect Effects
Alternative 4 has more potential to reduce bare soil and improve soil productivity and quality compared to the current grazing and proposed action alternatives because the allotment is rested 1 out of 3 years.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue but gradual recovery should begin with rest every third year. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.8 percent but would begin to recover because of rest every third year.

Ground Cover
Ground cover on upland and riparian sites is expected to improve more than the other 2 action alternatives (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Mudd Creek Allotment

Mudd Creek No Action (No Grazing) Alternative

Direct/Indirect Effects
Livestock removal from the Mudd Creek Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 4.1% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
Removal of livestock is expected to result in increased ground cover on both upland and riparian sites as plant species composition improves (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Mudd Creek allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Mudd Creek Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 4.1 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland and riparian sites is expected to remain static for the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.
Monitoring
No soil monitoring is planned for this alternative.

Mudd Creek Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)

- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.
- During construction of new water developments, minimize ground disturbance to that area needed to accomplish the work.
- All new water developments would be spring developments with head boxes, <300 feet of piping for gravity feed to a water tank with posts and rails around the tank for protection and stabilization, and <0.1 mile of fencing around the spring to exclude livestock from the spring source. The design will also include escape ramps and a mechanism, such as a float or shut-off valve to control flow of water in tanks and troughs to reduce potential impacts to sage-grouse and other birds (USDA FS 2012).

Direct/Indirect Effects
The proposed action alternative could result in a slight improvement in soil productivity and quality compared to the current grazing alternative from the application of proposed allowable use levels.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue, or improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 4.1 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland and riparian sites is expected to remain static for the long term but some potential for improvement resulting from proposed allowable use levels (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Mudd Creek Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.
- All allotments would have Range Implementation Monitoring annually.
- During construction of new water developments, minimize ground disturbance to that area needed to accomplish the work.
- All new water developments would be spring developments with head boxes, <300 feet of piping for gravity feed to a water tank with posts and rails around the tank for protection and stabilization, and <0.1 mile of fencing around the spring to exclude livestock from the spring source. The design will also include escape ramps and a mechanism, such as a float or shut-off valve to control flow of water in tanks and troughs to reduce potential impacts to sage-grouse and other birds (USDA FS 2012).

Direct/Indirect Effects
Alternative 4 has some potential to reduce bare soil and improve soil productivity because the allotment is rested 1 out of 3 years.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils,

caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue but gradual recovery may begin with rest every third year. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 4.1 percent but would begin to recover because of rest from grazing every third year.

Ground Cover
Ground cover on upland and riparian sites could improve because the allotment is rested from grazing 1 out of 3 years (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.
Monitoring
No soil monitoring is planned for this alternative.

Pintlar Creek Allotment

Pintlar Creek No Action (No Grazing) Alternative

Direct/Indirect Effects
Livestock removal from the Pintlar Creek Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease,

and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 2.8% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
Upland sites currently are at desired condition but removal of livestock is expected to result in increased ground cover on both upland and riparian sites as plant species composition improves (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Pintlar allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Pintlar Creek Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of

soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.8 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover is expected to remain at desirable levels on upland sites. Little improvement in ground cover is expected on riparian sites (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.
Monitoring
No soil monitoring is planned for this alternative

Pintlar Creek Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing.

Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
The proposed action alternative could result in a slight improvement in soil productivity and quality compared to the current grazing alternative from the application of proposed allowable use levels and deferred livestock entry every other year.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue, or improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.8 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland and riparian sites is expected to remain static for the long term but some potential for improvement resulting from proposed allowable use levels (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Pintlar Creek Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.
- All allotments would have Range Implementation Monitoring annually.

Direct/Indirect Effects
Alternative 4 has some potential to reduce bare soil and improve soil productivity because livestock entry is deferred every other year and Pintler Meadows is closed to livestock grazing for a minimum of 10 years.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue but gradual recovery may begin with deferred livestock entry every other year. Pintler Meadows will be closed to livestock grazing for 10 years and will recover more rapidly. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will improve slightly, over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.8 percent but would begin to recover because of rest from grazing every third year.

Ground Cover
Rapid improvement in ground cover expected in Pintler Meadows because of closure to grazing. Some improvement elsewhere but bare ground will likely remain static over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Mussigbrod Allotment

Mussigbrod No Action (No Grazing) Alternative

Direct/Indirect Effects
Livestock removal from the Mussigbrod Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 3.3% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments

likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
Upland and riparian sites currently are slightly below or at desired condition, respectively. Removal of livestock is expected to result in increased ground cover on both upland and riparian sites as plant species composition improves. Improved cover is needed on the east tributary of Bender Creek which partially burned in 2000 (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Mussigbrod allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Mussigbrod Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.3 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover is expected to remain static on upland and riparian sites for the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Mussigbrod Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.
- During construction of new water developments, minimize ground disturbance to that area needed to accomplish the work.
- All new water developments would be spring developments with head boxes, <300 feet of piping for gravity feed to a water tank with posts and rails around the tank for protection and stabilization, and <0.1 mile of fencing around the spring to exclude livestock from the spring source. The design will also include escape ramps and a mechanism, such as a float or shut-off valve to control flow of water in tanks and troughs to reduce potential impacts to sage-grouse and other birds (USDA FS 2012).

Direct/Indirect Effects
The proposed action alternative is expected to lead to a more rapid improvement in soil productivity and quality compared to the current grazing alternative because of:

Application of allowable use levels.
Reduction in the season of use.
Allotment rest from grazing 1 year out of 3.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. However, soil recovery would begin because allowable use levels are applied, season of use is reduced, and the allotment is rested 1 year in 3. Thus, rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation are likely to improve over time.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.3 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland and riparian sites is expected to improve more rapidly than current grazing management for the reasons stated above and because 2 temporary exclosures are converted into 2 permanent exclosures (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative

Mussigbrod Alternative 4

Mitigation/Design

The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.
- All allotments would have Range Implementation Monitoring annually.
- During construction of new water developments, minimize ground disturbance to that area needed to accomplish the work.
- All new water developments would be spring developments with head boxes, <300 feet of piping for gravity feed to a water tank with posts and rails around the tank for protection and stabilization, and <0.1 mile of fencing around the spring to exclude livestock from the spring source. The design will also include escape ramps and a mechanism, such as a float or shut-off valve to control flow of water in tanks and troughs to reduce potential impacts to sage-grouse and other birds (USDA FS 2012).

Direct/Indirect Effects

Alternative 4 is expected to lead to a more rapid improvement in soil productivity and quality compared to the proposed action alternative because:

- Application of allowable use levels.
- Reduction in the season of use.
- Mussigbrod pasture rested from grazing 1 year out of 3.
- Bender pasture rested a minimum of 10 years.

Detrimental Soil Erosion, Compaction and Hummocks

Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue but gradual recovery will begin with 10 years of rest for the Bender pasture. More gradual recovery of the Mussigbrod pasture is expected because it us deferred for 2 years and is rested every third year.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.3 percent but would begin to recover because of rest from grazing described above and below.

Ground Cover
A faster rate of vegetative recovery than the proposed action is expected from the proposed actions in this alternative (Greenwood 2013). Proposed rest of the Bender pasture for a minimum of 10 years combined with a single pasture modified rest rotation strategy would substantially reduce the intensity and duration of livestock grazing use on the allotment. These actions would allow for increased forage plant development and reproduction in the Bender pasture, and sustainable forage use in the Mussigbrod pasture. As a result, substantial improvement in species composition, shrub cover (primarily willows), and ground cover is expected on disturbed rangeland sites within the Bender pasture. These improvements would also help prevent establishment and spread of invasive plants. Some improvement in these same rangeland health indicators can be expected in the Mussigbrod pasture as well. These improvements in ground cover would lessen erosion risk in areas currently low in cover, and would also provide additional organic matter to the soils, which would improve soil quality.

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Ruby Creek Allotment

No Action (No Grazing) Alternative

Livestock removal from the Ruby Creek Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased

organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 1.9% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
Removal of livestock is expected to result in increased ground cover on both upland and riparian sites as plant species composition improves (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Ruby Creek allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Ruby Creek Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of

soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 1.9 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland and riparian sites is expected to remain static for the long term (Greenwood 2013).
No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative

Ruby Creek Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing.

Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
The proposed action alternative is not expected to improve much over the current grazing alternative.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects may recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 1.9 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland and riparian sites is expected to remain static for the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Ruby Creek Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps will be maintained, etc.).
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.
- All allotments would have Range Implementation Monitoring annually.

Direct/Indirect Effects
Alternative 4 has some potential to reduce bare soil and improve soil productivity because Butler pasture is rested 1 out of 3 years.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing will continue because livestock concentrate in the same areas.

Areas with more dispersed grazing and without detrimental soil effects could improve slowly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 1.9 percent.

Ground Cover
Some increased ground cover is expected (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Dry Creek Allotment

Dry Creek No Action (No Grazing) Alternative

Livestock removal from the Dry Creek Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 5.4% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
Removal of livestock is expected to result in increased ground cover over the long term. (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Ruby Creek allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Dry Creek Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 5.4 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland and riparian sites is expected to remain static for the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Dry Creek Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
The proposed action alternative will result in a slight improvement in soil productivity and quality over the current grazing alternative because proposed allowable use levels are applied and a rest year is incorporated into the grazing system.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue or improve slightly over time.

Areas with more dispersed grazing and without detrimental soil effects may recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 5.4 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland sites is expected to remain static. Ground cover is expected to increase on riparian sites over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Dry Creek Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
All effects are the same as the Proposed Action alternative.

Alternative 4 will result in a slight improvement in soil productivity and quality over the current grazing alternative because proposed allowable use levels are applied and a rest year is incorporated into the grazing system.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue or improve slightly over time.

Areas with more dispersed grazing and without detrimental soil effects may recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 5.4 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover on upland sites is expected to remain static. Ground cover is expected to increase on riparian sites over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Twin Lakes Allotment

Twin Lakes No Action (No Grazing) Alternative

Livestock removal from the Dry Creek Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 5.4% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
Upland and riparian sites currently meet desired conditions for ground cover. Removal of livestock is expected to result in increased ground cover where needed (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Ruby Creek allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Twin Lakes Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.7 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Existing desirable ground cover on upland and riparian sites is likely to continue with little change over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Twin Lakes Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed

to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)

- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
The proposed action alternative will improve soil productivity and quality over the current grazing alternative because proposed allowable use levels are applied and rest periods are incorporated into the grazing system.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue or improve slightly over time.

Areas with more dispersed grazing and without detrimental soil effects will improve more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.7 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Existing desirable ground cover on upland and riparian sites is likely to continue with increased ground cover where needed over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Twin Lakes Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
All effects for alternative 4 are the same as those for the Proposed alternative.

Alternative 4 will improve soil productivity and quality over the current grazing alternative because proposed allowable use levels are applied and rest periods are incorporated into the grazing system.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue or improve slightly over time.

Areas with more dispersed grazing and without detrimental soil effects will improve more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 2.7 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Existing desirable ground cover on upland and riparian sites is likely to continue with increased ground cover where needed over the long term (Greenwood 2013).
No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Monument Allotment

Monument No Action (No Grazing) Alternative

Livestock removal from the Monument Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 3.2% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
Upland sites do not currently meet desired conditions for ground cover and may be the result of drought or low site productivity. Removal of livestock is expected to result in increased ground cover on sites where needed (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Ruby Creek allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Monument Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.2 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Existing ground cover is less than desirable on upland and riparian sites and is likely to continue with little change over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Monument Proposed Action Alternative

Mitigation/Design Features
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
All effects for the Proposed Action alternative will be similar to those for the Current Grazing Alternative.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.
Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.2 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Existing ground cover is less than desirable on upland and riparian sites and is likely to continue with little change over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).
Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Monument Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)

- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
Alternative 4 will improve soil productivity and quality over the current grazing alternative because proposed allowable use levels are applied and the entire allotment is rested for 1 year every 4 years.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue or improve slightly over time.

Areas with more dispersed grazing and without detrimental soil effects will improve more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.2 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover may increase under this alternative due to application of allowable use levels and incorporation of rest into the grazing system (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Some past timber harvest areas are still considered suitable range. Soil cumulative effects are considered unlikely because most soil effects from timber harvest have recovered and these areas are transitioning from suitable range to forest communities.

Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Pioneer Allotment

Pioneer No Action (No Grazing) Alternative

Livestock removal from the Pioneer Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 3.3% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
Overall upland and riparian sites meet desirable condition for ground cover. Livestock removal should result in increased ground cover on sites below desired condition (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Ruby Creek allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Pioneer Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in the slowest improvement in soil productivity and quality compared to the other alternatives.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.
Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.3 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Overall upland and riparian sites meet desirable condition for ground cover and are expected to remain static over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Pioneer Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
All effects for the Proposed Action alternative will be similar to those for the Current Grazing Alternative.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.3 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Overall upland and riparian sites meet desirable condition for ground cover and is expected to remain static over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Pioneer Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
Alternative 4 will improve soil productivity and quality over the current grazing alternative and Proposed Action alternative because proposed allowable use levels are applied and the entire allotment is rested for 1 year every 4 years.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue or improve slightly over time.

Areas with more dispersed grazing and without detrimental soil effects will improve more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.3 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Ground cover may increase under this alternative due to application of allowable use levels and incorporation of rest into the grazing system (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

Monitoring
No soil monitoring is planned for this alternative.

Saginaw Allotment

Saginaw No Action (No Grazing) Alternative

Livestock removal from the Saginaw Allotment would result in the most rapid improvement in soil productivity and quality compared to the other alternatives.
Detrimental Soil Erosion, Compaction and hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would start to recover. In the uplands, this would be a slow process beginning with increased organic matter input. Eventually, soil cover would increase, erosion rates would decrease, and soil productivity would improve in the limited areas that currently have bare soils. Soil structure would improve and a greater proportion of precipitation would enter the soil and be stored in the soil. However, these changes depend on improving structure and pore space distribution, which is biologically mediated and would occur only after soil organic matter increases and trampling effects are ameliorated. Wet soils would improve more rapidly. Soil functions probably could return to near reference conditions within 20-50 years, though actual change would rely on climate and soil characteristics, and would likely be variable.

Areas with more dispersed grazing and without detrimental soil effects will recover more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

S*oil Quality Standard* – Areal Extent
Detrimental disturbance is expected to begin to recover from the existing 3.4% in the 10-year timeframe. However, heavily impacted sites along fence lines and around water developments likely would remain detrimentally disturbed through the 10-year timeframe considered for this analysis.

Ground Cover
Overall upland sites meet desired condition for ground cover and riparian sites were below desired condition. Livestock removal likely will result in increased ground cover on upland and riparian sites (Greenwood 2013).

The risk of soil productivity effects from weeds is low because the Forest Service will continue to monitor and control weed populations under this alternative (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Livestock removal from the Ruby Creek allotment would eliminate any cumulative effects from combinations of grazing and other activities.

Monitoring
No soil monitoring is planned for this alternative.

Saginaw Current Grazing Alternative

Direct/Indirect Effects
The current grazing management alternative will result in little improvement in soil productivity and quality.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.4 percent because cattle would continue to concentrate in the same locations.

Ground Cover
Overall upland and riparian sites meet desirable condition for ground cover and are expected to remain static over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

The Rainbow Family had its annual gathering in the Saginaw Allotment in the summers of 2000 and 2013. In 2000, the gathering was about 23,000 people while in 2013 it was much smaller at about 6,000 people. Prior to the 2013 gathering, the area had recovered from detrimental soil impacts from the 2000 gathering, partly because the Rainbow Family did hand treatments of areas that were compacted before disassembling their camp. Decompaction treatments were also done in the summer of 2013; however, it is estimated that about 5 acres of detrimental soil compaction exist currently in areas that were heavily used for parking and gathering. These heavily impacted areas are expected to recover in 10-15 years based on observations of recovery after the 2000 gathering. The soil effects of the Rainbow Family gathering are included with the 3.4 percent estimate of detrimental disturbance for the allotment. Therefore the detrimental soil disturbance estimates for the Rainbow Family gathering combined with detrimental disturbance associated with grazing are well within the SQS as are the cumulative effects.

Monitoring
No soil monitoring is planned for this alternative.

Saginaw Proposed Action Alternative

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)

- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects
All effects for the Proposed Action alternative will be similar to those for the Current Grazing Alternative. The Proposed Action alternative will result in little improvement in soil productivity and quality.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue over time.

Areas with more dispersed grazing and without detrimental soil effects will remain static as well even though bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent
Detrimental soil disturbance would be expected to remain relatively constant at the current 3.4 percent because cattle would continue to concentrate in the same locations.
Ground Cover
Overall upland and riparian sites meet desirable condition for ground cover and are expected to remain static over the long term (Greenwood 2013).

No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects
Soil cumulative effects only occur when multiple activities happen on the same soil area. Limited dispersed recreation occurs on suitable range but impacts in most cases are transitory and involve very small areas.

The Rainbow Family had its annual gathering in the Saginaw Allotment in the summers of 2000 and 2013. In 2000, the gathering was about 23,000 people while in 2013 it was much smaller at about 6,000 people. Prior to the 2013 gathering, the area had recovered from detrimental soil impacts from the 2000 gathering, partly because the Rainbow Family did

hand treatments of areas that were compacted before disassembling their camp. Decompaction treatments were also done in the summer of 2013; however, it is estimated that about 5 acres of detrimental soil compaction exist currently in areas that were heavily used for parking and gathering. These heavily impacted areas are expected to recover in 10-15 years based on observations of recovery after the 2000 gathering. The soil effects of the Rainbow Family gathering are included with the 3.4 percent estimate of detrimental disturbance for the allotment. Therefore the detrimental soil disturbance estimates for the Rainbow Family gathering combined with detrimental disturbance associated with grazing are well within the SQS as are the cumulative effects.

Monitoring
No soil monitoring is planned for this alternative.

Saginaw Alternative 4

Mitigation/Design Feature
The following mitigation and/or design features would apply to NFS lands only under this alternative. These mitigation measures are a subset of those found in Chapter 2. These mitigation measures would have a positive effect on soil quality.

- All existing improvements would continue to be maintained at a level that serves their intended purposes (i.e. the pipelines that service the tanks would be cleaned as needed to maintain water to the tank, existing wildlife escape ramps would be maintained, fencing, etc.)
- When any one of the Allowable Use Level metrics is reached, livestock would be moved.
- All allotments would have Range Implementation Monitoring annually.
- The permitted on date (date livestock are authorized to enter the allotment) could be adjusted to assure vegetative development is adequate prior to livestock grazing. Actual on or off dates would continue to be adjusted on an annual basis to provide for range readiness or to mitigate prior season grazing effects, current season forage production, weather, or other conditions when necessary.

Direct/Indirect Effects - Alternative 4 may improve soil productivity and quality over the current grazing alternative and Proposed Action alternative because of reductions in the season of use.

Detrimental Soil Erosion, Compaction and Hummocks
Concentrated grazing along fences, around water developments and at scattered locations in the dispersed grazing areas has exposed bare soil to erosion, compacted soils and, in wet soils, caused hummocking. Under this alternative, all existing soil effects from livestock grazing would continue. Thus, similar rates of biomass production, soil organic matter input, levels of soil cover, soil productivity and degrees of compaction, erosion rates, and sedimentation will continue or improve slightly over time.

Areas with more dispersed grazing and without detrimental soil effects will improve more rapidly because bare soil, soil compaction and hummocking occur less extensively and less intensively.

Soil Quality Standard – Areal Extent - Detrimental soil disturbance would be expected to remain relatively constant at the current 3.4 percent because cattle would continue to concentrate in the same locations.

Ground Cover - Ground cover may increase under this alternative due to reduction in the season of use (Greenwood 2013). No effects on soil productivity would be expected from weed colonization because weed infestations will continue to be monitored and controlled by the Forest Service and therefore there is a low risk of measurable weed spread (Greenwood 2013).

Cumulative Effects - Soil cumulative effects only occur when multiple activities happen on the same soil area. Limited dispersed recreation occurs on suitable range but soil impacts in most cases are transitory and involve very small areas.

The Rainbow Family had its annual gathering in the Saginaw Allotment in the summers of 2000 and 2013. In 2000, the gathering was about 23,000 people while in 2013 it was much smaller at about 6,000 people. Prior to the 2013 gathering, the area had recovered from detrimental soil impacts from the 2000 gathering, partly because the Rainbow Family did hand treatments of areas that were compacted before disassembling their camp. Decompaction treatments were also done in the summer of 2013; however, it is estimated that about 5 acres of detrimental soil compaction exist currently in areas that were heavily used for parking and gathering. These heavily impacted areas are expected to recover in 10-15 years based on observations of recovery after the 2000 gathering. The soil effects of the Rainbow Family gathering are included with the 3.4 percent estimate of detrimental disturbance for the allotment. Therefore the detrimental soil disturbance estimates for the Rainbow Family gathering combined with detrimental disturbance associated with grazing are well within the SQS as are the cumulative effects.

Monitoring - No soil monitoring is planned for this alternative.

Comparison of Alternatives

Table 15: Summary of Effects by Alternatives for Seymour Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compactionnear fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 97.6 % free of detrimental soil disturbance. The existing 2.4% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 97.6 % free of detrimental soil disturbance. The existing 2.4% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 97.6 % free of detrimental soil disturbance. The existing 2.4% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 97.6 % free of detrimental soil disturbance. The existing 2.4% detrimental soil disturbance would be expected to remain relatively constant.

Table 15: Summary of Effects by Alternatives for Seymour Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Some potential for increased ground cover on both upland and riparian sites with removal of livestock trampling impacts, and improvement in species composition.	Some potential for increased ground cover on upland sites with improved species composition. Riparian ground cover expected to remain static due to continuation of annual livestock trampling impacts to stream banks.	Some potential for increased ground cover on upland sites with improved species composition. Riparian ground cover expected to remain static due to continuation of annual livestock trampling impacts to stream banks. Proposed AUL's could result in a faster improvement in ground cover compared to current grazing, but would not be detectable in the next 10 years.	Some potential for increased ground cover on upland sites with improved species composition. Overall, riparian ground cover expected to remain static due to continuation of annual livestock trampling impacts to stream banks, but is some potential for improvement in the Tenmile pasture with reduced livestock use.

No irreversible or irretrievable commitment of the soil resource is predicted or expected for any of the alternatives.

Table 16: Summary of Effects by Alternatives for Fishtrap Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions but rest year would initiate recovery

Comparison of Alternatives
Soil

Table 16: Summary of Effects by Alternatives for Fishtrap Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions but rest year would initiate recovery
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions but rest year would initiate recovery
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 97.2 % free of detrimental soil disturbance. The existing 2.8% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 97.2 % free of detrimental soil disturbance. The existing 2.8% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 97.2 % free of detrimental soil disturbance. The existing 2.8% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 97.2 % free of detrimental soil disturbance. The existing 2.8% detrimental soil disturbance would be expected to remain relatively constant.
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Bare ground amounts would remain mostly static over the long term.	Some potential for increased ground cover but bare ground amounts are expected to remain mostly static over the long term.	Potential for greater reductions in bare ground amounts when compared to current grazing and proposed action alternatives.

No irreversible or irretrievable commitment of the soil resource is predicted or expected for any of the alternatives

Table 17: Summary of Effects by Alternatives for Mudd Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions but rest year would initiate recovery
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions but rest year would initiate recovery
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions but rest year would initiate recovery
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 95.9 % free of detrimental soil disturbance. The existing 4.1% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 95.9 % free of detrimental soil disturbance. The existing 4.1% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 95.9 % free of detrimental soil disturbance. The existing 4.1% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 95.9 % free of detrimental soil disturbance. The existing 4.1% detrimental soil disturbance would be expected to remain relatively constant.

Comparison of Alternatives
Soil

Table 17: Summary of Effects by Alternatives for Mudd Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Bare ground amounts would remain mostly static over the long term.	Some potential for increased ground cover but bare ground amounts are expected to remain mostly static over the long term.	Potential for greater reductions in bare ground amounts when compared to current grazing and proposed action alternatives.

No irreversible or irretrievable commitment of the soil resource is predicted or expected for any of the alternatives.

Table 18: Summary of Effects by Alternatives for Pintlar Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Rapid recovery in Pintler Mdws from closure, little change elsewhere.
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Rapid recovery in Pintler Mdws from closure, little change elsewhere.

Comparison of Alternatives
Soil

Table 18: Summary of Effects by Alternatives for Pintlar Creek Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Rapid recovery in Pintler Mdws from closure, little change elsewhere.
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 97.2 % free of detrimental soil disturbance. The existing 2.8% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 97.2 % free of detrimental soil disturbance. The existing 2.8% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 97.2 % free of detrimental soil disturbance. The existing 2.8% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 97.2 % free of detrimental soil disturbance. The existing 2.8% detrimental soil disturbance would be expected to remain relatively constant.
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Bare ground amounts would remain mostly static over the long term.	Some potential for increased ground cover but bare ground amounts are expected to remain mostly static over the long term.	Rapid improvement in ground cover in Pintler Meadows. Some potential for increased ground cover on other upland and riparian sites, but bare ground amounts are expected to remain mostly static over the long term.

No irreversible or irretrievable commitment of the soil resource is predicted or expected for any of the alternatives

Table 19: Summary of Effects by Alternatives for Mussigbrod Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Recovery begins but little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Recovery begins with more rapid recovery in Bender pasture from closure.
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Recovery begins but little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Recovery begins with more rapid recovery in Bender pasture from closure.
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks near fences and water. None noted on plots. Recovery begins but little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Recovery begins with more rapid recovery in Bender pasture from closure.
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 96.7 % free of detrimental soil disturbance. The existing 3.3% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 96.7 % free of detrimental soil disturbance. The existing 3.3% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 96.7 % free of detrimental soil disturbance. The existing 3.3% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 96.7 % free of detrimental soil disturbance. The existing 3.3% detrimental soil disturbance would be expected to remain relatively constant.

Comparison of Alternatives
Soil

Table 19: Summary of Effects by Alternatives for Mussigbrod Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Bare ground amounts would remain mostly static over the long term.	Good potential for increased ground cover, with reduced livestock use, and greater protection of existing disturbed areas.	Rapid improvement in ground cover in Bender pasture. Some potential for increased ground cover on other upland and riparian sites within Mussigbrod pasture.

No irreversible or irretrievable commitment of the soil resource is predicted or expected for any of the alternatives.

Table 20: Summary of Effects by Alternatives for Ruby Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions'
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.

Comparison of Alternatives
Soil

Table 20: Summary of Effects by Alternatives for Ruby Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 98.1 % free of detrimental soil disturbance. The existing 1.9% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 98.1 % free of detrimental soil disturbance. The existing 1.9% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 98.1 % free of detrimental soil disturbance. The existing 1.9% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 98.1 % free of detrimental soil disturbance. The existing 1.9% detrimental soil disturbance would be expected to remain relatively constant.
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Little to no improvement in ground cover.	Little to no improvement in ground cover.	Some potential for increased ground cover.

No irreversible or irretrievable commitment of the soil resource is predicted or expected for any of the alternatives.

Table 21: Summary of Effects by Alternatives for Dry Creek Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions'

Comparison of Alternatives
Soil

Table 21: Summary of Effects by Alternatives for Dry Creek Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 94.6 % free of detrimental soil disturbance. The existing 5.4% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 94.6 % free of detrimental soil disturbance. The existing 5.4% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 94.6 % free of detrimental soil disturbance. The existing 5.4% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 94.6 % free of detrimental soil disturbance. The existing 5.4% detrimental soil disturbance would be expected to remain relatively constant.
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Little to no improvement in ground cover.	Some potential for increased ground cover on riparian sites, but bare ground is expected to remain mostly static on upland areas due to low site productivity.	Some potential for increased ground cover on riparian sites, but bare ground is expected to remain mostly static on upland areas due to low site productivity.

No irreversible or irretrievable commitment of the soil resource is predicted or expected for any of the alternatives.

Table 22: Summary of Effects by Alternatives for Twin Lakes Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions'
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 97.3 % free of detrimental soil disturbance. The existing 2.7% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 97.3 % free of detrimental soil disturbance. The existing 2.7% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 97.3 % free of detrimental soil disturbance. The existing 2.7% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 97.3 % free of detrimental soil disturbance. The existing 2.7% detrimental soil disturbance would be expected to remain relatively constant.

Comparison of Alternatives
Soil

Table 22: Summary of Effects by Alternatives for Twin Lakes Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground cover where needed.	Ground cover at desirable, little to no improvement in ground cover.	Ground cover at desirable condition but some potential for increased ground cover on riparian and upland sites where needed.	Ground cover at desirable condition but some potential for increased ground cover on riparian and upland sites where needed.

No irreversible or irretrievable commitment of the soil resource is predicted or expected for any of the alternatives.

Table 23: Summary of Effects by Alternatives for Monument Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions'
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.

Comparison of Alternatives
Soil

Table 23: Summary of Effects by Alternatives for Monument Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 96.8 % free of detrimental soil disturbance. The existing 3.2% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 96.8 % free of detrimental soil disturbance. The existing 3.2% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 96.8 % free of detrimental soil disturbance. The existing 3.2% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 96.8 % free of detrimental soil disturbance. The existing 3.2% detrimental soil disturbance would be expected to remain relatively constant.
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground where site productivity is favorable.	Ground cover amounts would remain unchanged over the long term.	Little to no change in ground cover over the long term.	Potential for measurable improvement in ground cover over the long term.

No irreversible or irretrievable commitment of the soil resource is predicted or expected for any of the alternatives.

Table 24: Summary of Effects by Alternatives for Pioneer Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions'

Comparison of Alternatives
Soil

Table 24: Summary of Effects by Alternatives for Pioneer Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 96.7 % free of detrimental soil disturbance. The existing 3.3% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 96.7 % free of detrimental soil disturbance. The existing 3.3% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 96.7 % free of detrimental soil disturbance. The existing 3.3% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 96.7 % free of detrimental soil disturbance. The existing 3.3% detrimental soil disturbance would be expected to remain relatively constant.
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground where needed.	Ground cover amounts would remain unchanged over the long term.	Little to no change in ground cover over the long term.	Potential for measurable improvement in ground cover over the long term.

Table 25: Summary of Effects by Alternatives for Saginaw Allotment

Resource Indicator And Unit of Measure	No Grazing Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
Detrimental soil erosion *Unit of Measure*: Soil loss more than 1 ton per acre per year.	Detrimental erosion near fences and water. None noted on plots. Eroding areas would improve the fastest under this alterative.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions would be expected	Detrimental erosion near fences and water. None noted on plots. Little change from current conditions'
Detrimental soil compaction *Unit of Measure*: Presence of a root limiting soil layer, surrogate for a 15 percent increase in natural bulk density.	Detrimental compaction near fences and water. None noted on plots. Compacted areas would improve the fastest under this alterative.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected..	Detrimental compaction near fences and water. None noted on plots. Little change from current conditions would be expected.
Detrimental soil hummocks *Unit of Measure*: Hummocks 2 inches high.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Hummock areas would improve the fastest under this alterative..	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.	Detrimental hummocks on wet soil near fences and water. None noted on plots. Little change from current conditions would be expected.
Soil Quality Standard Areal Extent *Unit of Measure*: 85 percent of suitable range must have soil free of detrimental disturbance.	Suitable range is 96.6 % free of detrimental soil disturbance. The existing 3.4% detrimental soil disturbance would improve the fastest under this alternative.	Suitable range is 96.6 % free of detrimental soil disturbance. The existing 3.4% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 96.6 % free of detrimental soil disturbance. The existing 3.4% detrimental soil disturbance would be expected to remain relatively constant.	Suitable range is 96.6% free of detrimental soil disturbance. The existing 3.4% detrimental soil disturbance would be expected to remain relatively constant.
Ground Cover (Greenwood 2013) *Unit of Measure*: Percent ground cover in relation to expected potential amounts.	Most rapid improvement in ground where needed.	Ground cover amounts would remain unchanged over the long term.	Little to no change in ground cover over the long term.	Potential for measurable improvement in ground cover over the long term.

Hydrology

Existing Condition

Regulatory Framework

Laws Relating to Water Quality and Quantity

Laws that govern Federal actions with potential to affect water quality and quantity include the Organic Act of 1897, the Multiple Use-Sustained Yield Act, the National Environmental Policy Act, the Clean Water Act, the Forest and Rangeland Renewable Resources Act and the National Forest Management Act.

The Clean Water Act and applicable State of Montana regulations are discussed in additional detail below.

Clean Water Act

The Federal Water Pollution Control Act of 1972 (Public Law 92-500) as amended in 1977 (Public Law 95-217) and 1987 (Public Law 100-4) is also known as the Federal Clean Water Act.

This act provides the structure for regulating pollutant discharges to waters of the United States. As stated in Section 101 of the act, the objective of the act is "…to restore and maintain the chemical, physical, and biological integrity of the Nation's waters". Control of point and nonpoint sources of pollution are among the means to achieve the stated objective. The U.S. Environmental Protection Agency (EPA) administers the act, but many permitting, administrative, and enforcement functions are delegated to state governments. In Montana, the designated agency is the Montana Department of Environmental Quality (MDEQ).

The following sections of the Clean Water Act (1972, Amended 1987) apply to any Federal action, which may affect a water body, regardless of its beneficial use:

- Section 101: The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.
- Section 208(2) (F): A process to identify agriculturally and silviculturally related nonpoint sources of pollution, and set forth procedures and methods to control to the extent feasible such sources.
- Section 303: States have responsibility to develop and review water quality standards.
- Section 313: Requires all Federal Agencies to control and abate water pollution under all Federal, State, and local requirements. Executive Order 12088 specifies this compliance.
- Section 319: Requires Federal consistency with the State Non-Point Source (NPS) program. The State NPS program includes a process for identifying Best Management Practices (BMPs) to control identified sources.
- Section 404: defines the permitting process for activities relating to wetlands

Sections 208 and 319 of the Act recognize the need for control strategies for nonpoint source pollution.

Section 305(b) of the Act requires states to assess the condition of their waters and produce a biennial report summarizing the findings.

Water bodies that have water quality determined to be either impaired (not fully meeting water quality standards) or threatened (likely to violate standards in the near future) are compiled by Montana DEQ in a separate list under Section 303(d) of the Act. This list must be submitted to EPA every two years.

Water bodies on the 303(d) list (known as Water Quality Limited—or WQL—waters) are to be targeted, and scheduled, for development of water quality improvement strategies on a priority basis.

These strategies are in the form of total maximum daily loads, or TMDLs, which technically consist of the quantity of pollutants that may be delivered to a water-body without violating water quality standards. In practice they are plans to improve water quality in a listed water-body until water quality standards are met (i.e., until designated uses are fully supported).

Section 404 of the act outline the permitting process for discharging dredged or fill material into waters of the United States, including wetlands. The U.S. Army Corps of Engineers administers the 404 program. Under Section 401 of the act, states and tribes may review and approve, set conditions on, or deny Federal permits (such as 404 permits) that may result in a discharge to State or tribal waters, including wetlands

Montana Laws Relating to Water Quality and Quantity

The following Montana Code Title 75: Environmental Protection, Chapter Five: Water Quality (http://data.opi.mt.gov/bills/mca_toc/75_5_1.htm) and Montana Administrative Rules of the State of Montana (ARM).

75-5-101. Policy

It is the public policy of this state to:

(1) conserve water by protecting, maintaining, and improving the quality and potability of water for public water supplies, wildlife, fish and aquatic life, agriculture, industry, recreation, and other beneficial uses;

(2) Provide a comprehensive program for the prevention, abatement, and control of water pollution; and

(3) Balance the inalienable rights to pursue life's basic necessities and possess and use property in lawful ways with the policy of preventing, abating, and controlling water pollution in implementing the program referred to in subsection (2).

75-5-102. Intent -- purpose -- rights of action not abridged.

(1) The legislature, mindful of its constitutional obligations under Article II, section 3, and Article IX of the Montana constitution, has enacted this chapter. It is the legislature's intent that the requirements of this chapter provide adequate remedies for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources.

(2) A purpose of this chapter is to provide additional and cumulative remedies to prevent, abate, and control the pollution of state waters.

75-5-104. Special applicability
This chapter applies to drainage or seepage from all sources, including that from artificial, privately owned ponds or lagoons, if such drainage or seepage may reach other state waters in a condition which may pollute the other state waters.

76-13-101. Purpose
1) (a) It is the purpose of part 2 and this part to provide for:

(i) The protection and conservation of natural resources, range, and water; and

(ii) The prevention of soil erosion.

(b) It is further the purpose of part 2 and this part to more adequately promote and facilitate the cooperation, financial and otherwise, between the state and public and private agencies that are associated in the work.

(2) To achieve the conservation of natural and watershed resources, the legislature encourages the use of best management practices in timber sale planning, associated road construction and reconstruction, timber harvesting, site preparation, and related activities and establishes a process to ensure that information on best management practices is provided to owners and operators engaged in forest practices on private land.

75-7-102. Intent -- policy
(1) The legislature, mindful of its constitutional obligations under Article II, section 3, and Article IX of the Montana constitution, has enacted *The Natural Streambed and Land Preservation Act* of 1975. It is the legislature's intent that the requirements of this part provide adequate remedies for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources.

(2) It is the policy of the state of Montana that its natural rivers and streams and the lands and property immediately adjacent to them within the state are to be protected and preserved to be available in their natural or existing state and to prohibit unauthorized projects and, in so doing, to keep soil erosion and sedimentation to a minimum, except as may be necessary and appropriate after due consideration of all factors involved.

Further, it is the policy of this state to recognize the needs of irrigation and agricultural use of the rivers and streams of the state of Montana and to protect the use of water for any useful or beneficial purpose as guaranteed by The Constitution of the State of Montana.

77-5-301. Findings and purpose
(1) The legislature finds that the streamside management zone:

(a) acts as an effective sediment filter to maintain water quality;

(b) provides shade to regulate stream temperature;

(c) supports diverse and productive aquatic and terrestrial riparian habitats;

(d) protects the stream channel and banks;

(e) provides large, woody debris that is eventually recruited into a stream to maintain riffles, pools, and other elements of channel structure; and

(f) promotes flood plain stability.

(2) The legislature further finds that maintaining the integrity of forest streams is crucial to the quality and quantity of water available to Montanans for domestic, agricultural, industrial, and recreational use.

(3) The legislature further finds that forest streams are highly susceptible to impacts from land development and that in many cases forest practices in streamside zones in Montana are causing excessive and unnecessary damage to the banks, beds, and protective vegetation of forest streams.

(4) The legislature further finds that, through careful management in the streamside zone, owners and operators can achieve timber harvest goals without sacrificing water quality or impairing the beneficial uses of the water.

(5) The purposes of this part are:

(a) To protect the legitimate public interest in the quality and quantity of forest waters;

(b) To provide for standards, oversight, rehabilitation, and penalties to ensure that forest practices are conducted in a manner that conserves the integrity of Montana's streamside zones;

(c) To provide guidelines for the management of wildlife habitat in streamside zones; and

(d) To allow operators necessary flexibility to use practices appropriate to site-specific conditions in the streamside management zone.

Montana ARM 16.20.603

This states that Best Management Practices (BMPs) are the foundation of water quality standards for the State of Montana. The Forest Service has agreed to follow BMPs in a Memorandum of Understanding with the State. Many BMPs are applied directly as mitigation at the project level. Implementing and effectiveness monitoring for BMPs are routinely conducted by contract administrators and during other implementation and annual monitoring events (USDA Forest Service, 2009, Ch 3, pg 186).

Montana ARM 17.30, sub-chapter 6 Surface Water Quality Standards and Procedures

This administrative rule details the water quality standards for the State of Montana. The Forest Service has primary responsibility to maintain these standards on lands under their jurisdiction in the State.

Other Existing Laws, Regulations, Executive Orders and Memorandums of Understanding

The NFMA requirements for the conservation of soil and water resources is listed in 36 CFR 219.27 (a)(e)(f). "Conservation of soil and water resources involves the analysis, protection,

enhancement, treatment, and evaluation of soil and water resources and their responses under management and shall be guided by instructions in official technical handbooks".

Forest Service Manual, Water Resources Management, sections 2532.02, 2532.03

Sections 2532.02 and 2532.03 of the Manual describe the objectives and policies relevant to protection (and, where needed, improvement) of water quality on National Forest System lands so that designated beneficial uses are protected. Guidelines for data collection activities (inventory and monitoring) are also described.

Forest Service Handbook 2500

This handbook states policy and direction regarding watershed management.

Forest Service Handbook 2509.22 Soil and Water Conservation Handbook

Provides a non-point source management strategy to develop site-specific conservation practices for activities on national Forest System lands to minimize effects on soil and water resources and protect water-related beneficial uses.

Executive Order 11988, Floodplain Management

This Executive Order requires that agencies avoid, to the extent possible, adverse impacts associated with occupancy and modification of floodplains. It applies to all floodplain locations, as a minimum to areas in the 100-year, or base, floodplain.

Executive Order 11990, Protection of Wetlands

This Executive Order states that agencies shall minimize destruction, loss, or degradation of wetlands and shall preserve and enhance their natural and beneficial values. Agencies are to avoid construction in wetlands unless it is determined that there is no practicable alternative and that all practicable measures are taken to minimize harm to wetlands.

Memorandum of Understanding

Montana ARM 16.20.603 states that there is a Memorandum of Understanding (MOU) between the State of Montana and the Forest Service, which states that the Forest Service will use best management practices, or BMPs, to deal with preventing or mitigating non-point source pollution. However in discussions with the Forest Hydrologist it was indicated that no such MOU exists (Weinner 2010).

Consistency and compliance with the Forest Plan

With the implementation of range improvements, more stringent AUL's for streams that are functioning at risk with a downward trend or non-functioning, and avoidance periods under the proposed alternative and Alternative 4, the Hydrology resource would be in compliance with the Forest Plan.

Introduction

Project allotments contain a number of subwatersheds (6th field HUCs) which are defined as part of a hierarchical classification system used by the United States Geological Survey

(USGS). The USGS has defined and documented watershed boundaries, along with common terms and a reference numbering scheme in the National Hydrography Data set (NHD). Within the data set, each drainage area is named and assigned a unique reference number so its location and boundaries are consistently interpreted. The names and numbers used for 6th level watersheds in this report are based upon this data. All of the watersheds in this project area flow into the Big Hole River or are diverted for irrigation on private land along the way.

The following sections describe the existing condition of the affected environment for hydrology resources in the North and West Big Hole AMP project area and include the following: climate, geology, municipal watersheds, water quality, water quantity, stream flow timing, stream channels, riparian resources, floodplains, wetlands, springs, bogs, and existing levels of disturbance. The affected environment section also addresses the existing conditions for the issue indicators used in the environmental consequences section of this report.

Climate

The climate in the project area is highly variable and influenced by its proximity to the Continental Divide. The amount of precipitation varies widely and is strongly influenced by topography. May and June tend to have the highest amount of precipitation in the project area as reflected by mean precipitation. Snowfall tends to be concentrated from November to April, with storms occurring as early as mid-September or as late as May in the high mountains. Annual snowfall is variable but can be as much as 300 inches in the mountains. Temperatures range from a mean maximum of 79.4 ºF in July to a mean minimum of 1.2 ºF in January. Warming temperatures in the spring and early summer produces increased stream flows combined with spring rains to increase surface runoff and high flow or flood conditions (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?mt9067, Table 1).

Table 1 below provides a summary of the monthly climate data from a nearby climate site at Wisdom, MT maintained by the Western Regional Climate Center.

Table 1: Monthly Climatte Date Summary for Wisdom Montana

Metrics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	26.4	31.1	38.5	49.2	60.3	68.6	79.4	77.8	67.6	55	38	28	51.7
Average Min. Temperature (F)	1.2	3.3	10.8	21.2	28.7	36.1	38.2	34.7	27.8	21.3	12.3	3.6	19.9
Average Total Precipitation (in.)	0.7	0.52	0.74	0.95	1.64	1.96	1.09	1.03	0.99	0.83	0.76	0.77	11.97
Average Total SnowFall (in.)	11.8	8.3	8.6	4.5	2.5	0.5	0	0	0.5	1.9	7.8	10.8	57
Average Snow Depth (in.)	9	10	8	1	0	0	0	0	0	0	2	5	3

Period of Record : 1/ 1/1923 to 9/30/2012

Geology

The allotments in the northern part of the project area are largely granitic. They also underlain by some Pre-Cambrian belt bedrock and the lower valleys containing tertiary sediments surrounding glacial till. The west and south allotments are mostly belt bedrock with large areas of glacial moraines (course textured material) and some tertiary sediment. The Saginaw Allotment is mostly underlain by sedimentary valley-bottom deposits (heavy textured materials that are easily eroded).

Municipal Watersheds

A municipal watershed, as defined by the Forest Service, are those having a water system which services at least 15 service connections, or serves 25 people for 60 days or more per year. No municipal watersheds occur within the North and West Big Hole AMP project area.

Water Quality

Livestock typically influence water quality through the introduction of sediment and vegetation alteration. There are thirteen 303(d) listed streams within the project area or directly downstream (See Table 2 below). None of the project streams listed for fecal coliform so no information was collected for this project.

Sediment and impacts to streamside vegetation are the primary water quality parameters affected by management activities within the analysis area. Grazing has occurred adjacent to most or all of the streams within the analysis area, and the subsequent increases in sediment and/or changes in vegetation composition have likely exceeded naturally occurring levels for some period. Channel morphology has been influenced through alteration of riparian vegetation and changes in sedimentation originated from physical changes in the stream channel or the landscape. These changes represent deviation from desired stream conditions and, depending on the extent of change, can be indicative of a loss in stream function. As stream function improves, these attributes will improve. Sediment changes and their effects on stream function and values are covered in the individual stream discussion.

The Forest Plan does not require specific water quality monitoring, so it is not a specific part of the survey work we do. We do, however monitor the functioning status of the streams and their morphology. Since sediment is the most common impairment to water quality in Forest streams, stream function is most typically a good indicator of water quality conditions. By changing the grazing practice on some sites by enforcing riparian guidelines and standards, the effects will change the condition of the streams by moving the trends toward proper functioning condition. The water quality concerns are most likely to appear in the non-functioning streams. By limiting the time that cows spend in the riparian areas and stream bottoms, we can move the streams that are not properly functioning to a desired future condition which will improve water quality.

Table 2: TMDL (303d) Listed Streams in the Project Area

Stream	Probable Impaired Uses	Use-Support Status	Probable Causes of Impairment	Probable Sources of Impairment
Corral Creek (headwaters to mouth (Deep Creek))	Aquatic Life	Partially Supporting	Alteration in stream-side or littoral vegetative covers; Physical substrate habitat alterations; Sedimentation/ Siltation	Natural Sources; Rangeland Grazing; Silviculture Activities
Twelvemile Creek (headwaters to mouth (Deep Creek))	Aquatic Life	Partially Supporting	Sedimentation/ Siltation	Grazing in Riparian or Shoreline Zones; Silviculture Harvesting
Sevenmile Creek (headwaters to mouth (Deep Creek))	Aquatic Life	Partially Supporting	Alteration in stream-side or littoral vegetative covers; Sedimentation/ Siltation	Natural Sources; Rangeland Grazing; Streambank Modifications/ destabilization
Deep Creek (headwaters to mouth (Big Hole River))	Aquatic Life	Partially Supporting	Alteration in stream-side or littoral vegetative covers; Low flow alterations; Sedimentation/ Siltation	Rangeland Grazing; Streambank Modifications/ destabilization; Irrigated Crop Production
Fishtrap Creek (confluence of West & Middle Forks to mouth (Big Hole River))	Aquatic Life; Primary Contact Recreation	Partially Supporting	Alteration in stream-side or littoral vegetative covers; Low flow alterations; Phosphorus (Total); Sedimentation/ Siltation	Grazing in Riparian or Shoreline Zones; Flow Alterations from Water Diversions
Pintlar Creek (headwaters to mouth (Big Hole River))	Aquatic Life; Primary Contact Recreation	Partially Supporting	Low flow alterations; Other flow regime alterations; Physical substrate habitat alterations; Temperature, water	Grazing in Riparian or Shoreline Zones; Impacts from Abandoned Mine Lands (Inactive); Impacts from Hydrostructure Flow Regulation/modification; Irrigated Crop Production; Loss of Riparian Habitat; Natural Sources

Table 2: TMDL (303d) Listed Streams in the Project Area

Stream	Probable Impaired Uses	Use-Support Status	Probable Causes of Impairment	Probable Sources of Impairment
Mussigbrod Creek (headwaters to mouth (North Fork Big Hole River))	Aquatic Life; Drinking Water; Primary Contact Recreation	Not Supporting; Not Supporting; Partially Supporting	Alteration in stream-side or littoral vegetative covers; Lead; Low flow alterations; Other anthropogenic substrate alterations; Physical substrate habitat alterations; Sedimentation/ Siltation	Agriculture; Grazing in Riparian or Shoreline Zones; Acid Mine Drainage; Loss of Riparian Habitat; Natural Sources; Impacts from Abandoned Mine Lands (Inactive); Impacts from Hydrostructure Flow Regulation/modification; Irrigated Crop Production; Rangeland Grazing
Ruby Creek (headwaters to mouth (North Fork Big Hole River))	Aquatic Life; Primary Contact Recreation	Partially Supporting	Alteration in stream-side or littoral vegetative covers; Low flow alterations; Physical substrate habitat alterations; Temperature, water	Grazing in Riparian or Shoreline Zones; Loss of Riparian Habitat; Rangeland Grazing; Silviculture Activities; Impacts from Hydrostructure Flow Regulation/modification; Irrigated Crop Production; Dredge Mining; Forest Roads (Road Construction and Use); Unspecified Unpaved Road or Trail
North Fork Big Hole River (headwaters to mouth (Big Hole River))	Aquatic Life; Primary Contact Recreation	Partially Supporting	Alteration in stream-side or littoral vegetative covers; Low flow alterations; Sedimentation/ Siltation	Grazing in Riparian or Shoreline Zones; Loss of Riparian Habitat; Silviculture Activities; Irrigated Crop Production; Highway/Road/Bridge Runoff (Non-construction Related)
Miner Creek (headwaters to mouth (Big Hole River))	Agricultural; Aquatic Life; Drinking Water	Insufficient Information; Partially Supporting; Insufficient Information	Sedimentation/ Siltation	Grazing in Riparian or Shoreline Zones; Forest Roads (Road Construction and Use)

Table 2: TMDL (303d) Listed Streams in the Project Area

Stream	Probable Impaired Uses	Use-Support Status	Probable Causes of Impairment	Probable Sources of Impairment
Big Hole River (headwaters to Pintlar Creek)	Aquatic Life; Primary Contact Recreation	Partially Supporting	Alteration in stream-side or littoral vegetative covers; Low flow alterations; Sedimentation/ Siltation; Temperature, water	Agriculture; Highways, Roads, Bridges, Infrastructure (New Construction); Irrigated Crop Production; Loss of Riparian Habitat; Rangeland Grazing
Governor Creek (headwaters to mouth (Warm Springs Creek))	Aquatic Life; Primary Contact Recreation	Not Supporting; Partially Supporting	Alteration in stream-side or littoral vegetative covers; Copper; Low flow alterations; Other anthropogenic substrate alterations; Physical substrate habitat alterations; Sedimentation/ Siltation	Agriculture; Grazing in Riparian or Shoreline Zones; Loss of Riparian Habitat; Impacts from Hydrostructure Flow Regulation/ modification; Irrigated Crop Production; Habitat Modification - other than Hydromodification
Big Hole River (Pintlar Creek to Divide Creek)	Aquatic Life; Drinking Water; Primary Contact Recreation	Not Supporting; Not Supporting; Partially Supporting	Alteration in stream-side or littoral vegetative covers; Copper; Lead; Low flow alterations; Physical substrate habitat alterations; Sedimentation/ Siltation; Temperature, water	Agriculture; Grazing in Riparian or Shoreline Zones; Highways, Roads, Bridges, Infrastructure (New Construction); Acid Mine Drainage; Impacts from Abandoned Mine Lands (Inactive); Irrigated Crop Production; Rangeland Grazing

Water Quantity, Climate Change, and Stream Flow Timing

There are a few stream gauges located on the Upper Big Hole River below project streams that are maintained by the USGS. These stream gauges show general timing of runoff for the streams in the project area although they have little relevance to understanding stream flow characteristics of project streams. There is no current stream flow information available for project streams.

Stream flow typically peaks in May or June and decreases as the available shallow ground-water system drains. Typically, spring runoff conditions extend into July. Low stream flow conditions are typical from August to March.

Climate change effects are difficult to predict but in general the primary effects are anticipated to influence runoff timing which will likely be earlier in the year with higher variations associated with the aspect of the watershed (Lundquist and Flint, 2006).

Water quantity in the project area has been most notably affected by the current Mountain Pine Beetle Epidemic which has impacted much of the project area. Based on GIS exercises

approximately 40% of the mapped lodgepole dominated stands have some impact detected from MPB epidemic and more infestations have been observed recently. Increased stream flow in project streams is possible given the large number of dead trees observed and mapped. The effects will vary throughout the project area but watersheds that have large areas of lodgepole in the upper watershed will be the most affected. This has the potential to affect some stream characteristics but significant widening is not expected on project area streams. MPB effects will be discussed as part of cumulative effects discussion but only minor impacts both positive and negative are anticipated.

Wetlands, Springs, and Bogs

The most complete wetlands layer we have is from the Montana Natural Heritage Program. From those mapped wetland polygons qualitative data was collected and a general wetland condition will be discussed in the individual stream sections. Wetland areas varied in the degree of wetness from seasonal to perennial. Wetland condition will be discussed on the effects section of this document.

Existing Disturbance

The existing condition of project area watersheds reflects the influences of both natural (climatic and geologic) conditions and human activities. Natural causes of disturbance impacting watershed conditions include wildfire while past management activities affecting watershed resources include road and trail locations, grazing, prescribed fire, mining, recreation, timber harvest, and stream diversion structures/dewatering.

Roads and Trails

During field data collection, numerous road issues were noted. Observations included absence of, or non-functioning road ditches, perched and/or partially blocked culverts, improperly located culverts, unhardened ford crossings, and road gullies caused by improper drainage. Specific locations identified in field data collection can be found on hydro allot maps and are listed on observation points table.

Prescribed and Wildfire

Broadcast and jackpot burning was completed in a number of allotments at low levels across the project area. The acres of treatment can be found on table Draft_FACTS_Activities_Allotments_Laura. There were no areas identified in the project area where prescribed fire treatments had any negative effects in the project area.

Wildfires have had more of an impact in the project area specifically in the Mussigbrod Allotment. Site specific effects are discussed in the individual stream descriptions and in the effects discussion.

Past Harvest

Past Harvest is prevalent over the entire project area with varying levels of harvest intensity. The acres of treatment can be found on table FACTS_Timber_Harvest_Allotments_103012. Overall current harvest levels are not expected to create conditions that would contribute to cumulative effects. This can be concluded with confidence because we find that most of the intense harvest of green trees was conducted in the 70's (see table FACTS_Timber_Harvest_Allotments_103012) and water yield recovery should back to existing condition based on literature including Grant et al. 2008. The more recent harvest does not affect enough of the watershed area to change water yield and runoff timing and

current buffer practices are not expected to influence watershed conditions. Furthermore, most of the most recent harvest has targeted dead and dying timber from the bark beetle epidemic which does not have as much effect on water yield changes as green tree harvest.

Mining
Historic mining activity was observed in several areas of the project area. Currently there are 26 active mines identified in the project area (based on GIS Data) with most of the substantial activity occurring in the Ruby Allotment. There were no major effects identified within the project are although minor cumulative effects were noted on some streams and discussed in the individual stream descriptions and effects sections of this document.

Recreation
At present there is a wide variety of both dispersed and developed recreation opportunities in the project area. There are campgrounds, picnic sites, trailheads, winter non-motorized recreation use, winter motorized recreation use, backcountry use and summer motorized and non-motorized use. Specific sites where recreation was impacting hydrology resources were collected during field work and can be found on hydro allot maps and are listed on observation points table.

Stream Diversions in the Project area
A large amount of the water in the project area is diverted shortly after it leaves FS lands but several streams had diversions within the project area which created significant effects to project streams through dewatering and channel manipulation especially in the lower reaches. There is no good inventory of the legal and illegal diversions in the project area but several sites were identified during qualitative stream surveys. Site specific impacts will be discussed in the stream descriptions. Sites collected during field work and can be found on hydro allot maps and are listed on observation points table.

Individual Stream Descriptions

Table 3 below breaks out all of the Perennial Streams in the project area by Allotment and Pasture and describes the information we have and will analyze for the project. Additional qualitative data was collected (hydro allot maps and are listed on observation points table) to account for conditions that were not inventoried in the below table and also utilized to provide quality control for streams that had quantitative surveys completed.

Table 3: Project Streams by Allotment and Pasture

Allotment	Pasture Name	Stream Name	Key Watershed	TMDL	Legacy Stream Surveys	*Recent Stream Surveys	Function and Trend
Seymour	Seymour	LaMarche Cr, E Fk	NA	No			
		Seymour Cr	Restoration	No			
	Sullivan	Bear Trap Gulch	Restoration	No			
		Sullivan Cr	Restoration	No	2 Surveys		FAR

Table 3: Project Streams by Allotment and Pasture

Allotment	Pasture Name	Stream Name	Key Watershed	TMDL	Legacy Stream Surveys	*Recent Stream Surveys	Function and Trend
		Sullivan Cr, Trib1	Restoration	No			
		Twelvemile Cr	Restoration	Yes			
		Twelvemile Cr, W Fk	Restoration	No			
	Tenmile	Corral Cr	Fisheries	Yes			
		Slaughterhouse Cr	Fisheries	No		Yes	FAR↑
		Tenmile Cr	Fisheries	No	2 Surveys	Yes	F
Fishtrap	East Fork	Fishtrap Cr, E Fk	NA	No	Yes	Yes	FAR
		Fishtrap Cr, E Fk, Trib1	NA	No	Yes	Yes	FAR
	West Fork	Fishtrap Cr	NA	Yes			
		Fishtrap Cr, Middle Fk	NA	No			
		Fishtrap Cr, W Fk	NA	No			
		Swamp Cr	NA	No	Yes	Yes	FAR
Mudd Creek	Mudd Creek	Calvert Cr	NA	No	Yes	Yes	FAR
		Calvert Cr, Trib1	NA	No			
		Mudd Cr	NA	No			
		Mudd Cr, E Fk	NA	No			
		Mudd Cr, Trib1	NA	No	Yes		FAR
		Mudd Cr, Trib2	NA	No	Yes		F
		Mudd Cr, W Fk	NA	No			
		York Gulch	NA	No	2 Surveys	Yes	F
		York Gulch, Trib1	NA	No	Yes	Yes	FAR
		York Gulch, Trib1, Trib2	NA	No	Yes		F
Pintler Creek	Pintler Creek	Beaver Cr	NA	No			
		Pintler Cr	NA	Yes	2 Surveys	Yes	NF
		Pintler Cr, Trib1	NA	No	Yes	Yes	FAR↓
Mussigbrod	Bender Pasture	Bender Cr	NA	No	Yes		F
		Bender Cr, Trib1	NA	No			NF

Table 3: Project Streams by Allotment and Pasture

Allotment	Pasture Name	Stream Name	Key Watershed	TMDL	Legacy Stream Surveys	*Recent Stream Surveys	Function and Trend
		Bender Cr, Trib1, Trib1	NA	No			
	Mussigbrod Pasture	Mussigbrod Cr	NA	Yes	2 Surveys	Yes	F
Ruby Creek	Cow Cr. Pasture	Nugget Cr	NA	No			
		Pioneer Cr	NA	No			
		Rabbit Cr	NA	No			
		Ruby Cr	NA	Yes	4 Surveys		FAR
		Ruby Cr, Trib1	NA	Yes			
		Ruby Cr, Trib2	NA	No			
		Ruby Cr, Trib3	NA	No	Yes		F
		Ruby Cr, Trib3, Trib1	NA	No	Yes		F
		Ruby Cr, W Fk	NA	No		Yes	FAR
		Cow Cr	NA	No	Yes	Yes	FAR↑
		Calf Cr	NA	No	2 Surveys	Yes	FAR
	Lower Ruby Pasture	Ruby Cr	NA	Yes	Yes		F
		Big Moosehorn Cr	Restoration	No	2 Surveys		F
		Butler Cr	NA	No			
		Gory Cr	Restoration	No	Yes		F
		Little Moosehorn Cr	NA	No	Yes		F
		Nickel Bar Gulch	NA	No			
		Ruby Cr	Restoration	Yes			
	Butler Pasture	Butler Creek	Restoration	No	Yes	Yes	FAR
Dry Creek	Lower Dry Creek Pasture	Sawmill Cr	NA	No			
		Big Lake Cr	NA	No	Yes	Yes	F
	Upper Dry Creek Pasture	Sawmill Cr	NA	No			
		Big Lake Cr	NA	No	Yes		F
		Big Lake Cr, Trib1	NA	No			
		Big Lake Cr, Trib1, Trib1	NA	No			
		Dry Cr	NA	No	Yes		FAR

Table 3: Project Streams by Allotment and Pasture

Allotment	Pasture Name	Stream Name	Key Watershed	TMDL	Legacy Stream Surveys	*Recent Stream Surveys	Function and Trend
Twin Lakes	Lower Big Lake Pasture	Big Swamp Cr	NA	No	2 Surveys	Yes	FAR
		Slag-a-melt Cr	NA	No	Yes		F
		Big Swamp Cr, N Branch	NA	No			
	Lower Little Lake Pasture	Little Lake Cr	NA	No		Yes	F
	Upper Big Lake Pasture	Big Swamp Cr	NA	No			
		Slag-a-melt Cr	NA	No			
		Little Lake Cr	NA	No			
Monument	Hamby Creek Pasture	Englejard Cr	NA	No		Yes	FAR
		Hamby Cr	NA	No			
		Little Swamp Cr	NA	No			
	Miner Creek Pasture	Miner Cr	NA	Yes	Yes	Yes	F
		Gravelle Cr	NA	No			
Pioneer	Pioneer Pasture	Pioneer Cr	NA	No	Yes		F
		Pioneer Cr, N Fk	NA	No		Yes	F
		Pioneer Cr, Trib1	NA	No			
		Berry Cr	NA	No	2 Surveys	Yes	FAR
	Skinner Meadows Pasture	Big Hole R	NA	No	3 Surveys	Yes	F
		Blind Canyon Cr	NA	No	Yes		F
		Jahnke Cr	NA	No			
	VanHouten Pasture	Big Hole R	Restoration	Yes			
		Big Hole R, Trib1	Restoration	No			
		Berry Cr	NA	No			
Saginaw	Pasture 1	Big Hole R, Trib2	Restoration	No			
	Pasture 2	Big Hole R	NA	Yes			
		Englebaugh Cr	Restoration	No			
		Englebaugh Cr, E Fk	Restoration	No	Yes	Yes	FAR
		Englebaugh Cr, W Fk	Restoration	No	Yes		FAR
		Englebaugh Cr, W Fk, Trib1	Restoration	No			

Table 3: Project Streams by Allotment and Pasture

Allotment	Pasture Name	Stream Name	Key Watershed	TMDL	Legacy Stream Surveys	*Recent Stream Surveys	Function and Trend
		Saginaw Cr	Restoration	No	Yes		FAR
	Pasture 3	Englebaugh Cr, E Fk	Restoration	No	2 Surveys	Yes	FAR↓
		Englebaugh Cr, E Fk, Trib1	Restoration	No	Yes		FAR↓
		Englebaugh Cr, W Fk	Restoration	No			
	Pasture 4	Governor Cr	NA	Yes			
		Governor Cr, Trib1	NA	No	2 Surveys		FAR↓
		Governor Cr, Trib1, Trib1	NA	No		Yes	FAR↓
		Indian Cr	NA	No	Yes		FAR
		Little Indian Cr	NA	No	2 Surveys		FAR

(* Recent Surveys include 2008 and 2011)

Allotment Specific Descriptions

Seymour Allotment

The Seymour Allotment is comprised of three Forest Service pastures and six MFWP pastures that are part of the rest rotation. There are 10 mapped streams segments on FS lands (See Appendix A-5 for map) with two TMDL listed streams (Twelvemile and Corral Creek). Corral Creek, Slaughterhouse, and Tenmile Creeks are in fisheries key watersheds and twelvemile, Sullivan, and Seymour are in restoration key watersheds in the 2009 Forest Plan. There are four legacy stream surveys completed (two on tenmile and two on Sullivan Creek) in the allotment and one new survey (Tenmile) completed. Most of the streams were assessed qualitatively as well as additional areas on concern where noted.

Tenmile pasture

The tenmile pasture has been rested the last few years but grazing impacts were observed near the road possibly from moving cows through the area or the presence of trespass cows. All of the grazing impacts observed during the qualitative surveys were minor and described in more detail below.

There are two legacy stream surveys present in the upper end of the drainage. The results show that the streams in the pasture appear to be functioning. Both of the historic stream surveys show that the streams were properly functioning with limited grazing impacts.

Qualitative surveys show that the stream appears to be functioning with limited cow impacts (i.e., bank trampling/shearing, bank widening from cows trailing across the stream). Some impacts from roads were noted with a high natural sediment load possibly from transitional channel type changes and recent bark beetle effects.

Slaughterhouse Creek was quantitatively surveyed in 2008 and qualitatively surveyed. The results show that the stream was functioning at risk with an upward trend with some cow impacts that decreased as you moved upstream. Road impacts were also noted in places.

Corral Creek was functioning at risk and had some localized cow impacts above the road that decrease as you move upstream into the trees. Below the road there are recreation and cow impacts in the open area and then the stream is diverted causing more impacts downstream where the stream is more a ditch than a stream with the historic channel completely abandoned at low flow. This stream is TMDL listed for sediment and although grazing impacts are contributing to sedimentation, channel diversions appear to be the greatest influence to decreased channel conditions.

Sullivan Pasture

Twelvemile Creek and a West Fork tributary both appeared to be functioning with limited cow impacts. An expansive willow complex protects lower twelvemile and West Fork with significant beaver activity and broad riparian wetland areas. Twelvemile is a TMDL listed stream for sediment but there was very little evidence that grazing impacts were a major contributor to sedimentation given the densely willowed riparian area and recent rest period. Sullivan Creek is a well armored with a large floodplain. Cow impacts are present in places but limited by armored morphology and forested setting. Natural channel migration and multiple channel development is common in this watershed and is partially attributed to beaver activity. Although there was a legacy stream survey conducted low on Sullivan Creek, the current condition has divergent channels making comparisons and trend calls difficult. The stream was rated as functioning at risk in legacy surveys and appears to be in a static or slightly upward trend based on qualitative assessments. Lower in the drainage there are more cow impacts, but as you move upstream they decrease and are very limited in upper tributaries (e.g., Bear Trap Gulch).

Seymour Pasture

Seymour Creek is a large active channel with large substrate and multiple natural channels. Road impacts exist, especially at the bridge crossing, but overall condition appear to be functioning. Recreation impacts also noted but cow impact is limited.

LaMarche Creek looked to be in proper functioning condition, with no obvious cow impacts seen.

MFWP Pastures

There are 6 MFWP pastures below FS lands with only a small portion of FS land encompassed in them. Most of the streams in the pastures were characterized by large willowed riparian areas that limited grazing access. A recent quantitative survey on tenmile creek was completed and found the stream to be functioning at risk with limited grazing impacts. Several areas were looked at qualitatively and found there to be localized grazing effects but overall MFWP pastures appeared to be in functioning.

Fishtrap Allotment

The Fishtrap Allotment is comprised of two pastures and has six mapped streams (See Appendix A-5 for map) with one TMDL listed streams (Fishtrap Creek). There are three legacy stream surveys completed (EF Fishtrap, EF Fishtrap trib, and Swamp Creek) in the allotment and three new surveys (EF Fishtrap, EF Fishtrap trib, and Swamp Creek) completed. Most of the streams were assessed qualitatively as well with additional areas of concern noted.

East Fork Pasture

East Fork of Fishtrap Creek consists of the main fork and a tributary fork, both are within the East Fork Pasture and both have a legacy stream survey and recent streams survey, the results show little change in stream widths over the past 12 years. This result was expected given the forested nature of these streams. The tributary of the East Fork of Fishtrap showed more signs of grazing pressure and the impacts associated with soft banks which included a higher bank angle and more evidence of trampling. These streams would be rated as functioning at risk with a static trend.

The results of the qualitative survey suggest that the streams in this pasture have limited cow impacts in most areas and isolated areas of more intense pressure where trailing and congregation occurs more regularly. Other potential impacts to stream integrity include road and irrigation diversions.

West Fork Pasture

Swamp Creek had one legacy and one recent survey completed (2008), the results show a static trend based on the comparison of legacy vs. recent survey widths. Stream has a high number of willows that provide good structural support but the stream is dynamic with a wide range of channel widths.

The qualitative survey shows that the stream is well protected by willow in many sections which limits cattle access. Some cow impacts were observed where cattle were able to access stream but damage was minimal. There are natural sediment sources (bare cut slopes) as well as some minimal road impacts indicated on the survey. A new structure was installed recently on the 1279 road crossing which limited the impacts from roads.

The Middle Fork of Fishtrap has some cow impacts but mostly from cattle trailing. There is some damage and sediment delivery from cow trails; dropping a few of the dead trees would help remedy this issue. Wetlands adjacent to the stream looked healthy and most of the stream appeared to be in functioning condition with minimal use given the forested landscape. A new culvert on the 1279 road has reduced road impacts but an old crossing below the road is still causing some disturbance in the stream character.

The West Fork of Fishtrap if heavily fortified by an extensive willow complex that limits cattle access. The stream had extensive beaver activity and looks to be in functioning condition as do the adjacent wetlands.

The mainstem of Fishtrap creek begins at the confluence of the Middle and West Forks, where the stream is designated as being on the 303d list of quality impaired waters. Minimal cattle impacts were identified and stream conditions on the forest appeared to be in functioning condition.

Mudd Creek Allotment

The Mudd Creek Allotment has one pasture with 13 mapped stream segments (See Appendix A-5 for map). There are seven legacy stream surveys completed (Calvert Creek, Mudd Creek Trib 2, Mudd Creek Trib 1, two on York Gulch, two on York gulch tributaries) in the allotment and three new surveys (Calvert Creek, York Gulch, York Gulch trib) completed. Most of the streams were assessed qualitatively as well and additional areas of concern where noted.

Mudd Creek Pasture

Calvert Creek has a legacy and a new stream survey; the results support the qualitative assessment which indicates substantial grazing impacts below the FR 1223 as well as cumulative effects from dewatering due to a stream diversion which have degraded stream function. There was evidence that the stream was on a downward trend based on an increase in bankfull channel width from 1999 to 2011 but qualitative data showed the trend was more static with cumulative effects from dewatering primarily driving the overwidening although some grazing impacts also exist.

Cow impacts were prevalent below the main road crossing to the pasture fence. There is also a non-functioning headgate that is having significant impacts to hydrology resources on the lower end of the stream. The stream above the road crossing improves quickly and only limited cow impacts were observed within one quarter mile above the road.

The tributary on the map is intermittent and cow impacts were minimal.

Mudd Creek is a relatively good sized stream with extensive willow bottom that limits cow accessibility to stream. There are two legacy surveys but only on tributaries of the main system which appear to be more ephemeral. Trib 1 did have some cow impacts but were limited by downed timber. Mudd Creek below the 1223 road crossing was functioning at risk

but heavily de-watered from dysfunctional diversion structures, some cow impacts were also noted. The upper portions of Mudd Creek, above all of the roads, had some cow impacts but they decreased as you went upstream and disappeared almost entirely when you got into the forested portions of the watershed. There were road impacts noted in places and the West Fork also had a stream diversion to supplement York Gulch that had some hydrology impacts from de-watering effects.

York Gulch has been modified to receive water from the West Fork of Mudd Creek and most of the stream has been enclosed by fencing and is properly functioning. There are three legacy surveys and two new surveys, unfortunately the lower York Gulch new surveys is in an exclosure on a modified channel so it is not a good indicator of grazing pressure. The other new survey is on a tributary to York Gulch, it was on a higher gradient channel but still showed slight improvement based on bankfull channel widths. Most of the streams in this pasture, including the tributary of York Gulch where the survey was located, are on forested streams with limited grazing pressure although there are a few problem areas where more available suitable grazing lands adjacent to streams are available.

The stream is ditched above the main road crossing and is mostly fenced out below the road so cow impacts were very limited. In areas adjacent to the stream that were accessible for grazing, conditions also appeared to be functioning. Places that were not properly functioning appeared to be improving. The main tributary appeared to be functioning as well.

Pintler Creek Allotment

The Pintler Creek Allotment has one pasture with two mapped streams segments (See Appendix A-5 for map). There are three legacy stream surveys completed (Pintler creek above the lake, Pintler Creek below the lake, and Pintler Creek Trib) in the allotment and one new survey (Pintler creek trib) completed. Most of the streams were assessed qualitatively as well to capture additional areas of concern.

Pintler Creek Pasture

Pintler Creek trib is a small stream with a legacy survey and a new survey completed, unfortunately the data for the legacy survey could not be found so a quantitative assessment could not be completed. The data for the 2011 quantitative survey showed that the stream was functioning at risk with some grazing impacts that were limited by the forested nature of the stream. Below road 1223 where the stream is in more of a meadow a qualitative survey was also completed and considerable grazing impacts were observed. The stream is overwidened and has lost connection with floodplain in places.

Pintler Creek is a relatively large stream that is listed for physical substrate habitat alterations on the 303d list of impaired waters. The stream has limited grazing impacts below the lake where it is wooded with limited range. Above the lake the stream is very deep with vertical banks which limit grazing impacts. Further upstream in the large meadow there are some significant grazing impacts and a section of non-functioning stream where cows have broken

down banks and overwidened a section of stream. This area is in the vicinity of the legacy stream survey but only constitutes a portion of the overall stream length.

Mussigbrod Allotment

The Mussigbrod Allotment has two pastures with four mapped streams segments (See Appendix A5 for map). There are three legacy stream surveys completed (two on Mussigbrod, one on Bender) in the allotment. Most of the streams were assessed qualitatively as well as additional areas on concern where noted.

Mussigbrod Pasture

Mussigbrod Creek had two legacy stream surveys completed but conditions have changed significantly following a large wildfire which burned a large portion of the allotment. Mussigbrod is listed as an impaired stream on the 303d list but cattle impacts were found to be limited especially higher in the watershed. Cow impacts were observed in the lower reaches as well as recreation impacts and significant effects from diversions which dewatered the channel. The stream looked well overall though.

There are three legacy stream reaches on Mussigbrod Creek (1998) and at the time these reaches were surveyed, all three reaches were determined to be functioning with static trends. It was noted that one of the reaches contained lots of large woody debris on the banks and in the channel.

Bender Pasture

Bender Creek Watershed was heavily burned in the 2001 fire but has recovered very well. Cow impacts were limited by extensive downed trees and dense riparian vegetation. Beavers have also started colonizing the stream but all indications show a healthy recovery.

There is one legacy (1998) stream reach on Bender Creek and at the time of the survey the reach was determined to be functioning with static trend.

The Bender Trib was not as fortunate as Bender Creek. A large meadow created a sanctuary for cows to feed and grazing impacts were heavily focused on the Bender Trib creating non-functioning conditions. Beavers have also colonized this stream and may have exacerbated problems creating large headcuts and loss of channel form. Temporary exclosures were put in place to limit grazing impacts but they were ineffective.

Ruby Creek Allotment

The Ruby Creek Allotment has three pastures with 28 mapped streams segments (See Appendix A-5 for map). There are 15 legacy stream surveys completed (Butler, Gory, Little Moosehorn, two on Big Moosehorn, five of Ruby, two on Ruby tributaries, two on Calf, and one on Cow Creek) in the allotment and four new surveys (Butler, Calf, and two on Ruby

Creek) completed. Most of the streams were assessed qualitatively as well as additional areas on concern where noted.

Butler Pasture

Butler Creek is the only stream in the Butler pasture; it has one legacy survey and one new survey. The legacy stream reach surveyed was determined to be non-functioning with a static trend, but the current survey determined the reach to be functioning at risk with a slight upward trend although grazing impacts were still a concern.

The qualitative survey indicates limited cattle impacts above FS road 943 due to the large complex riparian corridor with extensive willow development and beaver activity. This is a relatively large stream with good channel morphology and riparian communities. The concern area appears to be downstream of the 943 road crossing where site conditions were found to be more degraded in the quantitative surveys.

Lower Ruby Pasture

The Lower Ruby Pasture has a number of mapped streams all of which are encompassed in restoration watersheds in the Forest Plan. Ruby Creek is a relatively large stream that has been identified on the 303d list as impaired (see table 2 above) the tributaries that flow into Ruby Creek in the Lower Ruby Pasture include Gory Creek, Nickel Bar Gulch, Wenger Creek, Little Moosehorn, and Big Moosehorn. There are four legacy stream surveys in the pasture. The legacy surveys on Gory, Little Moosehorn and both surveys on Big Moosehorn Creek determined that each of the reaches was functioning with static trends.

Qualitative data for Gory Creek shows that the stream has limited cow impacts with the section above the 943 road crossing mostly forested and functioning. The area below the road turns into a wide willow riparian complex with beaver activity noted. Some cow impacts were observed near the road but they decreased as you went downstream. Nickel Bar Gulch was functioning with limited cow impacts.
Wenger Gulch is a heavily modified stream with some cow impacts but far more for historic impacts from channelizing and diversion. There were road issues noted as well where beavers are plugging an undersized culvert on the 943 road.

Big and Little Moosehorn both were functioning with some cow impacts noted in the lower stretches. Adjacent wetlands were functioning as well and grazing issues appeared to be focused in areas where cows were concentrated under trees for shade. Riparian areas were wet and willowed which provided good protection to stream banks.

Ruby Creek within the pasture was functioning and the large willowed riparian bottom provided good protection. Most significant issues noted were road related.

Cow Creek Pasture

The cow creek pasture encompasses the headwaters of Ruby Creek and has a number of tributaries. There are 10 legacy stream surveys in the pasture and three recent surveys. There was quite a bit of variability in the legacy quantitative survey results. Three legacy surveys on Cow, the upper Ruby and the lower West Fork Ruby Creeks determined that these reaches was non-functioning; Two legacy survey reaches were considered functioning-at-risk (upper Calf Creek and Upper Ruby Creek): Five legacy reaches were determined to be properly functioning (lower reach on the Calf Creek (Cow Creek trib.); two tributaries to Ruby Creek (Tribs 1 & 2), the lower reach on Ruby Creek, and the middle reach on the West Fork Ruby Creek).

The recent surveys were conducted on Calf Creek (Cow Creek trib.), Ruby Creek (Ruby Up), and West Fork Ruby Creek (W Fk Ruby DN). Calf Creek was determined to be functioning properly with some banks showing evidence of shearing, but for the most part functioning and being held together with dense sedge growth and some willow. Ruby Creek (Ruby Up) was determined to be functioning at risk with a static trend; there are some collapsed/sheared banks and evidence of trampling, but large portions of the reach have good willow growth protecting the banks. West Fork Ruby is considered to be functioning at risk with a static trend. A large portion of the survey reach has willow growth to protect the banks, though where there aren't many willows the banks have been sheared and there are also a few inner meander banks with large depositions.

Qualitative surveys show that Ruby Creek and some of the tributaries have some significant road issues in a number of locations. There are also cow impacts is places with some degraded areas. There were no non-functioning sections that were observed but several that were functioning at risk although most areas appeared to be improving from historic conditions.

Cow and Calf Creek flow through a very large wetland complex with historic diversion channels that appear to be modified for flood irrigation. Historic grazing appears to be higher than current conditions and several sections of stream appear to be improving although there are some sections that are still degraded. Cow impacts decrease as you move upstream and adjacent wetland conditions look good although there are some grazing impacts and historic human impacts like undesigned water developments and channel modification.

Nugget, Pioneer, and Rabbit Creek Tribs have mining and road impacts noted and appear to be as significant as grazing impacts. Grazing impacts were also noted but channel and bank conditions were okay in the sections of stream walked.

Ruby Creek trib 3 has two channels and both are being negatively impacted from road crossings. Both channels have cow impacts but were limited by willow bottoms and wet meadow complexes. One of the channels was also channelized historically but is still functioning within its modified channel.

The upper Ruby Creek tributaries including the West Fork, Trib 1, and trib 2 all had cow impacts noted but not to the extent where they making the streams non-functioning. Most of the impacts were isolated to the lower reaches of the streams near the main channel of Ruby Creek. There were grazing impacts but cumulative effects from roads and mining created more channel problems than grazing. All of the sections surveyed were at a minimum functioning at risk with static or improving trends.

Dry Creek Allotment

The Dry Creek Allotment has two pastures with seven mapped streams segments (See Appendix A-5 for map). There are three legacy stream surveys completed (Dry Creek, Big Lake Creek near forest boundary, and Big Lake Creek near the lake) in the allotment and one new survey (Lower Big Lake) completed. Most of the streams were assessed qualitatively as well as additional areas on concern where noted.

Lower Dry Creek Pasture

There are two mapped streams in the Lower Dry Creek pasture, Big Lake Creek and Sawmill Creek. Sawmill Creek was walked but there was no evidence of perennial water or riparian vegetation. Big Lake Creek had a legacy stream survey and a new stream survey. Both the legacy and the current surveys determined that the reach on Big Lake Creek was functioning at risk with a static trend. Most of the streambanks were stable due to cobble/boulder substrate. This is a relatively large stream and the surveys fell on a forested transport reach which was not a good indicator of stream condition due to morphology constraints.

The qualitative surveys indicate that the stream is functioning with grazing impacts limited by the large substrate and high flows.

Upper Dry Creek Pasture

Dry Creek and upper Big Lake Creek had legacy stream surveys completed although no new surveys were completed. The legacy site on Dry Creek was visited for resurveying, but the survey reach was dry and therefore not resurveyed. Qualitative surveys indicate considerable grazing impacts on Dry Creek especially lower down in the allotment. The lower portion of the stream is also diverted and subsequently dried up causing degraded conditions. The stream has a good willow component and some large substrate which has held the stream together but in a degraded condition over most of the walked reach. Dropping a few trees in the riparian corridor would help disrupt cattle grazing and may limits grazing access to sensitive areas.

The streams in the upper watershed are primarily forested with some meadow complexes that had minimal impacts.

Twin Lakes Creek Allotment

The Twin Lakes Allotment has four pastures with seven mapped streams segments (See Appendix A-5 for map). There are three legacy stream surveys completed (two on Big Swamp and one on Slag-a-melt Creek) in the allotment and one new survey (Slag-a-melt) completed. Most of the streams were assessed qualitatively as well as additional areas of concern where noted.

Lower Big Lake Pasture

The lower Big Lake Pasture qualitative survey indicated that grazing impacts were present in the pasture especially in areas where cows could easily access stream banks. Stream conditions appeared to be functioning, beaver activity as well as dense riparian vegetation limited grazing disturbance. Grazing impacts subsided quickly as you moved upstream into the more forested sections of the pasture. Road and recreation impacts noted in the survey.

Lower Little Lake Pasture

The lower end of Little Lake Creek in the Lower Little Lake Creek Pasture overall appeared to be functioning although there was some problem areas noted. A complex riparian corridor with significant beaver activity limited cattle access the stream banks. Areas where cows could easily access the stream had the most significant issues but did not constitute a large portion of the stream.

Upper Little Lake Pasture

The upper end of Little Lake Creek in the Upper Little Lake Creek pasture was not looked at but conditions are expected to be functioning given the conditions in the lower pasture and fact that the stream is mostly forested.

Upper Big Lake Pasture

There are three legacy stream surveys (two on Big Swamp—an upper and a lower, and one on Slag-a-melt), one survey of Big Swamp from 2008, and one new survey in the upper pasture (Slag-a-melt). The legacy surveys for the upper Big Swamp Creek and Slag-a-melt reaches were determined to be functioning with static trend and the lower site on Big Swamp Creek was considered functioning at risk with a static trend. The recent survey on Slag-a-melt also considered the stream reach to be functioning with a static trend.

Both of the stream segments are mostly forested and minimal grazing effects were observed.

Monument Allotment

The Monument Allotment has two pastures with six mapped streams segments (See Appendix A-5 for map). There is one legacy stream surveys completed (Miner Creek) in the allotment. Most of the streams were assessed qualitatively and areas of concern where noted.

Miner Creek Pasture

There are two streams mapped in the Miner Creek Pasture the first, Gravelle Creek is intermittent but the condition looked good and there was more wildlife use than cattle use observed. Several spring wetland areas also were in healthy condition.

Miner Creek which is a listed as impaired on the 303d list appeared to be properly functioning based on the legacy survey and 2008 surveys which show extensive undercut banks, deep pools, and stable vegetated banks. There was extensive beaver activity noted as well and impacts from recreation and roads.

Hamby Pasture

There were no quantitative surveys completed in the pasture but qualitative surveys were completed on all of the streams in the pasture and on several un-mapped streams. The surveys indicated that there were grazing impacts in several areas but they were localized and limited by dense willow bottoms and swampy wet adjacent wetlands. Many of the streams in the pasture were impacted from diversions and roads issues creating non-functioning sections of streams at times where they were channelized or severely overwidened.

Pioneer Allotment

The Pioneer Allotment has three pastures with 11 mapped streams segments (See Appendix A-5 for map). There are seven legacy stream surveys completed (two on Berry Creek, one of Pioneer, three on the upper Big Hole, and one on Blind Canyon) in the allotment and two new surveys (Berry Creek and upper Big Hole) completed. Most of the streams were assessed qualitatively as well as additional areas on concern where noted.

VanHouten Pasture

There are three mapped streams in the VanHouten pasture, Berry Creek, Big Hole trib1, and two small sections of the upper Big Hole River. The small section of the Big Hole River are on the 303d list as impaired waters (See Table 2 above) and is identified as a restoration watershed in the Forest Plan. The lower stream segment had the most effects from grazing pressure because it was a located at the lower end of the pasture closer to the pasture fence where cows congregate. The upper section of stream did not have as many grazing effects identified.

Lower Berry Creek in the VanHouten Pasture overall appeared to be functioning with limited grazing effects. There was some multiple channel development but was in balance with the landform. Impacts from motorized trails and water diversions were also noted.

The Big Hole trib also appeared to be functioning and had limited grazing impacts. The stream was heavily modified by beavers which made the stream difficult to access. There is a campground on the upper reaches which had limited recreation impacts.

Pioneer Pasture

There are three mapped streams in the Pioneer pasture: two on Berry Creek (upper and lower), and one on Pioneer Creek. There were three legacy and one new stream survey completed. All three legacy surveys determined the reaches to be functioning properly with static trends. The recent survey on Berry Creek (Down) considered the stream reach to be functioning at risk. There was evidence of a downward trend but after looking at the stream more closely it appears the channel widening was a result of high flows from the 2011 runoff season based on photo comparisons and on-the-ground observations.

The streams are characterized by areas of stringer meadows with grazing impacts limited to localized places where cows could easily access stream banks. Cow impacts were observed in areas especially where trailing paths were close to stream banks and near fence lines. Unhardened crossings on Pioneer Creek and Berry Creek were also noted as cumulative effects.

Skinner Meadows Pasture

There are three mapped streams in the Skinner Meadows pasture, Jahnke Creek, two sections of the Upper Big Hole River, and Blind Canyon Creek. There were 4 legacy surveys completed, three on the Big Hole (upper, middle, and lower) and one on Blind Canyon Creek and one new survey on the Big Hole River. All four legacy surveys determined the reaches to be functioning properly. The recent survey on the lower Big Hole River considered the stream reach to be functioning properly with an upward trend.

All of the streams in the pasture had minimal grazing impacts noted. Blind Canyon and Jahnke Creek were mostly forested limiting most grazing effects. The Upper Big Hole has a broad willowed riparian corridor which limits cow access. The lower section of the upper Big Hole Big Hole River is on the 303d list as impaired waters (See Table 2 above) but less than 500 feet are in the pasture and that small section was properly functioning. The upper section of the upper Big Hole River was not listed as impaired.

Saginaw Allotment

The Saginaw Allotment has four pastures with 20 mapped streams segments (See Appendix A-5 for map). Most of Pasture's one, two, and three are identified in the Forest plan as restoration watersheds. There are eleven legacy stream surveys (two on Govenor Creek trib 1, two on Little Indian Creek, one on Indian, one on Saginaw, one the West Fork of Englebaugh, three on the East Fork of Englebaugh, and one on the East Fork of Englebaugh trib 1) in the allotment and two new surveys (both on the East Fork of Englebaugh) completed. Most of the streams were assessed qualitatively as well as additional areas on concern where noted.

There were two large recreation events in the Saginaw allotment in 2000 and 2013 in association with the Rainbow Gathering. There was limited short term impacts to hydrology resources but no long term effects are anticipated from these events.

Pasture 1

The Big Hole Trib 2 is the only stream mapped in pasture 2 and is a very small intermittent channel. Because it is the only water in the pasture grazing pressure is high and the conditions on the stream show with extensive grazing impacts observed over most of the channel. Conditions improve some as you get into the trees in the upper reaches but still impacted.

Pasture 2

Pasture two incorporates the East and West fork of Englebaugh and the mainstem below the confluence as well as some umapped streams. The past also captures the entire drainage of Saginaw Creek. There are three legacy surveys (Lower East Fork Englebaugh, West Fork Englebaugh, and Saginaw) and one new survey completed (Lower East Fork Englebaugh). The Lower East Fork Englebaugh was determined historically to be non-functioning with a static trend; the current surveyed determined the reach to be functioning at risk with a static trend. The legacy survey on Saginaw Creek determined the stream reach to be functioning at risk with a static trend.

Saginaw Creek is a very small stream with limited riparian vegetation. The sedge channel shows signs of grazing pressure but is still functioning. This was the results of the legacy stream survey as well.

The East Fork of Englebaugh above the confluence was the most heavily impacted stream in the pasture with grazing pressure concentrated by a fence and steep hillside. Others streams in the pasture showed signs of grazing impacts but were limited and appeared to recovering from historic use. The lower meadow of Englebaugh was properly functioning. Conditions within this pasture showed fewer signs of grazing impacts than the other pastures in the allotment.

Pasture 3

Pasture three incorporates the upper sections of the West Fork of Englebaugh, the East Fork of Englebaugh, and the East Fork of Englebaugh Trib 1. There are three legacy (Middle East Fork Englebaugh Upper East Fork Englebaugh, and East Fork of Englebaugh Trib 1) and one new stream survey (Upper East Fork Englebaugh). Two of legacy surveys determined the reaches to be non-functioning; Middle East Fork Englebaugh and Upper East Fork Englebaugh. The East Fork Englebaugh Trib 1 was determined to be functioning with a static trend. The recent survey on the East Fork Englebaugh (South Trib) considered the stream reach to be functioning at risk with a downward trend.

The West Fork of Englebaugh is a small forested stream that did not have a lot of significant grazing impacts primarily because its location on the landscape with minimal suitable grazing habitat adjacent to the stream.

The East Fork of Englebaugh and trib 1 did have significant grazing impacts and some sections of the stream were non-functioning with others functioning at risk with a downward trend associated with several headcuts that have started to form in the channel. The location of this stream on the landscape makes it difficult to manage because it is at the base of a steep hill with a narrow stringer meadow that congregates cattle.

Pasture 4

Pasture four has four mapped streams including two tributaries of Governor Creek, Little Indian, and Indian Creek. There are 5 legacy stream surveys (two on Little Indian, two on Governor Trib 1, and one on Indian) and one survey completed in 2008 (Governor Trib 1 of trib 1). Four were considered functioning (two on Little Indian, one on Governor Trib 1, and one on Indian) and one was considered non-functioning (Governor Trib 1).

Qualitative surveys indicate significant grazing impacts on several sections of stream. Grazing impacts were observed on all streams and there were sections of stream on the Governor tributaries that would be considered non-functioning or functioning at risk with a downward trend.

Little Indian also had sections of functioning at risk with a downward trend but only one small section of non-functioning stream above the road where a headcut has entrenched the stream.

Indian Creek had grazing effects from the source to the forest boundary with heavier effects noted lower to the forest boundary. There was some willow growth which limited impacts in some areas but overall the entire stream would be rated as functioning at risk.
All of the streams in this pasture are characterized by stringer meadows which makes management especially difficult by concentrating grazing pressure on riparian bottoms. There are willows present on the lower reaches although most of the streams are primarily comprised of sedge riparian zones. Where willows are present they are not dense enough to limit grazing access to banks.

Analysis

Methodology

Spatial Scale

The spatial extent of the direct and indirect effects is encompassed within the HUC 6 boundaries that fall within the project area boundary. Most of the direct effects will be observed on specific perennial stream segments within the allotment boundaries. Some indirect effects are expected adjacent to perennial stream segments and on intermittent stream segments but all direct and indirect effects from cattle grazing will be encompassed in the HUC 6 boundaries. Project watershed boundaries can be found on Big Hole AMP overview map.

The cumulative effects analysis area includes the same watersheds identified for indirect and direct effects as well as additional watershed acres above the project area boundary where cumulative effects could affect downstream resources. Cumulative effects were not analyzed below the project area boundary because effects from FS lands were determined to be negligible in the scope of all activities (examples included; large scale agriculture, significant diversions to most project streams, and large year round grazing practices) occurring in the Big Hole River Drainage.

Temporal Scale

The temporal scale for this analysis is the life of this document (approximately 10 -15 years). When it comes to the effects on conditions associated with stream channel morphology temporal effects can be as short as one season and as long as decades depending on a number of variables linked to vegetation, geology, and channel morphology. Pertinent stream variables will be discussed in this document and addressed in direct, indirect, and cumulative effects.

Resource Indicators to be Analyzed and Units of Measure

Table 4: Analysis Questions, Resource Indicators, and Units of Measure

Analysis Question	Resource Indicator	Unit of Measure
1: Will there be a change in stream and riparian function?	*Is there a change in the grazing intensity for the pasture/allotment?*	Bank Disturbance
		Stubble height
		Woody utilization
	How would the change in Annual Use Levels (AUL's) influence stream and riparian function?	Stream Functionality
		Stream Trend
		Vegetation Composition
2: Will there be a measurable change in water quality (potential for sediment delivery)?	*Is there a change in the grazing intensity for the pasture/allotment?*	Bank Disturbance
		Stubble height
		Woody utilization
	How would the change in AUL's influence Water quality?	Stream Functionality
		Stream Trend
		Vegetation Composition
3: Will there be a change in water quality on 303d Listed Streams?	*Is there a change in the grazing intensity for the 303d listed stream?*	Bank Disturbance
		Stubble height
		Woody utilization
	How would the change in AUL's influence Water quality?	Stream Functionality
		Stream Trend
		Vegetation Composition

Analysis Assumptions

Why we use AUL's as a measure

We know from studies completed on the forest (Bohn, 2004) that when we meet AUL's on a particular stream segment, we typically see stream conditions improve towards desired condition. By using AUL's as a measure for relative grazing pressure changes from existing condition we can use that measure to determine what effects we would expect to see in existing stream condition, trend, and vegetation composition. Change in channel condition and vegetation composition is the primary hydrology related effect from cattle impacts and also captures the contributions from cumulative effects to best describe changes associated with project action(s).

The change in channel condition directly relates to the amount of sediment that enters streams and reduces water quality. Vegetation composition is important because it provides a buffer for sediment delivery from grazing and cumulative effects and provides protection for banks

and channel stability. For these reasons we have the same measures for water quality and 303d listed streams as have for stream and riparian function.

By using AUL's as a measure, we make some assumptions based on past practices that allow us to put more weight in our assessment. These assumptions help us develop the proposed action alternatives in this project. These assumptions are as follows;

Assumption a: Making AUL's more restrictive will help streams recover more quickly.

For streams that are not-functioning or functioning at risk with a downward trend we will make the AUL's more restrictive to recover these streams more quickly and move cows before they are have long term effects that would deter the streams recovery.

Assumption b: Additional resources like water developments and pasture fences will make compliance with AUL's easier.

Compliance with AUL's is one of the most important factors in allowing a stream to recover. Non-compliance can set a stream back for years and is the reason for some of the degraded sections of project streams. By adding fences and providing off site water it is easier to manage grazing movements and the amount of time spent in a certain areas which is important to reduce pressure on riparian areas and allow managers to move grazing animals before they exceed there AUL's and have greater impacts.

Assumption c: Changing the season of use can be beneficial to stream segments.

Changing the season of use can help manage vegetation and aid in recovery of specific vegetative components. This is site specific and governed by certain types of vegetation recovery although meeting AUL's can have similar effects. This is not the purpose of the season of use changes proposed and we do not expect substantial changes in vegetation composition from the minor changes in this decision.

Assumption d: Changes in stocking rates will make compliance with AUL's easier.

The less grazing animals on a stream, the longer it takes to meet AUL's and therefor the easier it is to manage and move cows when needed to protect riparian resources.

Assumption e: Rest Periods will allow streams to recover at a greater rate than being grazed.

Rest Periods allow the greatest recovery of riparian vegetation and in turn channel development to restore degraded stream systems. The longer and more frequently a pasture is rested the more recovery can occur although meeting AUL's is still critical when a pasture is grazed.

Analysis Methods

There is no single quantitative procedure to measure stream function. Forest Service Manual direction (FSM 2526) and scientific literature agree that a mix of qualitative and quantitative analysis is the best methodology to understanding current stream condition and anticipated

effects from project activities. On the Beaverhead-Deerlodge National Forest, we rely on the professional interpretation of data from the quantitative and quantitative inventories to access stream condition and ensure forest plan compliance.

To understand the existing stream/riparian function and water quality concerns we will analyze the streams in the project area to determine the current condition and trend. Furthermore, we will also identify problem areas and potential cumulative effects. Because this is such a large project area we will use available data as well as recently collected data to better understand existing condition and determine potential effects of the decision. The primary sets of data used to determine existing condition include;

- Quantitative stream morphology measurements
- Qualitative stream function assessments
- Photographic trend data

Specific metrics from the above data sets were utilized to identify trend (if applicable), they include;

- Average channel width
- Bank Stability
- Vegetation composition (presence/absence of willow and native riparian community with bank stabilizing roots masses)

Quantitative Stream surveys

Historic quantitative stream surveys were completed within the analysis area from 1992-2001. The surveys are reach-specific and designed to classify stream type (Rosgen, 1996). Protocols have evolved over the years to keep up with the best science available and not all metrics were utilized from historic surveys because of inconsistencies with historic data. Current Quantitative Surveys are more focused on channel width and bank stability which were metrics where we saw the most change from grazing related impacts. Current and historic protocols can be found in the project record under references.

Survey sites tend to be in lower gradient "response reaches" and are designed to enable assessment of stream condition and trend. Response reaches recover from impacts more quickly than other reaches and thus provide more immediate indications of effects from land management. They also allow us to account for impacts upstream of the surveyed reach. A number of sites in the project area were surveyed in 2008 in conjunction with a forest wide integrated stream monitoring program that started in the Big Hole River watershed. Additional key reaches were selected to be resurveyed in 2011 to determine trends in stream conditions. Historic Survey Protocols measured a number of variables to classify the stream and determine condition; including the following:

- Width/Depth ratio
- Sinuosity
- Stream Gradient
- Particle Size Distribution
- Cumulative Widths (Rosgen, 1996)
- Channel Stability Evaluation (Pfankuch, 1975; Rosgen, 1999)
- Bank Erosion Hazard Index (Rosgen, 1999; Rosgen, 2001)
- Entrenchment* (this metric was only used to determine Rosgen class)

Historic stream surveys were analyzed so the reach in question ("project" reach) could be compared to a reference reach from a watershed that is of similar drainage area (DA), valley bottom width (VBW), and valley bottom gradient (VBG) (Rosgen, 1998). This was how the initial Proper Functioning Condition (PFC) calls were made. Because of the challenges associated with finding a suitable reference reach and lack of confidence in the historic data we now use our Forest Plan guidance to determine if the current stream conditions are meeting a set of variables (*discussed in Rosgen 1999; Rosgen, 2001*). We would expect a stream to be properly functioning if the following variables are met:

- Stream can access its floodplain at 1-2 year intervals
- Stream can carry and manage the natural sediment load from the upstream watershed
- Stream can support a riparian vegetation associated with that valley bottom by maintaining the local water table
- Stream supports a stable morphology with a good mix of pools and riffles based on gradient and geology

If the stream is meeting these variables, we believe the stream is functioning properly. If the stream does not meet these variables then it is either functioning at risk of non-functioning. For streams that are functioning at risk we would expect minor deviations from the variables listed above and for streams that are not-functioning we would expect major deviation from the variables listed and most likely change in Rosgen channel type like a change from an "E" channel to a "C" channel (Rosgen, 1994).

Qualitative Surveys

During the summer of 2012 additional Qualitative surveys were conducted in the project area to supplement and validate Quantitative surveys. The Qualitative surveys represented visual observations throughout the project area and also included observations in wetland areas. Characterizing and determining condition of the streams and the riparian areas were the primary objectives of the Qualitative surveys. Capturing cumulative effect sources was also important and recorded where observed.

Qualitative surveys were necessary for a number of reasons; the primary reason was because there were only a few "response" reaches in the project area. While response reaches are important to quantitatively capture direct, indirect, and cumulative effects there is a large amount of stream miles that do not fall into this distinction. Beaver activity was another big factor. Many of the low gradient streams sections in the project area had considerable past and present beaver activity which makes conducting a Quantitative stream survey very difficult and typically does not provide reliable data for determining condition. Utilizing Qualitative stream surveys allowed us to fill in the data gaps across the project area and paint a more complete picture about the conditions on the ground. Qualitative data points can be found on hydro allotment maps and general descriptions can be found in observation points table.

Trend

Trend was determined by using the multiple years of data to compare the key variables listed above. Trend was determined by comparing the most recent data available to past data sets. A change in cumulative width between two or more years of data was used to determine trend; if

the stream width was narrower and other metrics show improvement form the recent quantitative survey, the stream is considered to have an upward trend (e.g., see figure 2), if the recent survey had a wider cumulative width and evidence of additional metrics describing grazing impacts, the stream is consider to have a downward trend (e.g., see figure 1), and if there was no or little difference the stream was considered to have a static trend (e.g., see figure 3).

For streams with only one year of data, a trend call was typically not made although condition and stream variables were described in detail. Trend data will continue to be collected for the project streams and management parameters as described in the EIS under the alternative descriptions. PFC condition and trend for the stream reaches used in this analysis can be found in the individual stream discussion. Trend was typically determined when we had two quantitative sites to compare but if good qualitative data was available and positive or negative trend was apparent, a trend call may have been discussed in the narrative.

Figure 1: Example of a downward trend

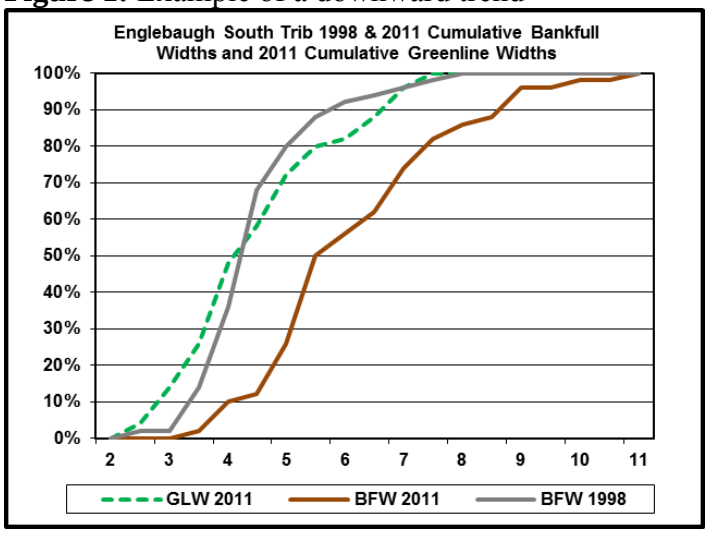


Figure 2: Example of an Upward Trend

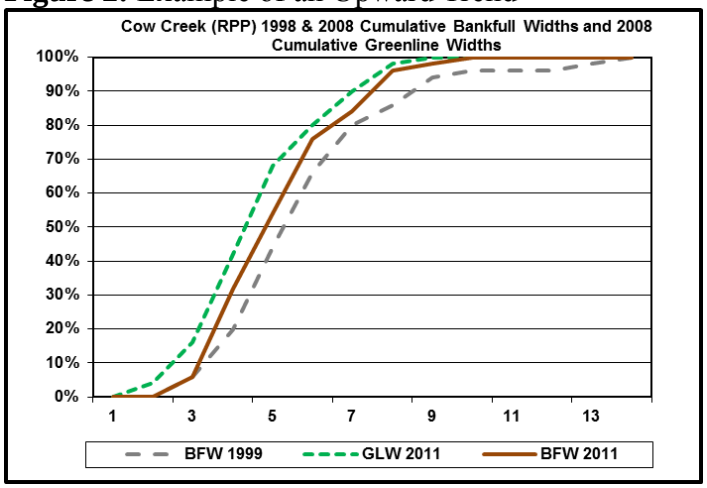
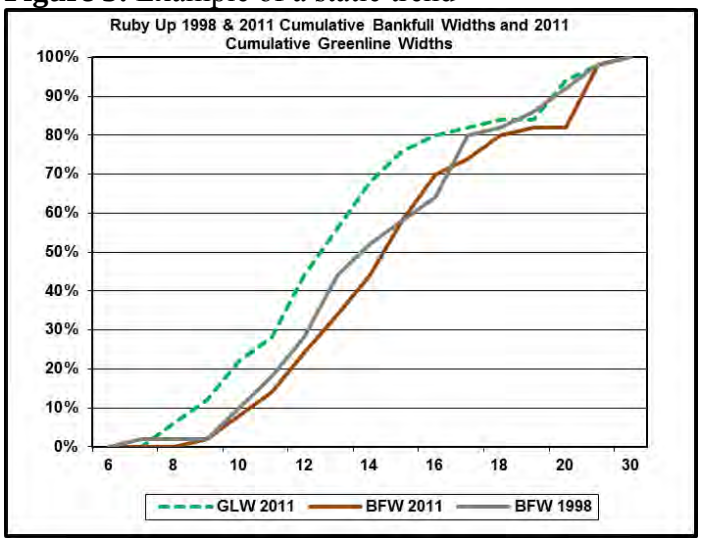


Figure 3: Example of a static trend



Past, Present, and Future activities used in the Analysis

Past, Present, and Future activities within the NWBH AMP project area that have the potential to affect hydrology resources listed above in the existing condition section. Those activities include, land management practices such as timber harvest, prescribed fire, fire suppression, bark beetle epidemic, roads and trails, recreation, mining, stream diversions, and livestock grazing. These activities will likely continue to affect the hydrology resources into the foreseeable future.

Seymour (all pastures)

Seymour No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The cumulative effects in the Seymour allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions especially the one found on Corral Creek are having the greatest impact on stream condition by dewatering the channel and limiting the ability for stream recovery.

Roads are also negatively affecting stream condition with undersized structures identified in the allotment which has been exacerbated by lodgepole mortality that has increase water yield in some areas. There are a number of aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

Removing cows is not expected to change the cumulative effects of these identified items but may help the recovery time of streams that are currently being negatively affected by roads and diversions.

Seymour Current Grazing Alternative

Direct/Indirect Effects

Tenmile Pasture

The direct and indirect effects to project streams in the tenmile pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the 10 mile pasture with the exception of sections of Corral Creek adjacent to the road. Additional monitoring may be necessary to ensure Corral Creek's condition improves but overall current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Sullivan Pasture

The direct and indirect effects to project streams in the Sullivan pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the Sullivan pasture. Overall grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Seymour Pasture

The direct and indirect effects to project streams in the Sullivan pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to the perennial streams and wetland areas in the Sullivan pasture. Overall grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

MFWP Pastures

The 6 MFWP pastures are below FS lands with only a small portion of FS land encompassed in them. The direct and indirect effects to project streams for all alternatives in the MFWP pastures would be similar to what we found in the existing condition because we are not proposing any changes to grazing management. Overall current grazing practices are having

limited impacts to the perennial streams and wetland areas in the MFWP pastures. Overall grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Cumulative Effects

The cumulative effects in the Seymour allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions especially the one found on Corral Creek are having the greatest impact on stream condition by dewatering the channel and limiting the ability for stream recovery. Roads are also negatively affecting stream condition with undersized structures identified in the allotment which has been exacerbated by lodgepole mortality that has increase water yield in some areas. There are a number of aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Seymour Proposed Action Alternative

Mitigation/Design Feature

The only significant change between the current grazing system and the proposed action would be the use of Tenmile pasture two out of three years. This pasture is currently unallocated so grazing impacts may be higher in this pasture but would reduce impacts in the other two pastures.

Direct/Indirect Effects

Tenmile Pasture

The direct and indirect effects to project streams in the tenmile pasture would be similar to what we found in the existing condition even though the pasture has been rested for several years. Overall past grazing practices are have had limited impacts to most of the perennial streams in the 10 mile pasture. The one exception may be Corral Creek which has non-functioning sections where more restrictive AUL's will be implemented to protect resources. Additional monitoring may be necessary to ensure Corral Creek's condition improves. Overall current grazing practices appear to be creating conditions that would allow the attainment of functioning condition although it will not be as quickly as the no action alternative.

Sullivan Pasture

The direct and indirect effects to project streams in the Sullivan pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the Sullivan pasture. Overall grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Seymour Pasture

The direct and indirect effects to project streams in the Sullivan pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to the perennial streams and wetland areas in the Sullivan pasture. Overall grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Cumulative Effects

The cumulative effects in the Seymour allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions especially the one found on Corral Creek are having the greatest impact on stream condition by dewatering the channel and limiting the ability for stream recovery. Roads are also negatively affecting stream condition with undersized structures identified in the allotment which has been exacerbated by lodgepole mortality that has increase water yield in some areas. There are a number of aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

The proposed action may add additional stress to streams impacted by the identified items but conditions were assessed with all of these factors considered and the proposed action would be more restrictive for streams that were non-functioning or functioning with a downward trend that would minimize grazing impacts on the most heavily impacted streams like Corral Creek.

Seymour Alternative 4

Mitigation/Design Feature

The only significant change between the current grazing system and the proposed action would be the use of Tenmile pasture one out of three years. This pasture is currently unallocated so grazing impacts may be higher in this pasture but would reduce impacts in the other two pastures.

Direct/Indirect Effects

Tenmile Pasture

The direct and indirect effects to project streams in the tenmile pasture would be similar to what we found in the existing condition even though the pasture has been rested for several years. Overall past grazing practices are have had limited impacts to most of the perennial streams in the 10 mile pasture. The one exception may be Corral Creek which has non-functioning sections where more restrictive AUL's will be implemented to protect resources. Additional monitoring may be necessary to ensure Corral Creek's condition improves. Overall current grazing practices appear to be creating conditions that would allow the attainment of functioning condition although it will not be as quickly as the no grazing alternative.

Sullivan Pasture

The direct and indirect effects to project streams in the Sullivan pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the Sullivan pasture. Overall grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Seymour Pasture

The direct and indirect effects to project streams in the Sullivan pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to the perennial streams and wetland areas in the Sullivan pasture. Overall grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Cumulative Effects

The cumulative effects in the Seymour allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions especially the one found on Corral Creek are having the greatest impact on stream condition by dewatering the channel and limiting the ability for stream recovery. Roads are also negatively affecting stream condition with undersized structures identified in the allotment which has been exacerbated by lodgepole mortality that has increase water yield in some areas. There are a number of aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

Alternative 4 may add additional stress to streams impacted by the identified items but conditions were assessed with all of these factors considered and the proposed action would be more restrictive for streams that were non-functioning or functioning with a downward trend that would minimize grazing impacts on the most heavily impacted streams like Corral Creek.

Fishtrap (all Pastures)

Fishtrap No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great as with current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The cumulative effects in the Fishtrap allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Roads will continue to negatively affect stream condition in the allotment although improvements to a couple of crossings will help minimize this effect. There are a number of aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

Removing cows is not expected to change the cumulative effects of these identified items but may help the recovery time of streams that are currently being negatively affected by roads and diversions.

Fishtrap Current Grazing Alternative

Direct/Indirect Effects

East Fork Pasture

The direct and indirect effects to project streams in the East Fork pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the East Fork pasture. Overall current grazing practices appear to be creating conditions that would allow the attainment of properly

functioning condition although it will not be as quickly as the no action alternative and Alternative 4.

West Fork Pasture

The direct and indirect effects to project streams in the West Fork pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the West Fork pasture. Overall grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative and Alternative 4.

Cumulative Effects

The cumulative effects in the Fishtrap allotment include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Roads will continue to negatively affect stream condition in the allotment although improvements to a couple of crossings will help minimize this effect. There are a number of aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Fishtrap Proposed Action Alternative

Mitigation/Design Feature

The only significant change between the current grazing system and the proposed action would be the change in AUL's measurements to be more site specific based on PFC calls to meet the Forest Plan standard one. This change however would not affect management because all of the streams in the allotment were found to be functioning at risk with a static or upward trend as well and some properly functioning stretches.

Direct/Indirect Effects

East Fork Pasture

The direct and indirect effects to project streams in the East Fork pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the East Fork pasture. Overall current grazing practices appear to be creating conditions that would allow the attainment of properly

functioning condition although it will not be as quickly as the no action alternative and Alternative 4.

West Fork Pasture

The direct and indirect effects to project streams in the West Fork pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the Sullivan pasture. Overall grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative and Alternative 4.

Cumulative Effects

The cumulative effects in the Fishtrap allotment include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Roads will continue to negatively affect stream condition in the allotment although improvements to a couple of crossings will help minimize this effect. There are a number of aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

The Proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Fishtrap Alternative 4

Mitigation/Design Features

There were two changes in Alternative 4 that could influence hydrology resources. The first significant changes between the current grazing system and the proposed action would be the change in AUL's measurements to be more site specific based on PFC calls to meet the Forest Plan standard one. This change however would not affect management because all of the streams in the allotment were found to be functioning at risk with a static or upward trend as well and some properly functioning stretches. The second change would be the rest of the entire allotment 1 year in 3. The anticipated effects for this proposed adjustment are discussed below.

Direct/Indirect Effects

East Fork Pasture

The direct and indirect effects to project streams in the East Fork pasture would be similar to what we found in the existing condition but in areas that had higher grazing pressure more

recovery would be anticipate during the rest years. Currently current grazing practices are having limited impacts to most of the perennial streams in the East Fork pasture. Alternative 4 would create conditions that would allow the attainment of properly functioning condition faster than the current grazing system and proposed action although it will not be as quickly as the no action alternative.

West Fork Pasture

The direct and indirect effects to project streams in the West Fork pasture would be similar to what we found in the existing condition but in areas that had higher grazing pressure more recovery would be anticipate during the rest years. Currently current grazing practices are having limited impacts to most of the perennial streams in the West Fork pasture. Alternative 4 would create conditions that would allow the attainment of properly functioning condition faster than the current grazing system and proposed action although it will not be as quickly as the no action alternative.

Cumulative Effects

The cumulative effects in the Fishtrap allotment include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Roads will continue to negatively affect stream condition in the allotment although improvements to a couple of crossings will help minimize this effect. There are a number of aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Mudd Creek

Mudd Creek No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The cumulative effects in the Mudd Creek allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions especially the one found on Calvert Creek and Mudd Creek are having the greatest impact on stream condition by dewatering the channel and limiting the ability for stream recovery. Roads are also negatively affecting stream condition with undersized structures identified in the allotment which has been exacerbated by lodgepole mortality that has increase water yield in some areas. There are a number of aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

Removing cows is not expected to change the cumulative effects of these identified items but may help the recovery time of streams that are currently being negatively affected by roads and diversions.

Mudd Creek Current Grazing Alternative

Direct/Indirect Effects

Mudd Creek Pasture

The direct and indirect effects to project streams in the Mudd Creek pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the Mudd Creek pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative and Alternative 4.

Cumulative Effects

The cumulative effects in the Mudd Creek pasture include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions especially the one found on Calvert Creek and Mudd Creek are having the greatest impact on stream condition by dewatering the channel and limiting the ability for stream recovery. Roads are also negatively affecting stream condition with undersized structures identified in the allotment which has been exacerbated by lodgepole mortality that has increase water yield in some areas. There are aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Mudd Creek Proposed Action Alternative

Mitigation/Design Features

The only changes between the current grazing system and the proposed action would be the AUL measurements which are more site specific based on PFC calls to meet the Forest Plan standard one. These changes however would not affect management because all of the streams in the allotment were found to be functioning at risk with a static or upward trend as well and some properly functioning stretches.

Direct/Indirect Effects

Mudd Creek Pasture

The direct and indirect effects to project streams in the Mudd Creek pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial streams in the Mudd Creek pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative and Alternative 4.

Cumulative Effects

The cumulative effects in the Mudd Creek pasture include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions especially the one found on Calvert Creek and Mudd Creek are having the greatest impact on stream condition by dewatering the channel and limiting the ability for stream recovery. Roads are also negatively affecting stream condition with undersized structures identified in the allotment which has been exacerbated by lodgepole mortality that has increase water yield in some areas. There are aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

The proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Mudd Creek Alternative 4

Mitigation/Design Features

Alternative 4 has the same change as that Proposed regarding the AUL measurements which are more site specific based on PFC calls to meet the Forest Plan standard one. These changes however would not affect management because all of the streams in the allotment were found to be functioning at risk with a static or upward trend as well and some properly functioning stretches. An additional change would be the rest of the entire allotment 1 year in 3. The anticipated effects for this proposed adjustment are discussed below.

Direct/Indirect Effects

Mudd Creek Pasture

The direct and indirect effects to project streams in the Mudd Creek pasture would be similar to what we found in the existing condition and proposed action but the rest of the allotment would allow all of the streams to recover at a greater rate than would be expected in the proposed action and current grazing system. Overall current grazing practices are having limited impacts to most of the perennial streams in the Mudd Creek pasture. Alternative 4 grazing practices would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Cumulative Effects

The cumulative effects in the Mudd Creek pasture include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions especially the one found on Calvert Creek and Mudd Creek are having the greatest impact on stream condition by dewatering the channel and limiting the ability for stream recovery. Roads are also negatively affecting stream condition with undersized structures identified in the allotment which has been exacerbated by lodgepole mortality that has increase water yield in some areas. There are aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Pintlar Creek Allotment

Pintlar Creek No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The cumulative effects in the Pintler Creek allotment include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Roads are having limited effects on allotment stream condition and lodgepole mortality has increased water yield in some areas. There are also aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

Removing cows is not expected to change the cumulative effects of these identified items but may help the recovery time of streams that are currently being negatively affected.

Pintlar Creek Current Grazing Alternative

Direct/Indirect Effects

Pintlar Creek Pasture

The direct and indirect effects to project streams in the Pintler Creek pasture would be similar to what we found in the existing condition. Overall current grazing practices are having limited impacts to most of the perennial stream segments in the Pintler Creek pasture. There are a couple of areas where we saw more intense grazing pressure though which include upper Pintler Creek and Lower Pintler Trib which are functioning at risk with a downward trend or non-functioning. These areas will have to more closely monitored if we expect to see the attainment of properly functioning condition in the future.
Cumulative Effects

The cumulative effects in the Pintler Creek allotment include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Roads are having limited effects on allotment stream condition and lodgepole mortality has increased water yield in some areas. There are also aspen stands that have also had significant

conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Pintlar Creek Proposed Action Alternative

Mitigation/Design Feature

The changes between the current grazing system and the proposed action would be the AUL measurements which are more site specific based on PFC calls to meet the Forest Plan standard one. These changes would affect management because stream segments like upper Pintler Creek and lower Pintler Trib were found to be functioning at risk with a downward trend or non-functioning condition. Another change will be the use of the pasture deferred every other year the effects of these changes are discussed below.

Direct/Indirect Effects

Pintlar Creek Pasture

The direct and indirect effects to project streams in the Pintler Creek pasture may be different to what we found in the existing condition because more restrictive AUL's in the pasture should help recover streams that are not currently functioning. Current grazing practices are having impacts to some stream segments in the pasture so the combination of deferred rest and more restrictive AUL's will benefit the condition of the stream and allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative and Alternative 4.

Cumulative Effects

The cumulative effects in the Pintler Creek allotment include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Roads are having limited effects on allotment stream condition and lodgepole mortality has increased water yield in some areas. There are also aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

The proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Pintlar Creek Alternative 4

Mitigation/Design Feature

Alternative 4 adds additional restrictions (see Alt 4 description Ch. 2) to the pasture and proposes some adding some fence to better control grazing movement to the upper part of the pasture which will be rested for a minimum of 10 years where more historical damage has occurred. The effects of these alternative proposals are discussed below.

Direct/Indirect Effects

Pintlar Creek Pasture

The direct and indirect effects to project streams in the Pintler Creek pasture will be different to what we found in the existing condition because extended rest and restrictive AUL's in the pasture should help recover streams that are currently not functioning. Current grazing practices are having impacts to some stream segments in the pasture especially parts of upper Pintler Creek which has led to the proposal of the long term rest of the upper meadows as well as stream channel enhancements to further recover damaged portions of the stream. This added restoration would likely allow the stream to become properly functioning faster than the no action alternative. The combination of deferred rest and more restrictive AUL's will benefit the condition of the stream and allow the attainment of properly functioning condition although it may not be as quickly as the no action alternative in the lower part of the pasture.

Cumulative Effects

The cumulative effects in the Pintler Creek allotment include roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Roads are having limited effects on allotment stream condition and lodgepole mortality has increased water yield in some areas. There are also aspen stands that have also had significant conifer encroachment as a result of fire suppression which could reduce wetland areas and negatively impact riparian associated vegetation.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Mussigbrod Allotment

Mussigbrod No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The most significant cumulative effects in the Mussigbrod allotment include stream diversions, fire effects, and dispersed recreation. All of these things will continue to affect project area streams regardless of grazing presence.

Fire effects from the Mussigbrod and Rat Creek fires as well as stream diversions like the one found on lower Mussigbrod are having impacts on stream condition.

Removing cows is not expected to change the cumulative effects of these identified items but may help the recovery time of streams.

Mussigbrod Current Grazing Alternative

Direct/Indirect Effects

Mussigbrod Pasture

The direct and indirect effects to project streams in the Mussigbrod pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to most of the perennial streams in the Mussigbrod pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Bender Pasture

The direct and indirect effects to project streams in the Bender pasture would be similar to what we found in the existing condition. Current grazing practices are having impacts to the Bender Trib which has resulted in non-functioning condition. Grazing effects coupled with fire effects have concentrated heavy grazing pressure on this small meadow stream segment. Temporary fencing was utilized to help reduce these impacts and would have to be improved for this alternative to meet FP Interim Livestock Grazing AUL's. This is the only area of the allotment where these grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition. Fixing and maintaining temporary fences could

help this area recover and other parts of the pasture allow the attainment of properly functioning condition although not as quickly as the other three alternatives.

Cumulative Effects

The most significant cumulative effects in the Mussigbrod allotment include stream diversions, fire effects, and dispersed recreation. All of these things will continue to affect project area streams regardless of grazing presence.

Fire effects from the Mussigbrod and Rat Creek fires as well as stream diversions like the one found on lower Mussigbrod are having impacts on stream condition and in some places have been exacerbated by grazing.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Mussigbrod Proposed Action Alternative

Mitigation/Design Feature

The changes between the current grazing system and the proposed action would be reductions in Head Months from 413 to 325, insignificant changes in season of use, rest of the entire allotment 1 out of 3 years, permanently fencing our non-functioning section of Bender Creek Trib, and AUL measurements which are more site specific based on PFC calls to meet the Forest Plan standard one. These changes would likely improve management and allow the attainment of properly functioning condition more quickly than current management.

Direct/Indirect Effects

Bender Pasture

The direct and indirect effects to project streams in the Bender pasture would be different to what we found in the existing condition with the change in grazing management. Current grazing practices are having impacts to the Bender Trib which has resulted in non-functioning condition. Grazing effects coupled with fire effects have concentrated heavy grazing pressure on this small meadow stream segment. Permanent fencing is proposed for this alternative which will allow non-functional stream segments time to recover without grazing effects. Fencing will help specific segments improve but could also move put more pressure on other areas in the pasture and that is why full allotment rest every 1 out of 3 years was proposed as well and lower numbers of cattle. AUL's tied to stream condition is the last proposed feature that will help all streams in the pasture recover and allow the attainment of properly functioning condition although not as quickly as Alternative 4 and the No Action Alternative.

Mussigbrod Pasture

The direct and indirect effects to project streams in the Mussigbrod pasture would be different to what we found in the existing condition because of the changes in management. The proposed grazing practices should limit impacts to the perennial streams in the Mussigbrod pasture with reductions in numbers and rest periods. The Proposed grazing practices should allow the attainment of properly functioning condition although it will not be as quickly as Alternative 4 and the No Action Alternative.

Cumulative Effects

The most significant cumulative effects in the Mussigbrod allotment include stream diversions, fire effects, and dispersed recreation. All of these things will continue to affect project area streams regardless of grazing presence.

Fire effects from the Mussigbrod and Rat Creek fires as well as stream diversions like the one found on lower Mussigbrod are having impacts on stream condition and in some places have been exacerbated by grazing although decreases in grazing pressure from the existing condition will reduce these impacts.

The proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Mussigbrod Alternative 4

Mitigation/Design Feature

Alternative 4 goes a step further than the proposed action and reduces the head months to 248, adds some drift fencing in the Mussigbrod pasture and rests the entire Bender Pasture for a minimum of 10 years.

Direct/Indirect Effects

Bender Pasture

The direct and indirect effects to project streams in the Bender Pasture will be very different from existing condition because the removal of cows from the pasture would allow all streams currently being impacted from domestic grazing to begin the recovery process. Recovery times of pasture streams will vary based on morphology and vegetation cover and also depend on the effectiveness of restoration activities. If restoration activities are successful streams should attainment properly functioning condition in the shortest time period, even faster than the no grazing alternative because of restoration activities.

Mussigbrod Pasture

The direct and indirect effects to project streams in the Mussigbrod pasture would be different than what we found in the existing condition because of the changes in management. Alternative 4 grazing practices should limit impacts to the perennial streams in the Mussigbrod pasture with reductions in numbers and rest periods. The Proposed grazing practices should allow the attainment of properly functioning condition although it will not be as quickly as the No Action Alternative.

Cumulative Effects

The most significant cumulative effects in the Mussigbrod allotment include stream diversions, fire effects, and dispersed recreation. All of these things will continue to affect project area streams regardless of grazing presence.

Fire effects from the Mussigbrod and Rat Creek fires as well as stream diversions like the one found on lower Mussigbrod are having impacts on stream condition and in some places have been exacerbated by grazing although decreases in grazing pressure from the existing condition will reduce these impacts.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Ruby Creek Allotment

Ruby Creek No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The cumulative effects in the Ruby Creek allotment include stream diversions, roads, dispersed recreation, historic mining, conifer encroachment and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

A number of cumulative effects were noted during the qualitative assessment of the allotment. The most significant impacts came from road crossings with undersized structure or unhardened fords, historic diversion channels were prevalent in the Cow Creek Pasture where

historic flood irrigation was evident, and historic mining activity which has modified stream segments.

Removing cows is not expected to change the cumulative effects of these identified items but may help the recovery time of streams that are currently being negatively affected by roads and diversions. The cumulative effects will be greater in the no action alternative than the Proposed Action and Alternative 4 because the proposed hardened crossings location would not be completed.

Ruby Creek Current Grazing Alternative

Direct/Indirect Effects

Butler Pasture

The direct and indirect effects to project streams in the Butler pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to most of the perennial streams in the Butler pasture although there are areas of degraded condition identified on lower Butler Creek. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives and continued monitoring of AUL's on lower Butler Creek will be important to maintain recovery.

Lower Ruby Pasture

The direct and indirect effects to project streams in the Lower Ruby pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to pasture streams but none of the streams were non-functioning or functioning at risk with a downward trend. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Cow Creek Pasture

The direct and indirect effects to project streams in the Cow Creek pasture would be similar to what we found in the existing condition. Grazing practices in the past have had impacts to some stream segments in the pasture which have resulted in non-functioning or functioning at risk with a downward trend conditions in past surveys. Current management has improved stream conditions based on the survey results although there are still a few stream segments that are being negatively impacted by grazing pressure. Compliance with the Interim Livestock Grazing AUL's would be very important to maintain and continue trend towards the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Ruby Creek Proposed Action Alternative

Mitigation/Design Feature

The changes between the current grazing system and the proposed action would be the rest of the Butler Pasture 1 out of 3 years and AUL measurements which are more site specific based on PFC calls to meet the Forest Plan standard one. These changes would likely improve management and allow the attainment of properly functioning condition more quickly than current management. Three hardened crossings are also proposed in the Cow Creek pasture.

Direct/Indirect Effects

Butler Pasture

The direct and indirect effects to project streams in the Butler pasture may be different to what we found in the existing condition. The proposed rest period for the Butler Pasture and AUL measurements which are more site specific based on PFC calls should help Butler Creek recover faster than current management. The proposed alternative should allow the attainment of properly functioning condition although it will not be as quickly as Alternative 4 and the no grazing alternative.

Lower Ruby Pasture

The direct and indirect effects to project streams in the Lower Ruby pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to pasture streams but none of the streams were non-functioning or functioning at risk with a downward trend. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no grazing alternative.

Cow Creek Pasture

The direct and indirect effects to project streams in the Cow Creek pasture would be similar to what we found in the existing condition. Grazing practices in the past have had impacts to some stream segments in the pasture which have resulted in non-functioning or functioning at risk with a downward trend conditions in past surveys. Current management has improved stream conditions based on the survey results although there are still a few stream segments that are being negatively impacted by grazing pressure. Compliance with the AUL measurements which are more site specific based on PFC calls will be important to maintain and continue trend towards the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no grazing alternative.

Cumulative Effects

The cumulative effects in the Ruby Creek allotment include stream diversions, roads, dispersed recreation, historic mining, conifer encroachment and water yield effects from

lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

A number of cumulative effects were noted during the qualitative assessment of the allotment. The most significant impacts came from road crossings with undersized structure or unhardened fords, historic diversion channels were prevalent in the Cow Creek Pasture where historic flood irrigation was evident, and historic mining activity which has modified stream segments. The three hardened crossings proposed in the Cow Creek pasture will help reduce cumulative effects and on Cow and Calf Creeks.

The proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Ruby Creek Alternative 4

Mitigation/Design Feature

Alternative 4 goes a step further than the proposed action and reduces the head months to from 714 cow and 85 horses to 613 cows and 72 horses and adds some drift fencing in the Cow Creek pasture to control grazing movement. Livestock entry into the Cow Creek pasture would also be deferred to approximately August 1st every other year.

Direct/Indirect Effects

Butler Pasture

The direct and indirect effects to project streams in the Butler pasture may be different to what we found in the existing condition. The proposed rest period for the Butler Pasture and AUL measurements which are more site specific based on PFC calls should help Butler Creek recover faster than current management. The reduction of cows and horses will also allow managers to move animals when AUL's are met. Alternative 4 should allow the attainment of properly functioning condition although it will not be as quickly as the no grazing alternative.

Lower Ruby Pasture

The direct and indirect effects to project streams in the Lower Ruby pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to pasture streams but none of the streams were non-functioning or functioning at risk with a downward trend. The changes proposed in Alternative 4 will allow the attainment of properly functioning condition although it will not be as quickly as the no grazing alternative.

Cow Creek Pasture

The direct and indirect effects to project streams in the Cow Creek pasture may be different than what we found in the existing condition. Grazing practices in the past have had impacts

to some stream segments in the pasture which have resulted in non-functioning or functioning at risk with a downward trend conditions in past surveys. Alternative 4 should allow managers to better manage grazing effects by reducing numbers and controlling movement with the proposed drift fencing. Compliance with the AUL measurements which are more site specific based on PFC calls will be important to maintain and continue trend towards the attainment of properly functioning condition although it will not be as quickly as the no grazing alternative.

Cumulative Effects

The cumulative effects in the Ruby Creek allotment include stream diversions, roads, dispersed recreation, historic mining, conifer encroachment and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

A number of cumulative effects were noted during the qualitative assessment of the allotment. The most significant impacts came from road crossings with undersized structure or unhardened fords, historic diversion channels were prevalent in the Cow Creek Pasture where historic flood irrigation was evident, and historic mining activity which has modified stream segments. The three hardened crossings proposed in the Cow Creek pasture will help reduce cumulative effects and on Cow and Calf Creeks.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Dry Creek Allotment

Dry Creek No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The cumulative effects in the Dry Creek allotment include stream diversions, roads, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions were the most significant cumulative effect identified in the allotment with all of the water being diverted in the lower reaches of Dry Creek. A road crossing on lower

Dry Creek was also identified as a cumulative effect to stream condition although effects were limited by the lack of water in the channel.

Removing cows is not expected to change the cumulative effects but may help the recovery time of streams that are currently being negatively affected by roads and diversions.

Dry Creek Current Grazing Alternative

Direct/Indirect Effects

Upper Dry Creek Pasture

The direct and indirect effects to project streams in the Upper Dry Creek pasture would be similar to what we found in the existing condition. Current grazing practices are having some impacts to Dry Creek but all of the other streams in the pasture are higher elevation forested streams with little impact. Dry Creek was functioning at risk with some degradation from grazing effects but conditions appear to be improving due to improved grazing practices. Under current grazing practices, if AUL's continue to be met, stream condition should move towards properly functioning condition although it will not be as quickly as the no action alternative and Alternative 4.

Lower Dry Creek Pasture

The direct and indirect effects to project streams in the Lower Dry Creek pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to Big Lake Creek the only perennial stream identified in the pasture and the large substrate and forested nature of the stream provide good protections. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Cumulative Effects

The cumulative effects in the Dry Creek allotment include stream diversions, roads, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions were the most significant cumulative effect identified in the allotment with all of the water being diverted in the lower reaches of Dry Creek. A road crossing on lower Dry Creek was also identified as a cumulative effect to stream condition although effects were limited by the lack of water in the channel.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Dry Creek Proposed Action Alternative

Mitigation/Design Feature

The significant changes between the current grazing system and the proposed action would be the change in AUL's measurements to be more site specific based on PFC calls to meet the Forest Plan standard one and rest of the entire allotment 1 out of 3 years. This change will help streams like Dry Creek recover more quickly.

Direct/Indirect Effects

Upper Dry Creek Pasture

The direct and indirect effects to project streams in the Upper Dry Creek pasture may be different for the proposed alternative because of the built in rest. Current grazing practices are having some impacts to Dry Creek which has led to degradation but additional rest will help Dry Creek recover more quickly than the current grazing practices which has already shown signs of improvement from past conditions which were non-functioning in historic surveys. The proposed action should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no grazing alternative.

Lower Dry Creek Pasture

The direct and indirect effects to project streams in the Lower Dry Creek pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to Big Lake Creek and increased rest will help stream condition even more. The proposed action should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no grazing alternative.

Cumulative Effects

The cumulative effects in the Dry Creek allotment include stream diversions, roads, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions were the most significant cumulative effect identified in the allotment with all of the water being diverted in the lower reaches of Dry Creek. A road crossing on lower Dry Creek was also identified as a cumulative effect to stream condition although effects were limited by the lack of water in the channel.

The proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Dry Creek Alternative 4

Mitigation/Design Feature

There are no changes between the Proposed Alternative and Alternative 4. Significant changes between the current grazing system and the proposed action and Alternative 4 would be the change in AUL's measurements to be more site specific based on PFC calls to meet the Forest Plan standard one and rest of the entire allotment 1 out of 3 years. These changes will help streams like Dry Creek recover more quickly.

Direct/Indirect Effects

Upper Dry Creek Pasture

The direct and indirect effects to project streams in the Upper Dry Creek pasture will be the same as the proposed action. Current grazing practices are having some impacts to Dry Creek which has led to degradation but additional rest will help Dry Creek recover more quickly than the current grazing practices which has already shown signs of improvement from past conditions which were non-functioning in historic surveys. Alternative 4 should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no grazing alternative.

Lower Dry Creek Pasture

The direct and indirect effects to project streams in the Upper Dry Creek pasture will be the same as the proposed action. Current grazing practices are having limited impacts to Big Lake Creek and increased rest will help stream condition even more. The proposed action should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no grazing alternative.

Cumulative Effects

The cumulative effects in the Dry Creek allotment include stream diversions, roads, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions were the most significant cumulative effect identified in the allotment with all of the water being diverted in the lower reaches of Dry Creek. A road crossing on lower Dry Creek was also identified as a cumulative effect to stream condition although effects were limited by the lack of water in the channel.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Twin Lakes Allotment

Twin Lakes No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The cumulative effects in the Twin Lakes allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and were the most significant cumulative effect identified in the allotment with large diversions influencing Big Swamp creek. A couple of road crossings and conifer encroachment in aspen stands were also identified as cumulative effects to streams.

Removing cows is not expected to change the cumulative effects but may help the recovery time of streams that are currently being negatively affected by roads and diversions.

Twin Lakes Current Grazing Alternative

Direct/Indirect Effects

Upper Big Lake Pasture

The direct and indirect effects to project streams in the Upper Big Lake Pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Historically Big Swamp and Slagamelt Creek were found to be functioning and 2011 survey results show that is still the case with well armored channels. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Lower Big Lake Pasture

The direct and indirect effects to project streams in the Lower Big Lake Pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Current grazing practices appear to be creating conditions that would allow the

attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Upper Little Lake Pasture

The direct and indirect effects to project streams in the Upper Little Lake Pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Lower Little Lake Pasture

The direct and indirect effects to project streams in the Lower Little Lake Pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Cumulative Effects

The cumulative effects in the Twin Lakes allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and were the most significant cumulative effect identified in the allotment with large diversions influencing Big Swamp creek. A couple of road crossings and conifer encroachment in aspen stands were also identified as cumulative effects to streams.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Twin Lakes Proposed Action Alternative

Mitigation/Design Feature

The significant changes between the current grazing system and the proposed action would be the change in AUL's measurements to be more site specific based on PFC calls to meet the Forest Plan standard one, additional rest built into the upper pastures two out of six years, and deferred entry till August 1st

Direct/Indirect Effects

Upper Big Lake Pasture

The direct and indirect effects to project streams in the Upper Big Lake Pasture would be similar to what we found in the existing condition. The proposed Alternative is expected to have limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Historically Big Swamp and Slagamelt Creek were found to be functioning and 2011 survey results show that is still the case with well armored channels. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Lower Big Lake Pasture

The direct and indirect effects to project streams in the Lower Big Lake Pasture would be similar to what we found in the existing condition. The proposed Alternative is expected to have limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Upper Little Lake Pasture

The direct and indirect effects to project streams in the Upper Little Lake Pasture would be similar to what we found in the existing condition. The proposed Alternative is expected to have limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Lower Little Lake Pasture

The direct and indirect effects to project streams in the Lower Little Lake Pasture would be similar to what we found in the existing condition. The proposed Alternative is expected to have limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Cumulative Effects

The cumulative effects in the Twin Lakes allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and were the most significant cumulative effect identified in the allotment with large diversions influencing Big Swamp creek. A couple of road crossings and conifer encroachment in aspen stands were also identified as cumulative effects to streams.

The proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Twin Lakes Alternative 4

Mitigation/Design Feature

There are no changes between the proposed action and Alternative 4 which includes changes from the current grazing system to incorporate AUL's measurements to be more site specific based on PFC calls to meet the Forest Plan standard one, additional rest built into the upper pastures two out of six years, and deferred entry till August 1st

Direct/Indirect Effects

Upper Big Lake Pasture

The direct and indirect effects to project streams in the Upper Big Lake Pasture would be similar to what we found in the existing condition with more flexibility from the additional rest. Alternative 4 is expected to have limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Historically Big Swamp and Slagamelt Creek were found to be functioning and 2011 survey results show that is still the case with well armored channels. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Lower Big Lake Pasture

The direct and indirect effects to project streams in the Lower Big Lake Pasture would be similar to what we found in the existing condition with more flexibility from the additional rest. Alternative 4 is expected to have limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Upper Little Lake Pasture

The direct and indirect effects to project streams in the Upper Little Lake Pasture would be similar to what we found in the existing condition with more flexibility from the additional rest. Alternative 4 is expected to have limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Current grazing practices appear to be creating

conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Lower Little Lake Pasture

The direct and indirect effects to project streams in the Lower Little Lake Pasture would be similar to what we found in the existing condition with more flexibility from the additional rest. Alternative 4 is expected to have limited impacts to streams in the pasture primarily because of the forested nature of the pasture. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the other three alternatives.

Cumulative Effects

The cumulative effects in the Twin Lakes allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and were the most significant cumulative effect identified in the allotment with large diversions influencing Big Swamp creek. A couple of road crossings and conifer encroachment in aspen stands were also identified as cumulative effects to streams.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Monument Creek Allotment

Monument No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The cumulative effects in the Monument Allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and were the most significant cumulative effect identified in the allotment with large diversions influencing Big Swamp creek. A couple of road crossings and conifer encroachment in aspen stands were also identified as cumulative effects to streams.

Removing cows is not expected to change the cumulative effects but may help the recovery time of streams that are currently being negatively affected by roads and diversions.

Monument Current Grazing Alternative

Direct/Indirect Effects

Miner Creek Pasture

The direct and indirect effects to project streams in the Miner Creek Pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture. Historically Miner Creek were found to be functioning and 2008 survey results show that is still the case with well vegetated banks with numerous undercuts. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Hamby Pasture

The direct and indirect effects to project streams in the Hamby Pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture primarily due to the thick willow bottoms. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Cumulative Effects

The cumulative effects in the Monument allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and were the most significant cumulative effect identified in the allotment with large diversions influencing Englejard and Little Swamp creek. A number of motorized trail crossings and conifer encroachment in aspen stands were also identified as cumulative effects to streams.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Monument Proposed Action Alternative

Mitigation/Design Feature

The only changes between the current grazing system and the proposed action would be the change in AUL's measurements to be more site specific based on PFC calls to meet the Forest Plan standard one. This is not expected to affect stream conditions because conditions were found to be functioning or functioning at risk with a static trend.

Direct/Indirect Effects

Miner Creek Pasture

The direct and indirect effects to project streams in the Miner Creek Pasture would be similar to what we found in the existing condition. The proposed alternative is expected to have limited impacts to streams in the pasture. Historically Miner Creek were found to be functioning and 2008 survey results show that is still the case with well vegetated banks with numerous undercuts. The proposed alternative is expected to create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Hamby Pasture

The direct and indirect effects to project streams in the Hamby Pasture would be similar to what we found in the existing condition. The proposed alternative is expected to have limited impacts to streams in the pasture primarily due to the thick willow bottoms. The proposed alternative is expected to create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Cumulative Effects

The cumulative effects in the Monument allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and were the most significant cumulative effect identified in the allotment with large diversions influencing Englejard and Little Swamp creek. A number of motorized trail crossings and conifer encroachment in aspen stands were also identified as cumulative effects to streams.

The proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Monument Alternative 4

Mitigation/Design Feature

The only changes between the proposed action and Alternative 4 would be resting the entire allotment 1 in 4 years. This could potentially affect stream conditions by allowing for more recovery on streams that were not properly functioning.

Direct/Indirect Effects

Miner Creek Pasture

The direct and indirect effects to project streams in the Miner Creek Pasture would be similar to what we found in the existing condition. Alternative 4 is expected to have limited impacts to streams in the pasture. Historically Miner Creek were found to be functioning and 2008 survey results show that is still the case with well vegetated banks with numerous undercuts. Alternative 4, which includes additional rest, is expected to allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Hamby Pasture

The direct and indirect effects to project streams in the Hamby Pasture would be similar but possibly better than what we found in the existing condition. Alternative 4 is expected to have limited impacts to streams in the pasture. Alternative 4, which includes additional rest, is expected to allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Cumulative Effects

The cumulative effects in the Monument allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and were the most significant cumulative effect identified in the allotment with large diversions influencing Englejard and Little Swamp creek. A number of motorized trail crossings and conifer encroachment in aspen stands were also identified as cumulative effects to streams.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Pioneer Allotment

Pioneer No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effect:

The cumulative effects in the Pioneer Allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and undesigned road crossings were the most significant cumulative effect identified in the allotment with diversions identified on Berry Creek and road impacts identified on Berry Creek and Pioneer Creek. Conifer encroachment in aspen stands was also identified as cumulative effects to streams.

Removing cows is not expected to change the cumulative effects but may help the recovery time of streams that are currently being negatively affected by roads and diversions.

Pioneer Current Grazing Alternative

Direct/Indirect Effects

Van Houten Pasture

The direct and indirect effects to project streams in the Van Houten Pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture. Qualitative surveys suggest that the streams functioning at risk but current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Pioneer Pasture

The direct and indirect effects to project streams in the Pioneer Pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams and appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Skinner Meadows Pasture

The direct and indirect effects to project streams in the Skinner Meadows Pasture would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture primarily due to the thick willow bottoms. Past and present surveys show most of the streams in the pasture are in properly functioning condition. Current grazing practices appear to be creating conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Cumulative Effects

The cumulative effects in the Pioneer Allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and undesigned road crossings were the most significant cumulative effect identified in the allotment with diversions identified on Berry Creek and road impacts identified on Berry Creek and Pioneer Creek. Conifer encroachment in aspen stands was also identified as cumulative effects to streams.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Pioneer Proposed Action Alternative

Mitigation/Design Feature

The only changes between the current grazing system and the proposed action would be the change in AUL's measurements to be more site specific based on PFC calls to meet the Forest Plan standard one. This is not expected to change management because affect most of the stream conditions were found to be functioning or functioning at risk with a static trend.

Direct/Indirect Effects

Van Houten Pasture

The direct and indirect effects to project streams in the Van Houten Pasture would be similar to what we found in the existing condition. The proposed alternative is expected to have limited impacts to streams in the pasture because there are no expected changes from the current grazing system. The proposed action should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Pioneer Pasture

The direct and indirect effects to project streams in the Pioneer Pasture would be similar to what we found in the existing condition. The proposed alternative is expected to have limited impacts to streams in the pasture because there are no expected changes from the current grazing system. The proposed action should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Skinner Meadows Pasture

The direct and indirect effects to project streams in the Skinner Meadows Pasture would be similar to what we found in the existing condition. The proposed alternative is expected to have limited impacts to streams in the pasture because there are no expected changes from the current grazing system. The proposed action should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as alternative 4 and the no action alternative.

Cumulative Effects

The cumulative effects in the Pioneer Allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and undesigned road crossings were the most significant cumulative effect identified in the allotment with diversions identified on Berry Creek and road impacts identified on Berry Creek and Pioneer Creek. Conifer encroachment in aspen stands was also identified as cumulative effects to streams.

The proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Pioneer Alternative 4

Mitigation/Design Feature

The only changes between the proposed action and Alternative 4 would be resting the entire allotment 1 in 4 years. This could potentially affect stream conditions by allowing for more recovery on streams that were not properly functioning.

Direct/Indirect Effects

Van Houten Pasture

The direct and indirect effects to project streams in the Van Houten Pasture would be similar to what we found in the existing condition but faster recovery is expected on streams that are currently not properly functioning from the additional rest proposed. Alternative 4 could decrease the limited impacts to streams with additional rest in the pasture. Alternative 4 should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly the no action alternative.

Pioneer Pasture

The direct and indirect effects to project streams in the Pioneer Pasture would be similar to what we found in the existing condition but faster recovery is expected on streams that are currently not properly functioning from the additional rest proposed. Alternative 4 should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly as the no action alternative.

Skinner Meadows Pasture

The direct and indirect effects to project streams in the Skinner Meadows Pasture would be similar to what we found in the existing condition but faster recovery is expected on stream sections that are currently not properly functioning from the additional rest proposed. Alternative 4 could decrease the limited impacts to streams with additional rest in the pasture. Alternative 4 should create conditions that would allow the attainment of properly functioning condition although it will not be as quickly the no action alternative.

Cumulative Effects

The cumulative effects in the Pioneer Allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

Stream diversions and undesigned road crossings were the most significant cumulative effect identified in the allotment with diversions identified on Berry Creek and road impacts identified on Berry Creek and Pioneer Creek. Conifer encroachment in aspen stands was also identified as cumulative effects to streams.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Saginaw Allotment

Saginaw No Action (No Grazing) Alternative

Direct/Indirect Effects

The removal of cows from the allotment would allow all streams currently being impacted from domestic grazing to begin the recovery process. Grazing from wildlife would continue and possibly increase but impacts would not be as great and current management. Recovery times would vary based on morphology and vegetation cover.

Cumulative Effects

The cumulative effects in the Saginaw Allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

A Stream diversion on the northern governor creek trib was the most significant cumulative effect identified in the allotment.

Removing cows is not expected to change the cumulative effects but may help the recovery time of streams that are currently being negatively affected by roads and diversions.

Saginaw Current Grazing Alternative

Direct/Indirect Effects

Pasture 1

The direct and indirect effects to project streams in Pasture 1 would be similar to what we found in the existing condition. Current grazing practices are having impacts to the only stream in the pasture. Qualitative surveys suggest that the stream is functioning at risk and current grazing practices do not appear to be creating conditions that would allow the attainment of properly functioning condition unless AUL's are closely monitored and not exceeded for a number of years.

Pasture 2

The direct and indirect effects to project streams in Pasture 2 would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture with the lower East Fork of Englebaugh Creek receiving the greatest pressure. Current grazing practices appear to be creating conditions that should allow the attainment of properly functioning condition if AUL's are not exceeded although it will not be as quickly as alternative 4 and the no action alternative.

Pasture 3

The direct and indirect effects to project streams in Pasture 3 would be similar to what we found in the existing condition. Current grazing practices are having impacts to the streams in the pasture. Qualitative and Quantitative surveys suggest that several stream sections are functioning at risk with a downward trend or non-functioning and current grazing practices do not appear to be creating conditions that would allow the attainment of properly functioning condition unless AUL's are closely monitored and not exceeded for a number of years.

Pasture 4

The direct and indirect effects to project streams in Pasture 4 would be similar to what we found in the existing condition. Current grazing practices are having impacts to the streams in the pasture. Qualitative surveys suggest that several stream sections are functioning at risk with a downward trend or non-functioning and current grazing practices do not appear to be creating conditions that would allow the attainment of properly functioning condition unless AUL's are closely monitored and not exceeded for a number of years.

Cumulative Effects

The cumulative effects in the Saginaw Allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

A Stream diversion on the northern governor creek trib was the most significant cumulative effect identified in the allotment.

The current grazing system may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Saginaw Proposed Action Alternative

Mitigation/Design Feature

The only changes between the current grazing system and the proposed action would be the change in AUL's measurements to be more site specific based on PFC calls to meet the Forest Plan standard one. This is expected to change management and effects because many of the stream conditions in the allotment were found to be functioning at risk with a downward trend and non-functioning which would tighten up AUL.

Direct/Indirect Effects

Pasture 1

The direct and indirect effects to project streams in Pasture 1 should improve from what we found in the existing condition. The Proposed Action would tighten AUL's on the only stream in the pasture because it is currently functioning at risk with a downward trend. By reducing AUL's we would expect to create conditions that would allow the attainment of properly functioning condition granted AUL's are not exceeded for a number of years.

Pasture 2

The direct and indirect effects to project streams in Pasture 2 would be similar to what we found in the existing condition. Current grazing practices are having limited impacts to streams in the pasture with the lower East Fork of Englebaugh Creek receiving the greatest pressure. The proposed action is expected to create conditions that should allow the attainment of properly functioning condition if AUL's are not exceeded although it will not be as quickly as alternative 4 and the no action alternative.

Pasture 3

The direct and indirect effects to project streams in Pasture 3 should improve from what we found in the existing condition. The proposed action should allow us to address the stream segments that are currently receiving the greatest impact in the pasture. Qualitative and Quantitative surveys suggest that several stream sections are functioning at risk with a downward trend or non-functioning so more restrictive AUL's should help create conditions that would allow the attainment of properly functioning granted AUL's are not exceeded for a number of years.

Pasture 4

The direct and indirect effects to project streams in Pasture 4 should improve from what we found in the existing condition. The proposed action should allow us to address the stream segments that are currently receiving the greatest impact in the pasture. Qualitative surveys suggest that several stream sections are functioning at risk with a downward trend or non-functioning so more restrictive AUL's should help create conditions that would allow the attainment of properly functioning granted AUL's are not exceeded for a number of years.

Cumulative Effects

The cumulative effects in the Saginaw Allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

A Stream diversion on the northern governor creek trib was the most significant cumulative effect identified in the allotment.

The proposed action may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Saginaw Alternative 4

Mitigation/Design Feature

The changes between the proposed action and Alternative 4 would be reducing the head months from 690 to 620 and changing the SOU for pastures 1-3 to 7/17-9/17 and pasture 4 to 8/26-9/17 (with no more than 150 cow/calf pairs) that accommodates an avoidance period in pasture 4 from 7/10-8/25. The changes listed above and the more restrictive AUL's for streams that are functioning at risk with a downward trend and non-functioning should help improve grazing management in the allotment.

Direct/Indirect Effects

Pasture 1

The direct and indirect effects to project streams in Pasture 1 should improve from what we found in the existing condition. Alternative 4 would tighten AUL's on the only stream in the pasture because it is currently functioning at risk with a downward trend. By reducing AUL's and head months we would expect to create conditions that would allow the attainment of properly functioning condition granted AUL's are not exceeded for a number of years.

Pasture 2

The direct and indirect effects to project streams in Pasture 2 would be similar to what we found in the existing condition. The reduction in head months in Alternative 4 should limit grazing impacts to streams in the pasture. Alternative 4 should create conditions that should allow the attainment of properly functioning condition if AUL's are not exceeded although it will not be as quickly as the no action alternative.

Pasture 3

The direct and indirect effects to project streams in Pasture 3 should improve from what we found in the existing condition. Alternative 4 should allow us to address the stream segments that are currently receiving the greatest impact in the pasture. Qualitative and Quantitative surveys suggest that several stream sections are functioning at risk with a downward trend or non-functioning so more restrictive AUL's and reduced head months should help create conditions that would allow the attainment of properly functioning.

Pasture 4

The direct and indirect effects to project streams in Pasture 3 should improve from what we found in the existing condition. Alternative 4 should allow us to address the stream segments that are currently receiving the greatest impact in the pasture. Qualitative surveys suggest that several stream sections are functioning at risk with a downward trend or non-functioning so more restrictive AUL's, reduced head months, and avoidance periods should help create conditions that would allow the attainment of properly functioning.

Cumulative Effects

The cumulative effects in the Saginaw Allotment include stream diversions, roads, conifer encroachment, and water yield effects from lodgepole mortality associated with the pine beetle epidemic. All of these things will continue to affect project area streams regardless of grazing presence.

A Stream diversion on the northern governor creek trib was the most significant cumulative effect identified in the allotment.

Alternative 4 may add additional stress to streams impacted by the identified circumstances discussed above that may impact recovery time but conditions were assessed with all of these factors considered.

Comparison of Alternatives

Table 5: Summary of Effects by Alternatives for Seymour Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↑[1] Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function = Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function = Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	↑ WQ on Twelvemile and Corral Creek ↑Function ↑Trend ↑Veg Comp	= WQ on Twelvemile and Corral Creek = Function = Trend = Veg Comp	= WQ on Twelvemile and Corral Creek = Function = Trend = Veg Comp	= WQ on Twelvemile and Corral Creek = Function = Trend = Veg Comp

[1] May be slight increase in grazing pressure due to tenmile pasture receiving grazing
= is no change expected

Table 6: Summary of Effects by Alternatives for Fishtrap Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function = Trend = Veg Comp	↑Stream Function = Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function = Trend = Veg Comp	↑WQ = Function ↑Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	↑ WQ on Fishtrap Creek ↑Function ↑Trend ↑Veg Comp	= WQ on Fishtrap Creek = Function = Trend = Veg Comp	= WQ on Fishtrap Creek = Function = Trend = Veg Comp	↑ WQ on Fishtrap Creek = Function ↑ Trend = Veg Comp

Table 7: Summary of Effects by Alternatives for Mudd Creek Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function = Trend = Veg Comp	↑ WQ = Function = Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	NA	NA	NA	NA

Table 8**:** Summary of Effects by Alternatives for Pintler Creek Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity ↓ Bank Disturbance ↓ Stubble Height ↓ Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp	↑ Stream Function ↑ Trend ↑ Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	↑ WQ = Function ↑ Trend = Veg Comp	↑ WQ ↑ Function ↑ Trend ↑ Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	↑ WQ on Pintler Creek ↑Function ↑Trend ↑Veg Comp	= WQ on Pintler Creek = Function = Trend = Veg Comp	↑ WQ on Pintler Creek = Function ↑ Trend = Veg Comp	↑ WQ on Pintler Creek ↑ Function ↑ Trend ↑ Veg Comp

Table 9**:** Summary of Effects by Alternatives for Missigbrod Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	↑ WQ = Function ↑ Trend = Veg Comp	↑ WQ = Function ↑ Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	↑ WQ on Mussigbrod Creek ↑Function ↑Trend ↑Veg Comp	= WQ on Mussigbrod Creek = Function = Trend = Veg Comp	↑ WQ on Mussigbrod Creek = Function ↑ Trend = Veg Comp	↑ WQ on Mussigbrod Creek = Function ↑ Trend = Veg Comp

Table 10**:** Summary of Effects by Alternatives for Ruby Creek Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	↑ WQ = Function ↑ Trend = Veg Comp	↑ WQ = Function ↑ Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	↑ WQ on Ruby Creek ↑Function ↑Trend ↑Veg Comp	= WQ on Ruby Creek = Function = Trend = Veg Comp	↑ WQ on Ruby Creek = Function ↑ Trend = Veg Comp	↑ WQ on Ruby Creek = Function ↑ Trend = Veg Comp

Table 11: Summary of Effects by Alternatives for Dry Creek Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	↑ WQ = Function ↑ Trend = Veg Comp	↑ WQ = Function ↑ Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	NA	NA	NA	NA

Table 12: Summary of Effects by Alternatives for Twin Lakes Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function = Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function = Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	↑ WQ on Miner Creek ↑Function ↑Trend ↑Veg Comp	= WQ on Miner Creek = Function = Trend = Veg Comp	= WQ on Miner Creek = Function = Trend = Veg Comp	= WQ on Miner Creek = Function = Trend = Veg Comp

Table 13: Summary of Effects by Alternatives for Monument Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function = Trend = Veg Comp	↑ WQ = Function ↑ Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	↑ WQ on Twelvemile Creek ↑Function ↑Trend ↑Veg Comp	= WQ on Twelvemile Creek = Function = Trend = Veg Comp	= WQ on Twelvemile Creek = Function = Trend = Veg Comp	↑ WQ on Twelvemile Creek = Function ↑ Trend = Veg Comp

Table 14: Summary of Effects by Alternatives for Pioneer Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function ↑ Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	↑ WQ on Big Hole River ↑Function ↑Trend ↑Veg Comp	= WQ on Big Hole River = Function = Trend = Veg Comp	= WQ on Big Hole River = Function = Trend = Veg Comp	↑ WQ on Big Hole River = Function ↑ Trend = Veg Comp

Table 15: Summary of Effects by Alternatives for Saginaw Allotment

Resource Indicator And Unit of Measure	**No Grazing Alternative**	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Change in Grazing Intensity? • Bank Disturbance • Stubble height • Woody utilization	↓Grazing Intensity ↓Bank Disturbance ↑Stubble Height ↓Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	= Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization	↓ Grazing intensity = Bank Disturbance = Stubble Height = Woody Utilization
Change in Stream Function? • Function • Trend • Veg Comp	↑Stream Function ↑Trend ↑Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function = Trend = Veg Comp	= Stream Function ↑ Trend = Veg Comp
Change in Water Quality? • Function • Trend • Veg Comp	↑WQ ↑Function ↑Trend ↑Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function = Trend = Veg Comp	= WQ = Function ↑ Trend = Veg Comp
Change in Water Quality on 303d listed streams? • Function • Trend • Veg Comp	↑ WQ on Big Hole River ↑Function ↑Trend ↑Veg Comp	= WQ on Big Hole River = Function = Trend = Veg Comp	= WQ on Big Hole River = Function = Trend = Veg Comp	= WQ on Big Hole River = Function = Trend = Veg Comp

Aquatics

Existing Condition

Laws and Executive Orders

National Environmental Policy Act of 1969 - The National Environmental Policy Act requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. This evaluation will consider the environmental impacts of the proposed action as well as several alternatives; therefore meeting the National Environmental Policy Act.

The National Forest Management Act of 1976 - Prevents watershed conditions from being irreversibly damaged and protects streams and wetlands from detrimental impacts. Land productivity must be preserved. Fish habitat must support a minimum number of reproductive individuals and be well distributed to allow interaction between populations. In this project regarding grazing we use standard levels of livestock use to avoid damaging streams, wetlands, and fish habitat.

2009 Beaverhead-Deerlodge National Forest Land and Resource Management Plan (Forest Plan; USDA 2009) - Provides specific direction (pages 13-21) that encourage the recovery and maintenance of functioning stream channels so that desired aquatic habitats are abundant; and ensures the viability of sensitive aquatic species is maintained. This analysis evaluates each alternative relative to its consistency with Forest Plan standards and its potential to maintain species viability. If management related mortality to individuals and indirect effects to habitat are not primary determinants in the persistence and distribution of a species across the Forest, we have met requirements regarding viability. In this project regarding grazing, we use standard levels of livestock use to avoid or minimize damaging streams, wetlands, and fish habitat.

Executive Order 13112 - Directs federal agencies whose actions may affect the status of invasive species to (1) prevent the introduction of invasive species, (2) detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, as appropriations allow. There is very little risk of cattle or livestock management introducing ANS to new waters.

Regulations and Policies

Forest Service Handbook 2509.22, Soil and Water Conservation Handbook: - provides a non-point Source Management Strategy to develop site-specific conservation practices for activities on National Forest System lands to minimize effects on soil and water resources and protect water-related beneficial uses. Standards for

Forest Service Handbook No. 2209.13-98-1, Grazing Permit Administration Handbook: 16.2 – Section 1 (Permit Administration). Directs decision makers on courses of action when there is noncompliance with livestock grazing standards; or other aspects of livestock grazing

permits terms and conditions. This information will need to be updated and included as this project updates these permits.

Consistency with the Forest Plan-The Forest Plan places a strong emphasis on aquatic resources. Given the rich and diverse resource base and the fact that the principles of aquatic ecosystem protection and restoration apply equally on both sides of the continental divide, Inland Native Fish Strategy (INFISH; USDA Forest Service 1995) direction is incorporated into the plan forestwide. Please see Appendix D for consistency with standards specific to the Forest Plan.

Existing Condition

The landscape encompassing the project area comprises eleven allotments and parts of 25 sub-watersheds (6th order hydrologic units - HUC's) within the Big Hole River drainage (Table 1). The streams of this project area originate on Forest Service and flow downstream sometimes onto Bureau of Land Management (BLM) or sometimes onto state and eventually private lands. See Appendix A6 for maps.

Table 1: Sub-watershed by Allotment, Fish Key Watersheds and Sensitive Species

Sub-Watershed	Allotment/s	Fish Key Watershed	Sensitive Species Occurrence and Opportunities for Effects to Occur from Changes in Grazing Management
Deep Creek	Seymour	Yes	WCT present with the potential to be affected by grazing changes; Arctic grayling downstream of allotment boundary; western toad not documented, but assume suitable habitat present and can be affected by grazing management. Suitable habitat present for western pearlshell mussel, and documented presence downstream of allotment boundary.
Seymour Creek	Seymour	No	WCT absent, thus no opportunity for grazing in this allotment to affect them; Arctic grayling downstream of allotment boundary; western toad not documented; assume suitable habitat present and can be affected by grazing management. Suitable habitat present for western pearlshell mussel
LaMarche Creek (small portion)	Seymour	No	WCT absent, thus no opportunity for grazing in this allotment to affect them; Arctic grayling downstream of allotment boundary; western toad not documented; assume suitable habitat present and can be affected by grazing management. Suitable habitat present for western pearlshell mussel
Fishtrap Creek	Fishtrap	No	WCT absent, thus no opportunity for grazing in this allotment to affect them; Arctic grayling downstream of allotment boundary; western toad not documented; assume suitable habitat present and can be affected by grazing management. Suitable habitat present for western pearlshell mussel
Big Hole River-Fishtrap (small	Mudd Creek	No	WCT absent, thus no opportunity for grazing in this allotment to affect them;

Table 1: Sub-watershed by Allotment, Fish Key Watersheds and Sensitive Species

Sub-Watershed	Allotment/s	Fish Key Watershed	Sensitive Species Occurrence and Opportunities for Effects to Occur from Changes in Grazing Management
portion)			western toad not documented; assume suitable habitat present and can be affected by grazing management. Suitable habitat probably absent for western pearlshell mussel (streams too small)
Mudd Creek	Mudd Creek	No	WCT absent, thus no opportunity for grazing in this sub watershed to affect them; western toad documented suitable habitat present and can be affected by grazing management. Suitable habitat absent for western pearlshell mussel
Big Hole River-Squaw Creek	Mudd Creek	No	WCT Present with the potential to be affected by grazing changes; Arctic grayling downstream of allotment boundary; western toad not documented; assume suitable habitat present and can be affected by grazing management. Suitable habitat absent for western pearlshell mussel
Pintler Creek	Pintler Creek	No	WCT absent, thus no opportunity for grazing in this allotment to affect them; western toad not documented; assume suitable habitat present and can be affected by grazing management; western pearlshell mussel not documented yet suitable habitat present
Plimpton Creek	Mussigbrod	Yes	Only a small portion of this sub-watershed and fish key watershed overlaps with the allotment. No riparian habitat nor fish nor mussels exist within this overlap so there is no potential to be affected by grazing.
Mussigbrod Creek	Mussigbrod	No	WCT absent; western pearlshell mussel and Arctic grayling present upstream of the allotment boundary with little potential to be affected by grazing changes; western toad not documented; assume suitable habitat present and can be affected by grazing management.
Johnson Creek	Mussigbrod	No	WCT and Arctic grayling absent; Suitable habitat probably absent for western pearlshell mussel; western toad presence documented; assume suitable habitat present and can be affected by grazing management.
Ruby Creek	Ruby Creek	No	WCT present with the potential to be affected by grazing changes; western toads not documented; however, assume suitable habitat present and species may occur, and grazing has opportunity to affect habitat; western pearlshell mussel not documented but suitable habitat possibly present

Table 1: Sub-watershed by Allotment, Fish Key Watersheds and Sensitive Species

Sub-Watershed	Allotment/s	Fish Key Watershed	Sensitive Species Occurrence and Opportunities for Effects to Occur from Changes in Grazing Management
West Fork Ruby Creek	Ruby Creek	No	WCT present with the potential to be affected by grazing changes; western toads not documented; however, assume suitable habitat present and species may occur, and grazing has opportunity to affect habitat; western pearlshell mussel not documented but suitable habitat possibly present
Upper Rock Creek	Dry Creek	No	WCT and Arctic grayling absent; Suitable habitat probably absent for western pearlshell mussel; western toad presence documented; assume suitable habitat present and can be affected by grazing management.
Big Lake Creek	Dry Creek	No	WCT present with the potential to be affected by grazing changes and Arctic grayling absent; western pearlshell mussel not documented; western toad presence documented; assume suitable habitat present and can be affected by grazing management.
Big Hole River-Big Swamp Creek	Dry Creek and Twin Lakes and Monument	No	WCT and Arctic grayling absent; Suitable habitat probably absent for western pearlshell mussel; western toad presence not documented; assume suitable habitat present and can be affected by grazing management.
Big Swamp Creek	Twin Lakes	No	WCT and Arctic grayling absent; Suitable habitat probably absent for western pearlshell mussel; western toad presence documented; assume suitable habitat present and can be affected by grazing management.
Little Lake Creek	Twin Lakes	No	WCT and Arctic grayling absent; Suitable habitat probably absent for western pearlshell mussel; western toad presence not documented; assume suitable habitat present and can be affected by grazing management.
Miner Creek	Monument	No	WCT absent; Arctic grayling and western pearlshell mussel present with the potential to be affected by grazing changes; western toads not documented however, assume suitable habitat present and species may occur, and grazing has opportunity to affect habitat
Englejard Creek	Monument	No	WCT and Arctic grayling absent; western toads documented outside of the allotment; however, assume suitable habitat present and species may occur and grazing has opportunity to affect habitat; western pearlshell mussel not documented

Existing Condition
Aquatics

Table 1: Sub-watershed by Allotment, Fish Key Watersheds and Sensitive Species

Sub-Watershed	Allotment/s	Fish Key Watershed	Sensitive Species Occurrence and Opportunities for Effects to Occur from Changes in Grazing Management
Big Hole River-Spring Creek	Monument	No	WCT and Arctic grayling absent; western toads not documented however, assume suitable habitat present and species may occur, and grazing has opportunity to affect habitat; Suitable habitat probably absent for western pearlshell mussel
Berry Creek	Pioneer	No	WCT and Arctic grayling absent; western toads not documented however, assume suitable habitat present and species may occur, and grazing has opportunity to affect habitat; western pearlshell mussel not documented
Headwaters Big Hole River	Pioneer	No	WCT present with the potential to be affected by grazing changes; Arctic grayling absent; western pearlshell mussel not documented; western toad presence documented and suitable habitat present and can be affected by grazing management.
Big Hole River-Saginaw Creek	Saginaw	No	WCT and Arctic grayling absent; western toads not documented however, assume suitable habitat present and species may occur, and grazing has opportunity to affect habitat; Suitable habitat probably absent for western pearlshell mussel
Upper Governor Creek	Saginaw	No	WCT present with the potential to be affected by grazing changes; Arctic grayling absent; western toad presence documented outside allotment boundary, but suitable habitat present and can be affected by grazing management; Suitable habitat probably absent for western pearlshell mussel

Western Toad

The western toad is on the Region 1 sensitive species list for the Beaverhead-Deerlodge NF. It is largely terrestrial and found in a variety of habitats from valley bottoms to high elevations. They breed in lakes, ponds and occasionally in slow flowing streams. They prefer shallow areas with muddy bottoms. Breeding typically occurs from May to July, and tadpoles will metamorphose when 2 to 3 months old (Reichel and Flath 1995). Juveniles can be found in dense aggregations adjacent to breeding grounds. They are susceptible to high mortality rates if measurable disturbance occurs shortly after metamorphosis as juveniles begin to migrate away from breeding areas.

Adult and juvenile toads are freeze intolerant and over-winter and shelter in underground caverns, or rodent burrows (Maxell 2000). Adults feed on a variety of ground dwelling invertebrates and are known to eat smaller individuals of their own species. Within the last 25 years, western toads have undergone population crashes in Colorado, Utah, southeast Wyoming and New Mexico (Ross et al. 1995, Corn 1997). In the northern Rocky Mountains they have also undergone declines. Extensive surveys across the Forest in the late 1990's revealed they were absent from a number of areas they historically occupied. Biologists believe, based on declines in other western states, they are depressed due to disease, most notably chytrid fungus.

While they remain widespread on and around the BDNF, they are relatively uncommon and appear to be occupying only 5 –7%, of the suitable habitat (Table 2, Maxell 2004).

From 2000-2003 a total of 1,481 lentic sites on and around the Beaverhead-Deerlodge National Forest, were surveyed to determine amphibian presence, whether it was suitable as a breeding site along with documenting possible land management influencing the sites. Sixty-nine percent or 1,020 sites across 78 randomly selected and 12 non-randomly selected sub-watersheds were considered to be suitable for amphibian breeding. Seventy-eight randomly selected sub-watersheds were inventoried. Surveys occurred within the project area. Surveys were done in Berry Creek, Pintler Creek, Big Swamp Creek, and Little Lake Creek watersheds.

Additionally, the random design of the survey allows results to be inferred, without bias, to other areas within the surveyed region. The results are summarized for the project area amphibians in Table 2 below. From this survey, we assume a general rate of occurrence for the following species across the Forest. This suggests with some level of confidence that these species occur and may breed within the project area.

Table 2: Frequance of Occurance and Breeding Activities of Amphibians on the BDNF

Species	Detected in Sub-Watershed	Breeding in Sub-Watershed	Number & Percent of Lentic Sites Detected	Number & Percent of Lentic Sites Breeding
Western Toad (*Bufo boreas*)	25 (37%) (95%CI = 26-48%)	18 (26%) (95%CI = 16-36%)	61 (7%) (95%CI = 5.3-8.7%)	29 (4%) (95%CI = 2.7-5.3%)

Table 2: Frequance of Occurance and Breeding Activities of Amphibians on the BDNF

Species	Detected in Sub-Watershed	Breeding in Sub-Watershed	Number & Percent of Lentic Sites Detected	Number & Percent of Lentic Sites Breeding
Long-toed Salamander (*Ambystoma macrodactylum*)	23 (68%) (95%CI = 53-83%)	23 (68%) (95%CI = 53-83%)	88 (19%) (95%CI = 15-22%)	87 (19%) (95%CI =15-22%)
Columbia Spotted Frog (*Rana luteiventris*)	55 (81%) (95%CI = 72-90%)	48 (71%) (95%CI = 61-81%)	510 (58%) (95%CI = 55-61%)	284 (32%) (95%CI =29-35%)

Western toads have been documented in 7 of the 11 allotments (See Appendix A6 for map). Suitable habitat is believed present for each in all or some of the allotments. Existing data surveys are sufficient to infer the abundance western toads are probably uncommon. We expect there are suitable breeding habitats for toads (and other amphibians) across the project area (Table 2). Outside of well-established lakes, ponds and wetlands that dependably provide habitat every year, some percentage amphibian habitat is transient in nature. Fluctuations in precipitation and/or beaver populations cause changes in the abundance and characteristics of ponds, wetlands, and stream side channels. Toads appear to be opportunists at some level and breeding sites sometimes occur in odd locations. Biologists on the BDNF once witnessed toad egg masses in a drainage ditch along a Forest Road.

Maxell (2004) evaluated the frequency that livestock impacts were extensive enough to negatively alter hydrologic function at lentic sites, suitable for amphibians. Of the 1481 potentially suitable sites surveyed on and around the BDNF, 46 (3.1%) were heavily altered by livestock. Of 1020 sites considered to be capable of supporting breeding for at least one species of amphibian, 36 (3.5%) were heavily altered.

The 4 watersheds in the project areas had no heavily altered lentic sites. The study surveyed 30 sites in the Pintler watershed, 23 in the Little Lake watershed, 30 sites in the Miner Creek watershed, and 30 sites in Berry Creek watershed and none were found to be heavily altered. All sites surveyed in Miner and Berry creek watersheds were upstream of the allotments.

Toads have been documented on the Seymour, Mudd, Mussigbrod, Dry Creek, Twin Lakes, Monument, Pioneer allotments within the project area. Seymour is the only allotment in which we have observed breeding western toads. There are also breeding toads in Twin Lakes in the Dry Creek allotment but cattle don't have access to the lakes. Information on distribution (Maxell 2004) however implies it is likely present at some level on other allotments.

Fisheries

Background

Fish species historically native to streams of the Big Hole watershed include westslope cutthroat trout (*Oncorhynchus clarkii lewisii*), Arctic grayling (*Thymallus arcticus*), mountain whitefish (*Prosopium williamsoni*), burbot (*Lota lota*), longnose dace (*Rhinichthys cataractae*), longnose sucker (*Catostomus catostomus*), white sucker (*Catostomus commersoni*), and mottled sculpin (*Cottus bairdi*) (Brown 1971).

With the advent of western culture, non-native fish stocking became prevalent to meet public desires for more diverse fisheries. Brook, brown, rainbow, and yellowstone cutthroat trout were stocked into streams within and around the analysis area. These species prospered in their new environments, but also displaced native fishes in many streams. Grayling are present in the watershed, but mainly relegated to the mainstem Big Hole River and some lakes. Burbot are largely restricted to lakes and lower reaches of the largest streams. Westslope cutthroat trout (WCT) remain in the headwaters of only about 1/4 of the 67 streams and their tributaries in the analysis area (Table 3).

Records stored in the Montana Rivers Information System (MRIS), survey data collected by State and Forest personnel, indicate only WCT, Arctic grayling, mottled sculpin, and eastern brook trout are currently present within the analysis area. In addition, information describing the presence and distribution of fish were augmented by phone conversation with the local Montana Fish, Wildlife, and Parks (MDFWP) fisheries biologist. Seventeen streams and some of their tributaries contain WCT. These are displayed in table 3.

Table 3 below shows where Arctic grayling and WCT are present and WCT genetic purity. Other fish species present in the analysis area include eastern brook trout (EBT), rainbow trout (RBT), mountain whitefish (MWF), longnose dace (LND), WCT x rainbow trout hybrids (WCT x RBT), WCT x Yellowstone cutthroat trout hybrids (WCT x YCT), burbot (BRB), longnose sucker (LNS) and mottled sculpin (MS). See Appendix A6 for maps.

Table 3: Fish present in Streams Within the Analysis Area by Allotment

Allotment	Stream	Fish Present	WCT Present	WCT Genetic Purity	Arctic grayling Present	Other Fish Species Present
Seymour	Tenmile	yes	yes	99*		EBT, WCTxRBT , MS
	Slaughterhouse	yes				EBT
	Corral	yes	yes	100		EBT
	Twelvemile	yes	upstream	100		EBT
	WF Twelvemile	yes				EBT
	Sullivan	no				
	Sullivan trib	no				
	Bear Trap Gulch	no				
	Dry	no				

Table 3: Fish present in Streams Within the Analysis Area by Allotment

Allotment	Stream	Fish Present	WCT Present	WCT Genetic Purity	Arctic grayling Present	Other Fish Species Present
	Seymour	yes	upstream	99*	dwnstrm	EBT, WCTxYCT, LND, MS
	EF La Marche	yes			dwnstrm	EBT
Fishtrap	EF Fishtrap	yes				EBT
	EF Fishtrap trib	yes				EBT
	Swamp	yes				EBT
	MF Fishtrap	yes				EBT
	WF Fishtrap	yes	upstream	Untested		EBT
Mudd	Camp Hollow	no				
	Calvert	no				
	EF Mudd	yes				EBT
	WF Mudd	yes				EBT
	Mudd	yes				EBT
	York Gulch	yes	yes	100	dwnstrm	EBT
Pintler	Pintler	yes	upstream	Untested suspected hybrids	Yes **	EBT, RBT, WCTxRBT, LND, MWF, MS, BRB
Mussigbrod	Mussigbrod	yes	upstream		Yes **	EBT, LNS, LND, MWF, MS, BRB
	Bender	yes	upstream	100		EBT
	Bender trib	yes				EBT
Ruby Creek	Butler					EBT
	Gory		yes	97		EBT
	Nickel Bar Gulch					EBT
	Wagnar	no				
	Ruby					EBT, LNS, BRB, MS
	Little Moosehorn	no				
	Big Moosehorn					EBT
	Calf					EBT, MS
	Ruby trib1					EBT
	Ruby trib 2					EBT
	Ruby trib 3		yes	100		EBT, MS
	WF Ruby					EBT, MS
	Rabbit					EBT, MS
	Nugget	no				
	Pioneer					EBT, MS
	Cow	no				

Table 3: Fish present in Streams Within the Analysis Area by Allotment

Allotment	Stream	Fish Present	WCT Present	WCT Genetic Purity	Arctic grayling Present	Other Fish Species Present
Dry Creek	Dry					MS
	Big Lake	yes	yes	93*		EBT, LNS, LND, WCTxRBT, MS, BRB
	Sawmill	yes				EBT
Twin Lakes	Slag a melt	yes				EBT
	Big Swamp	yes				EBT
	Little Lake	yes				EBT
Monument	Gravelle	No				
	Miner	yes			Yes**	EBT, LND, MS, BRB
	Englejard	yes				EBT
	Hamby	yes				EBT
	Little Swamp	yes				EBT
Pioneer	Berry	yes				EBT
	Pioneer	yes	upstream	100		EBT
	NF Pioneer	no				
	Jahnke	yes				EBT
	Blind Canyon	yes	yes	100		EBT
	Big Hole	yes				EBT, LNS, LND, MS, BRB
	Darkhorse	yes				EBT
Saginaw	Saginaw	No				
	Englebaugh	yes				EBT
	WF Englebaugh	yes				EBT
	Governor trib1	no				
	Governor trib2	yes	yes	100		EBT
	Little Indian	yes	yes	95		EBT
	Indian	yes	yes	100*		EBT

*-more highly hybrized fish also sampled in this stream
**- Arctic grayling present in Mussigbrod, Miner and Pinlter lakes

Arctic grayling-R1Sensitive

Fluvial (permanently stream-dwelling) arctic grayling became a major concern in Montana in the late 1970's and early 1980's. Concerns escalated for over a decade until a conservation plan was adopted. While numerous lake dwelling populations are present here and throughout the northern Rocky Mountains, the only confirmed self-sustaining fluvial population remaining outside of Canada and Alaska occurs in the Big Hole River. Historically, they were distributed throughout the upper Missouri River basin, with populations in the Big Hole, Red Rock, Beaverhead, Jefferson, Madison, Gallatin, Smith, and Sun rivers providing most of the

habitat (Kaya 1990). The species appeared to have been irregularly distributed, with the Sun and Smith rivers providing the only habitat downstream from Three Forks.

Conservation efforts over the last 13 years resulted in grayling reintroduction in the North and South Forks of the Sun Rivers as well as the Ruby and Beaverhead Rivers. They have all been limited in their success. The most promising place to reestablish grayling seems to be the Ruby River, upstream of Ruby Reservoir. Limited reproduction has been documented. While adult numbers are quite low, individuals seem to be distributed over about 47 miles of stream. Stocking is ongoing in the Ruby in attempt to establish a naturally sustained population. Recovery of grayling on the BDNF is largely focused on assisting with recovery objectives and ensuring management actions don't impede recovery.

The U.S. Fish and Wildlife Service has written many findings since 1982 on the Arctic grayling and its status with regard to the Endangered Species list. The most recent from 2010, constitutes the revised 12–month finding on whether to list the upper Missouri River DPS of Arctic grayling (*Thymallus arcticus*) as endangered or threatened. It is this finding that defines Arctic grayling as native lake or stream dwelling grayling as opposed to the stricter fluvial life form. It is this 'redefining' that brings our attention to grayling populations in Mussigbrod and Miner lakes within the Big Hole River basin. Both of these lakes hold what are considered to be native populations of Arctic grayling despite both receiving stocked grayling at various times in the past as well. Mussigbrod Lake lies within the Mussigbrod allotment and Miner Lake lies within the Monument allotment. Both lakes are fenced such that cattle cannot access their shorelines.

Pintler Lake is not listed specifically as part of the listing document, however it is listed by the Montana Fisheries Information System as having a grayling population. Pintler Lake is listed as having grayling common and the Pintler Creek near Pintler Lake as having grayling rare.

Hydrology surveys suggest Miner Creek, which is a listed as impaired on the 303d list, looked good which is in line with the legacy survey that indicated that it was in properly functioning condition with a static trend. Mussigbrod Creek had two legacy stream surveys completed but conditions have changed significantly following a large wildfire which burned a large portion of the allotment. Mussigbrod is listed as an impaired stream on the 303d list but cattle impacts were found to be limited especially higher in the watershed. Cow impacts were observed in the lower reaches as well as recreation impacts and significant effects from diversions which dewatered the channel. The stream looked well overall though. There are three legacy stream reaches on Mussigbrod Creek (1998) and at the time these reaches were surveyed, all three reaches were determined to be functioning acceptably each with static trends. It was noted that one of the reaches contained lots of large woody debris on the banks and in the channel. Pintler Creek is a relatively large stream that is listed for physical substrate habitat alterations on the 303d list of impaired waters. The stream has limited grazing impacts below the lake where it is wooded with limited range. Above the lake the stream is very deep with vertical banks which limit grazing impacts.

Westslope Cutthroat Trout – R1 Sensitive

Westslope cutthroat trout, (WCT) inhabit streams on both sides of the continental divide. Its eastside distribution is largely in Montana in the Missouri River drainage. Historically, within the Missouri basin, the downstream distribution extended to Great Falls and included headwaters of the Judith, Milk, and Marias rivers. On the west side of the divide, the subspecies occurs in the upper Kootenai, Clark Fork, Clearwater, and Salmon rivers. It also inhabits the Spokane River above Spokane Falls, and the Coeur d'Alene and St. Joe drainages.

Describing current WCT distribution is complicated by an abundance of populations with varied levels of genetic purity. The question that invariably surfaces is: "At what point has a WCT population become sufficiently hybridized that it fails to have conservation value, and its importance remains primarily as a recreational fishery? This has management implications, since the importance of individual populations must be defined to meet legal and regulatory requirements regarding species viability forest-wide. Shepard et al. (2005) used specific criteria to designate conservation populations. They are populations that are genetically unaltered; or which are hybridized or the genetic statuses is unknown, but have ecological, genetic and behavioral attributes of significance. Populations that occupy habitat likely to become part of a WCT conservation focus are also included. These criteria have been commonly used by state and federal management agencies and so are used for this analysis to help define livestock management to help meet conservation and restoration objectives.

Influences from non-native trout have resulted in severely disjointed WCT distribution patterns within the project area. Where they currently exist, they are often restricted to relatively short segments of headwater streams; often where fish passage barriers protect them from upstream invasion by nonnative trout. Consequently, they are isolated, and comprised of non-migratory residents lacking the characteristics and benefits of a meta-population. Within the project area, brook trout is the non-native species that is directly competing with cutthroat in a couple of streams. Risks associated with hybridization from non-native rainbow and Yellowstone cutthroat trout is the primary factor limiting conservation efforts to expand WCT distribution.

Westslope Cutthroat Trout Populations

Table 4 below describes the distribution of each WCT population inside and outside allotments. They occupy a total of 18.9 miles of stream, of which 12.8 miles are inside the allotments being analyzed (the direct and indirect analysis effects area). Cutthroat trout occur in 6.1 miles of stream outside the allotments (within the cumulative effects analysis area).

Table 4: Distribution of WCT populations by Allotment and Pasture

WCT Population	Allotment	Pasture	Miles occupied in Pasture	Population extends outside of analysis area	Miles outside of allotments
Tenmile	Seymour	Tenmile	1.5	Yes, upstream	1.5
Corral	Seymour	Tenmile	1.0	No	0

Table 4: Distribution of WCT populations by Allotment and Pasture

WCT Population	Allotment	Pasture	Miles occupied in Pasture	Population extends outside of analysis area	Miles outside of allotments
York Gulch	Mudd	Mudd Cr	4.0	Yes, downstream	0.5
Gory Creek	Ruby Creek	Lower Ruby	1.5	No	0
Ruby trib.	Ruby Creek	Cow Creek	1.0	No	0
Big Lake Creek	Dry Cr	Upper Dry Creek	0.1	Yes, upstream	2.0
Blind Canyon Cr	Pioneer	Skinner Meadows	0.2	Yes, upstream	1.5
Governor trib.	Saginaw	Pasture 4	0.5	no	0
Little Indian	Saginaw	Pasture 4	2.0	Yes, downstream	0.1
Indian	Saginaw	Pasture 4	1.0	Yes, upstream	0.5

Many of the cutthroat populations within the analysis areas were surveyed multiple times between 1994 and 2010. Most of the survey data, however, has limited value for comparison, because seasonal movement appears to be common among the populations. Thus, data used to define trends was heavily favored if it was from the same stream reaches and collected about the same time of the year.

Westslope Cutthroat Trout in Fish Key Watersheds

Tenmile Creek

Table 5: Summary of e-fish Inventoried Stream Segments on Tenmile Creek

	Reach 1 (1989)	Reach 2 (1993)	Reach 3 (1993)	Reach 4 (2010)
Stream meter post	4,851-4,952	4,131-4,206	8,934-8,995	7450-7750
Fish species	WCT, EBT, MS	None Found	WCT, EBT, MS	WCTxRBT, EBT, MS
Would support Fish	Yes	Yes	yes	yes
EBT:WCT ratio	4.7:1	n/a	13.2:1	8:1

Tenmile Creek is in a fish key watershed. WCT occupy 1.5 miles of Tenmile Creek within the Tenmile pasture of the Seymour allotment and another 1.5 miles of stream upstream of the

allotment boundary. WCT population abundance is low given few fish observed while sampling.

A 2-pass survey of reach 1, conducted in 1989, yielded 19 WCT and 89 EBT. A 1-pass survey was conducted in reach 2 in 1993. No fish were found at that time. Reach 3 was surveyed in 1993. A 1-pass survey yielded 5 WCT and 66 EBT. A 1-pass survey in 2010 was conducted in an effort to collect WCT genetic samples. Flows were relatively high and sampling was inefficient as a result, 32 EBT and 4 WCT were captured in reach 4. Population trend is likely stable or downward given the presence and relative abundance of non native EBT.

Genetics data exists for this population also. Analysis of 17 WCT captured in 1989 found 91% of the relevant loci to be indicative of WCT while 9.4% were indicative of RB. Analysis of five WCT from the 1993 sample found 100% of the relevant loci to be indicative of WCT. The accuracy of this finding is called into question, however, by the small sample size and the fact that an earlier analysis found less than pure WCT in the stream. A total of 13 WCT were tested from 2010 sampling and fish were found to be 99.7% WCT. The source of non-native genetics comes from historic stocking of RBT in headwater lakes in the drainage.

Very little of the riparian area of Tenmile Creeks is suitable for grazing as it is mainly under conifer cover. This pasture is grazed infrequently only grazed in 2 years since 2004. The hydrology report for this project notes that in general cattle impacts were limited and minor in the Tenmile Pasture.

A watershed assessment (USDA 2012) states that the reach above FS route 2483 had riparian zones in excellent condition noting high streambank stability, low fine sediment, and frequent pools suggesting that aquatic habitat conditions here have improved since a 1992 survey showed FAR with a downward trend.

Corral Creek

Table 6: Summary of e-fish Inventoried Stream Segments on Corral Creek

	Reach 1 (1994)	**Reach 2 (1994)**	**Reach 3 (2006)**	**Reach 4 (2009)**	**Reach 5 (2010) FWP**
Stream meter post	5320-5426	6752-6875	5300-6700	4950-6550	4000-4300
Fish species	EBT	EBT, WCT	EBT, WCT	EBT	EBT
Would support Fish	Yes	Yes	Yes	yes	yes
EBT:WCT ratio		1:3	35.3:1	403:0	66:0

Corral Creek is a perennial stream and is a tributary of Deep Creek. The creek flows southeast throughout its length (approximately 7km). The upper reaches flow across USFS land while the lower reaches flow across state land. WCT occupy about a mile of stream all within the Tenmile pasture of the Seymour allotment.

Two reaches of Corral Creek were surveyed in 1994. A 1-pass survey of reach 1 yielded a single EBT. A 2-pass survey of reach 2 yielded another EBT and three WCT (3-6 in. long). Analysis of the three fish found them to be 100% pure WCT. The small sample size, however,

means that hybridization cannot be ruled out, if WCT are still present in the creek. In 2006, 318 EBT were captured and only 9 WCT were found. In 2009, 3 days of sampling failed to turn up one WCT while just over 400 EBT were captured. Similar results were found in 2010 when an FWP crew sampled 1000 foot reach finding 66 EBT and no WCT. Over the years WCT have become less and less populous in Corral Creek. It is possible WCT no longer exist in Corral Creek or if they do, no longer represent a viable population.

Very little of the riparian area of Corral Creek is suitable for grazing as it is mainly under conifer cover. This pasture is grazed very infrequently, only grazed 2 years since 2004. The hydrology report for this project states: "Corral Creek was functioning at risk and had some localized cow impacts above the road that decrease as you move upstream into the trees. Below the road there are recreation and cow impacts in the open area and then the stream is diverted causing more impacts downstream where the stream is more a ditch than a stream with the historic channel completely abandoned at low flow. This stream is TMDL listed for sediment and although grazing impacts are contributing to sedimentation, channel diversions appear to be the greatest influence to decreased channel conditions."

A watershed assessment (USDA 2012) qualitatively states the aquatic habitat just above FS route 2483 show some signs of cattle grazing, but remains in good condition. Streambanks were under cut yet stable, pool habitat was abundant and large woody debris was common throughout a 500 foot long reach.

Westslope Cutthroat Trout in Other Watersheds

York Gulch

Table 7: Summary of 2001 Electrofishing Surveys on York Gulch

	1995 (1-pass)	Reach 9 (examined)	Reach 10 (1-pass)	Reach 11 (sptchk)	2006	2009
Stream meter post	8047-8220	6550-7150	7600-7700	8500-9200	7350-9050	7950-8650
Fish species	EBT, WCT	None	EBT	EBT, WCT	EBT, WCT	EBT, WCT
Would support Fish	Yes	At times	Yes	Yes	Yes	Yes
EBT:WCT ratio	1:2.4			1.5:1	2.6:1	2.8:1

York Gulch carries perennial flow for about 2.5 kilometers, between irrigation inflow and outflow ditches. Water is diverted from the West Fork Mudd Creek, around Mudd Creek Ridge, and dropped into the northern fork of York Gulch at about stream km 10. This water is subsequently diverted out of York Gulch, to the south, at stream km 7. Prior to 1998, the inflow was allowed to cascade down a steep draw resulting in severe gully development and transport of large amounts of sediment downstream. The NRCS helped design a stable bypass water delivery system.

WCT occupy about 4 miles of stream in the Mudd Creek pasture of the Mudd allotment and another half of a mile or so downstream from the forest boundary. WCT share this habitat with EBT and have never been sampled in great numbers. When tested, WCT have come back genetically pure though.

Fish sampling first occurred in 1995. This sample documented the presence of EBT and WCT. A total of 24 WCT and 10 EBT were captured. Most fish of both species measured between 76-149mm. Ten WCT were collected for genetic analysis. Results from the UM lab indicated these fish were genetically pure WCT.

Three sites in York Gulch were electrofished in 2001. The downstream-most sample, below the irrigation diversion, contained insufficient flow to support fish. The second reach, located downstream of the confluence of the forks contained only a few YOY EBT. The northern fork, containing the diverted flow from the West Fork Mudd Creek contained low numbers of both WCT and EBT. Fifteen EBT and 10 WCT were captured in 700 meters of stream. Fin clips, collected from the WCT were sent to the genetics lab at UM for analysis. Results indicate these 10fish are genetically pure WCT. A subsequent genetic sample of 12 fish in 2006 indicates genetically pure WCT as does a 33 fish sample from 2008.

During the summer of 2013, Montana Fish Wildlife and Parks conducted a westslope cutthroat trout restoration project encompassing York Gulch and the West Fork of Mudd Creek (MFWP 2013). This project removed nonnative brook trout from York Gulch and will aim to restore the cutthroat fishery to its historic state. If the fish migration barrier is successful at keeping brook trout out of the upper reach of York Gulch, then WCT will occupy the stream without competition from nonnative fish from stream mile 3 to the headwaters. An exclosure fence protects about 95% of the WCT occupied portion of York Gulch from cattle trampling.

A 1998 hydrology survey depict a non-functioning stream channel attempting to transport this sediment. Instream habitat surveys were done on 1.4 km of York Gulch in 2002. These surveys depict a stream about 1.5 meters wide at bankfull, comprised of mostly riffle habitat, with only a few, shallow pools. Water temperature was 17-19 degrees C at the time of the surveys (early July). Subsequent season long water temperature data has been collected and it suggests York Gulch is one of our warmer WCT streams in the Big Hole. This is likely a function of how York Gulch is treated as a ditch. The flow regime in this stream is largely dictated by timing and flows of West Fork Mudd flow diverted through York Gulch. This flow alteration limits the habitat quality in York Gulch as it drives the flow, temperature, and sediment regimes. An exclosure fence has been constructed around about 95% of the WCT occupied portion of York Gulch to protect it from cattle trampling.

The hydrology report for this project states: "York Gulch has been modified to receive water from the West Fork of Mudd Creek and most of the stream has been enclosed by fencing and is in very good shape. There are three legacy surveys and two new surveys, unfortunately the lower York Gulch new surveys is in an exclosure on a modified channel so it is not a good indicator of grazing pressure. The other new survey is on a tributary to York Gulch, it was on a higher gradient channel but still showed slight improvement based on bankfull channel

widths. Most of the streams in this pasture, including the tributary of York Gulch where the survey was located, are on forested streams with limited grazing pressure although there are a few problem areas where more available suitable grazing lands adjacent to streams are available.

The stream is ditched above the main road crossing and is mostly fenced out below the road so cow impacts were very limited. In areas adjacent to the stream that were accessible for grazing, conditions also appeared to be in good shape. Places that were not properly functioning appeared to be improving. The main tributary looked good as well.

West Fork Mudd Creek

During the summer of 2013, Montana Fish Wildlife and Parks conducted a westslope cutthroat trout restoration project encompassing York Gulch and the West Fork of Mudd Creek (MFWP 2013). This project removed nonnative brook trout from West Fork of Mudd Creek and will aim to restore the cutthroat fishery to its historic state above the diversion structure which acts as a fish migration barrier. If the fish migration barrier is successful at keeping brook trout out of the upper reach of WF Mudd, then WCT will occupy the stream without competition from nonnative fish from stream mile 1.5 to the headwaters. About 2.2 miles of WCT occupied WF Mudd lies within the grazing allotment, and 0.7 miles lie upstream of the allotment boundary. Most of the WCT habitat in this stream is under conifer cover and not very suitable for cattle grazing. One exception is a meadow the stream flows through for about 0.5miles. This meadow is susceptible to cattle impacts but is rarely visited by cattle likely because it is isolated by so much surrounding timber cover. Cattle impacts to the WCT occupied portion of this stream are few and far between.

Gory Creek

Gory Creek supports a WCT population in the Ruby Creek allotment and the Lower Ruby pasture. WCT occupy about a mile and a half of stream in this pasture and the population does not extend outside the pasture boundary. Gory Creek population of WCT is protected from the presence of EBT mainly by an intermittent reach of stream and relict beaver activity. Single pass catch per unit effort reveals approximately 9 fish per 100 m of sampling suggest high population abundance and the population trend is stable or upward.

Table 8: Summary of Electrofishing Inventoried Stream Segments on Gory Creek

	Reach 1 1996	**Reach 2 1989**	**Reach 2 2009**
Stream meter post	1619-1735	1759-1812	1750-2050
Fish species	WCT	WCT	WCT
EBT:WCT ratio	0:13	0:15	0:26

Gory Creek flows southwest approximately 3.5 km before emptying into Ruby Creek near stream km 12. Two sections of the stream, which is located entirely on USFS lands, have been surveyed (over a 450 meter reach) during the past 23 years.

A 1-pass survey of reach 2 was conducted in July 1989. 13 WCT were captured at the time and reports indicate that a genetic analysis was conducted on all 13 fish, which were found to be 100% WCT.A 1-pass survey of reach 1 was conducted in August 1996. 15 WCT were

captured at the time. In 2009, crews started sampling near downstream from the culvert on forest road 943. We encountered an unconsolidated channel and reach of stream with no flow. EBT and RBxCT caught in downstream portion of reach. There is unconsolidated channel and wetland and lack of flow separating these fish from the WCT upstream. No non-natives exist in the 'WCT' portion of the reach. In 300 meters of sampling the WCT-only reach, we captured 26 WCT for genetic samples and found no other species of fish. Genetic samples of 26 of these fish came back as 98% WCT x 2% YCT so fish here are considered slightly hybridized.

The riparian vegetative cover along the portion of Gory Creek occupied by WCT is spruce and other conifer cover. Habitat appears to be in good condition with large woody debris pools plentiful and despite granitic substrate. Cattle rarely occupy this portion of this stream and redd trampling is not considered a risk to this WCT population.

The hydrology report for this project states "Qualitative data for Gory Creek shows that the stream has limited cow impacts with the section above the 943 road crossing mostly forested and in good shape. The area below the road turns into a wide willow riparian complex with beaver activity noted. Some cow impacts were observed near the road but they decreased as you went downstream." The legacy surveys on Gory, determined that each of the reaches was functioning acceptably with static trends.

Unnamed tributary 1 to Ruby Creek

This stream flows south 3.2 km before emptying into Ruby Creek near kilometer post 25.2. The WCT population occupying the unnamed tributary 1 to Ruby Creek is in about one mile of stream the Cow Creek pasture of the Ruby Creek allotment. This population abundance is low, yet stable. Abundant EBT limit WCT ability to become more populous and expand their population. It is questionable whether or not this population is even viable any longer.

Several sections of this stream, which is located entirely on USFS lands, have been surveyed in 1994 and again in 2009. A 1-pass survey of reach 1 was conducted in September 1994. 49 EBT, mottled sculpin, and 2 WCT were found in this section. Survey reports state that an allozyme analysis found the WCT to be 100% pure.

A spot-check survey of reach 2 was conducted in September 1994. An unknown number of EBT and MSC were found in this section. In 2009, a 500 meter sampling from meterpost 850 to meterpost 1350 (approximating reach 1) yielded one WCT and 121 EBT. One week later, crews caught 4 WCT and tallied 53 EBT. Many more EBT were observed but not captured as the emphasis was placed on WCT sampling in attempt to get enough fish for a genetics sample. Too few WCT were captured so the samples were not sent for analysis.

Table 9: Summary of Electrofishing Inventoried Stream Segments on Unnamed Tributary 1 to Ruby Creek

	Reach 1 1994	**Reach 2 1994**	**Reach 1 2009**	**Reach 3 2009**
Stream meter post	821-976	938-1101	850-1350	2250-2800
Fish species	EBT, MSC, WCT	EBT, MSC	EBT, MSC, WCT	EBT, MSC, WCT
EBT:WCT ratio	49:2	unknown	121:1	unknown

Habitat was observed to be in good condition. The lower portion of the stream has thick healthy willow cover while the upper portion of the drainage is more under conifer cover. Neither section of stream appears suitable for cattle. The lack of cattle use seems to support this conclusion. The hydrology portion of this project states the legacy reach in Ruby trib 1 was functioning.

Big Lake Creek

The Big Lake Creek WCT population occupies about one tenth of a mile of the Dry Creek allotment in the Upper Dry Creek pasture. At roughly 10 fish per 100 m, even with less than ideal electrofishing efficiency I suspect population abundance is either medium or high. Trend I suspect is stable as the WCT to EBT ratio was maintained or increased between 1994 and 2001. Sampling reports show a well distributed length frequency for size distribution indicating multiple age classes were present. This supports a solid representation of all year classes in the population.

Table 10: Summary of Electrofishing Inventoried Stream Segments on Big Lake Creek

	Reach 6 1994	**Reach 5 2001**	**Reach 8 2001**
Stream meter post	42750-42902	42400-42500	43200-43300
WCT per 100 m	18	3 *	12
WCT:EBT ratio	27:13	3:13	12:3
Habitat quality	Good	Good	Good

*Surveyors note that electrofishing efficiency was poor due to the size of the stream in this section.

A 2-pass survey of reach 6 was conducted in August 1994. 13 EBT and 27 WCT were found in this section. Ten WCT were tested for genetic purity using horizontal starch gel electrophoresis. Alleles characteristic of both WCT and RB were detected at six loci. The average genetic contribution of WCT and RB are 93.3% and 6.7%, respectively. The geneticist concluded that the WCT in Big Lake Creek are "…undoubtedly hybridized populations of westslope cutthroat and rainbow trout." Reach 5 yielded 13 EBT and 3 hybrids, which were likely WCTxRB, during a 1-pass survey in 2001. Most of this reach classifies as a B2 and its average wet width is 2.5 meters. Reach 8 yielded 3 EBT and 12 hybrids, which were likely WCTxRB, during a 1-pass survey in 2001.

In 2001 the sampling reaches habitat was briefly assessed. Despite slight reduction in channel stability, pools were plentiful and provided nice depth. Most pools were formed by large woody debris, rock scours and meanders providing ample over wintering habitat.

Blind Canyon Creek

Blind Canyon Creek WCT population lies in the Pioneer allotment in the Skinner Meadows pasture for about 0.2 miles while the remainder of the population occupies about 1.5 miles of stream upstream from the allotment boundary. This population is allopatric as EBT have not expanded above a cascade section in the stream. WCT occupy 0.75 mile upstream of the trail crossing free of EBT competition. There was nothing obvious blocking these WCT from being further upstream. Habitat is still available at least 1 mile upstream from the trail crossing with decent pools and adequate large woody debris.

Table 11: Summary of Electrofishing Surveys on Blind Canyon Creek

	1997 (1-pass)	**2008**	**2010**
Stream meter post	1196-1352	100-800	1000-2700
Fish species	WCT	WCT, EBT	WCT
Would support Fish	Yes	Yes	Yes
EBT:WCT ratio	0:1	0.9:1	0:18

The 1997 electrofishing sample consisted of a single pass over 500 feet of stream. The data lists only a single fish captured – a WCT that was sent to the genetics lab at UM. The results indicate this fish was genetically pure WCT. In the 2008 sampling we electrofished from the culvert upstream to about MP 800. We captured 29 brook trout and 33 WCT. Brook trout were present at low densities through the entire reach despite a very steep narrow confined reach in which several LWD complexes appear to present challenges at least to fish passage. 2011 sampling the survey extended from meterpost 1000 to 2700. I verified 18 WCT and saw 6 more fish I couldn't identify. It's highly unlikely EBT occupy this portion of stream since every fish identified to species was a WCT. Ten of the WCT were greater than 150 mm and 8 were less than 150 mm.

Results from the 1998 hydrology habitat survey depict a functioning, stable B3 channel with good stream channel stability and low bank erosion potential. Blind Canyon Creek has a mean bankfull width of 2.1 meters and a width/depth ratio of 7. Hydrology efforts surveyed Blind Canyon Creek and determined the reaches to be functioning acceptably.

Governor Tributary

This unnamed stream is tributary to Governor Creek in the Big Hole River Drainage. This tributary flows for about 0.2 kilometers from the forest boundary before joining Governor Creek at km. 26.2. This tributary flows perennially for about 3.2 km from its headwaters to its confluence with Governor Creek. The unnamed tributary to Governor Creek supports a WCT population in the Saginaw allotment in Pasture 4. The population occupies about 0.5 mile of stream in the allotment and no additional stream outside the allotment.

In 1995, a 500' reach was sampled in this tributary, yielding a total of 18 WCT and 10 EBT. An eight fish sample, was preliminarily determined to be 100% WCT, by the UM genetics lab. In 2009, the stream was resampled. This tributary stream was occupied by WCT and EBT. In a reach about 700 meters long, we captured 22 WCT and 72 EBT. Genetic samples from all 22 WCT were tested and show they are most likely 100% WCT.

Over time, WCT abundance in the south tributary has declined. In 1995, sampling resulted in 1.8 WCT per EBT captured and by 2009 the relative abundance dropped to one WCT per 3.3 EBT. Similarly, in 1995, 18 WCT were captured in 500 feet of stream whereas the 2009 sampling captured roughly 5 WCT per 500 feet of stream sampled.

Table 12: Summary of Electrofishing Surveys on the Unnamed Tributary to Governor Creek

	South trib. 1995 (1-pass)	**South trib. 2009 (1-pass)**
Stream meter post	1032-1194	700-1400
Fish species	WCT, EBT	WCT, EBT
EBT:WCT	10:18	72:22

Very little of this stream is under conifer cover. As such it is open and accessible to cattle. Given the lack of channel protective vegetation, the risk of bank and WCT redd trampling is pretty high in this stream system. Two hydrology surveys were conducted on the south tributary in 1998. These are located in close proximity to each other, but depict quite different scenarios. The downstream site was determined to be a non-functioning C4 channel, with poor channel stability and high bank erosion potential. The upstream site, located only 200 meters above, consists of a functioning B3 channel, with good channel stability and moderate bank erosion hazard potential.

Little Indian Creek

Little Indian Creek is a tributary to Governor Creek in the Big Hole River sub-basin. It flows perennially for approximately 4 km. from its headwaters in section 26 to its mouth, downstream of the Forest boundary in section 19. The WCT population in Little Indian Creek extends about 2 miles within pasture 4 of the Saginaw allotment and an additional tenth of a mile downstream from the forest boundary.

Electrofishing survey work on Little Indian Creek is comprised of two, overlapping surveys, immediately downstream of forest road # 7335 in 1994 and a repeat survey in 2009. In 1994, EBT (n = 21) and westslope cutthroat trout (n = 4) were both documented. Preliminary results of a four-fish WCT sample, analyzed by the lab at UM, indicate these fish are 95% pure WCT.

In 2009 the reach from meter post 2200 to meter post 2475 was resampled. Again EBT (111 fish) and WCT (2 fish) were captured. WCT abundance in this stream appears to have slipped over time. There are far more EBT present per WCT in 2009 (56) than in 1994 (5). Similarly

while WCT numbers are quite low for both sampling times again they have slipped from one fish per 40 meters in 1994 to one fish per 140 meters in 2009.

Table 13: Summary of Electrofishing Surveys on Little Indian Creek			
	1994 (1-pass)	**1994 spotcheck**	**2009 (1-pass)**
Stream meter post	2229-2389	2346-2498	2200-2475
Fish species	WCT, EBT	WCT	WCT, EBT
EBT:WCT	21:4		111:2

Very similar to the unnamed tributary to Governor Creek, riparian vegetation is predominately sedge/grass, interspersed with sections of coniferous forest. Given the lack of channel protective vegetation, the risk of bank and WCT redd trampling is pretty high in this stream system. Hydrologic surveys were conducted on two reaches, encompassing over 1300 meters of stream channel in 1998. The downstream survey depicted a functional, E3 channel, with good channel stability, but with high bank erosion potential (Rosgen, 1996). The upper site, located upstream of the 1994 electrofishing reaches documented a shift in channel type, from a potential E3b, to a B5c. Substrate composition has shifted to sand-sized material, possibly a result of past management activities upstream. Stream channel stability is good, but bank erosion hazard is high. Despite the shift in channel type and increase in fine sediment, the channel at this site was called functioning. The hydrology report for this project identified Little Indian Creek also had sections of functioning at risk with a downward trend but only one small section of non-functioning stream above the road where a headcut entrenched the stream.

Indian Creek

Indian Creek flows perennially for about 4.5 kilometers on NFS land above its confluence with Governor Creek, downstream of the Forest boundary at km 27.8. The WCT population in Indian Creek occupies about 1 mile in the Saginaw allotment in Pasture 4 and another 0.5 mile upstream of the allotment boundary.

Electrofishing inventories consist of three samples. The first, in 1994, occurred about two kilometers above the mouth. The stream was not flowing when sampled (8/18/94) and fish were collected from residual pools. Eastern brook trout were the only species found.

The other survey consisted of a depletion estimate within the lower kilometer of the stream in August 1998. Relatively high densities of EBT were estimated (28 fish >3”/100m2). Two WCT (81 and 120 mm) were captured. A tributary stream, entering from the south in section 30, was spot-shocked during the aforementioned electrofishing survey. Although no data was recorded, notes indicate numerous, relatively large, WCT exist in this tributary, along with “better” habitat conditions and less livestock impacts.

In 2009 Indian Creek was single pass electrofished in two locations. At both locations a single westslope cutthroat was captured. Genetic samples were collected from captured cutthroat but have not been analyzed. No age-1 brook trout were captured at Indian 2 indicating limited

reproduction in this reach of the stream, but age-1 fish were captured at Indian 1. At Indian 1, near the Forest Service boundary, the stream was difficult to electrofish because higher water conditions at the end of June when it was sampled. For its small size, Indian Creek contains a relatively good fishery for brook trout, particularly farther upstream.

Since one survey depicts Indian Creek lacking flow and another survey suggests the main WCT production for Indian Creek likely lies within its unnamed tributary in section 30, very little of this streams WCT production lies within this grazing allotment.

Table 14: Summary of Electrofishing Surveys on Indian Creek

	1994 (spotcheck)	**1998 (2-pass)**	**2009**
Stream meter post	1994-2360	800-891	700-2000
Fish species	EBT	EBT, WCT	EBT, WCT
EBT:WCT		84:2	33:2

Habitat: Hydrology surveys, conducted in 1998, described a functioning E3b channel, averaging 0.4 meters wide two kilometers above its confluence with Governor Creek. Channel stability was rated "good" although bank erosion hazard was rated "high". General habitat information collected in conjunction with the 1998 electrofishing survey depict a stream severely impacted by cattle, as evidenced by poor streambank stability and overwidened channel. An intensive (R1/R4) habitat survey was done in 1998, but summarized data is not available. Notes associated with this inventory indicate the presence of several headcuts. These were noted as possible fish barriers, at least during low-flow periods. The hydrology report for this project states Indian Creek is considered to be functioning and has the least amount of grazing impacts for this allotment.

Western Pearlshell Mussel – R1 Sensitive

Margaritifera falcata may be one of the longest living freshwater invertebrates and animals. Specimens have been aged at greater than 90 years (Vannote and Minshall 1982). The western pearlshell mussel has an elongate shell typically 2.5-4 inches long with a concave ventral edge. The interior shell has a purple to pink hue as the outside shell is dark brown to black. Western Pearlshell Mussel was recently added to the Region 1 Sensitive Species List for the Beaverhead-Deerlodge National Forest.

The life history of this mussel consists of four basic life stages. The larval stage briefly parasitizes a host fish, by attaching to the gills. They fall off the host as a juvenile mussel. The larval parasitism on fish enables upstream transport to habitats otherwise difficult to reach by relatively immobile adult mussels. Western pearlshell glochidia are considered highly host specific (Bauer 1987) as they are typically restricted to salmonid fishes.

According to Stagliano (2010) they are found in cool-cold water, stable streams and rivers that are generally low to moderate gradient (1-2%) and wider than 2 meters. The average wetted stream width of streams with viable populations in Montana is 5.2 meters. The preferable benthic substrate is stable gravel and pebbles with a dominant substrate size of 32

mm. Generally, this is equivalent to a Rosgen Class C4 stream type. Willows or alders commonly dominate the riparian zone. It can occur in sand or gravel or among cobble and boulders in moderate to higher gradient larger rivers

Its distribution is currently sporadic, while formerly being widespread and common in western Montana streams (Stagliano 2010). The reduction in distribution is probably, in many instances, related to the loss of its preferred native intermediate host, cutthroat trout. It is known to use other non-native salmonid species as hosts, including rainbow and brook trout. It appears however, successful reproduction and recruitment may occur uncommonly when native cutthroat are absent.
According to Stagliano 2010, the western pearlshell mussel continues to experience significant range reductions over the last 100 years. The primary cause of stream habitat deterioration in Montana is high fine sediment load, related to agricultural practices, which is one of the most serious pollutants of streams systems. Excess fine sediment can degrade mussel habitats by decreasing substrate permeability. This has a smothering effect on juvenile mussels and limits successful recruitment (Stagliano 2010).

Western pearlshells are found within the analysis area in Miner and Mussigbrod creeks in the Miner Creek pasture of the Monument allotment and the Mussigbrod pasture of the Mussigbrod allotment respectively. They occupy streams downstream of the Seymour and Saginaw allotments and are found sporadically in the Big Hole River.

Miner Creek

In Miner Creek pearlshells are found in at least a half mile of stream very near the forest road 182 bridge over Miner Creek. In 2011, a spot survey observed 80 mussels in at least 2 size classes. Excavations were not made to find young mussels and none were observed.

The hydrology report for this project states: "Miner Creek which is a listed as impaired on the 303d list looked good which is in line with the legacy survey that indicated that it was in properly functioning condition with a static trend."

Mussigbrod Creek

Two mussels were observed in this stream after previous surveys failed to document their presence in the stream. This suggests mussels may not be numerous or widespread in Mussigbrod Creek. Mussels were found about a mile upstream from the forest boundary. The unsuccessful survey occurred downstream from the forest boundary near Gibbons school.

The hydrology report for this project states: "Mussigbrod is listed as an impaired stream on the 303d list but cattle impacts were found to be limited especially higher in the watershed. Cow impacts were observed in the lower reaches as well as recreation impacts and significant effects from diversions which dewatered the channel. The stream looked well overall though."

There are three legacy stream reaches on Mussigbrod Creek (1998) and at the time these reaches were surveyed, all three reaches were determined to be functioning acceptably each with static trends. It was noted that one of the reaches contained lots of large woody debris on the banks and in the channel.

Deep Creek

Western pearlshell mussels are found downstream of the forest service boundary outside of the Seymour allotment. The western pearlshell mussel population in Deep Creek is one of the most robust in the Big Hole River basin. They are widely distributed in Deep Creek and its tributary streams, French and California creeks. When found they are often found in pretty high densities and in multiple size classes indicating successful recruitment.

Aquatic Nuisance Species

Currently, there are no aquatic nuisance species documented within the project area. The nearest documented occurrence is whirling disease in the Big Hole River, near the town of Wisdom and the town of Jackson. These sites are approximately 37 and 9 miles, respectively, downstream of the National Forest boundary via the Big Hole River.

Management Indicator Species (MIS) *Drunella doddsi*

The mayfly, *Drunella doddsi*, is a management indicator species for the Beaverhead Deerlodge National Forest. It was selected because it commonly occurs in streams across the Forest and because it is influenced by changes in water quality, including sedimentation. The analysis for the Forest Plan recognized sedimentation as a common impact to aquatic systems from land management actions conducted on the Forest, including timber harvest, log hauling, and livestock grazing. High levels of sediment introduction in aquatic systems are commonly synonymous with degraded habitat conditions and poor stream function. They also tend to be consistent with reduced abundances of desired aquatic species and *Drunella doddsi*.

As such, *Drunella doddsi* was chosen as the Forest aquatics management indicator species to indicate whether management activities are effectively maintaining and/or improving conditions for desired aquatic species. There are specific habitats with greater potential for hosting *Drunella doddsi* than others. Its preference is commonly for higher stream gradients with larger substrate size. It will, however, occur in lower gradient reaches where there are surveys to evaluate aquatic impacts from management. If habitat conditions in a stream degrade and sediment levels increase, we expect *Drunella doddsi* to decline in moderate to lower gradient reaches where sediment has been deposited, leaving the population centralized in higher gradient areas where sediment is transported through without depositing. Thus, *Drunella doddsi* is probably more quickly influenced (and changes in abundance more observable) in lower gradient reaches than in its steeper, more preferred habitats.

Considering this, the lack of *Drunella doddsi's* presence in a set of samples doesn't necessarily mean it no longer occurs in the stream. Its absence more likely is a byproduct of chosen sampling locations and suggests *Drunella doddsi* is in low densities or is absent from lower gradient, less preferred habitats. If sampling suggests densities are low, we would tend to consider current habitat conditions and how improvements would correlate with changes in *Drunella doddsi* abundance. Therefore, the Forest's monitoring is designed to measure

changes in abundance of *Drunella doddsi* over time as an indication of changing sediment levels, and correspondingly changing stream sediment and habitat conditions.

The Forest has been acquiring data for *Drunella dodds*i in various streams the last few years. Because it was only identified as an aquatic management indicator species upon completion of the Forest Plan (USDA 2009), reliable trend information is not currently available. It has been quantified from samples in 59 different streams across the Forest. Twenty-six of the 59 streams were sampled in 2008; samples from approximately 40 streams collected in 2009 were analyzed for *Drunella doddsi* presence and abundance. Five of these stream samples were repeats of previous years sampling.

Nineteen of the streams sampled prior to 2009 had densities of less than 10 individuals per square meter. Seven streams had densities over 100 per square meter. Abundance naturally varies between years, and sampling times relative to the timing of emergence can or have influenced the comparability of some of the data. Because of these variables, we are not fully confident in what the data is telling us so far. As we learn emergence times in different streams, our sampling will be modified to yield the most comparable data. In the near future, the most reliable data will be derived from variations in abundances within the same streams as habitat conditions change.

In 2010, 23 streams were sampled to determine *Drunella doddsi* presence and abundance. Seven streams were sampled previously. None of the sampled streams were in the project area. The 2010 sampling occurred in late September and early October when the nymphs were larger and more easily identified. This maximized the chances of detection, and improved the accuracy of counting individuals. This information will likely be better to help understand natural variations in annual densities, rather than changes affected by Forest management.

In 2011, 24 streams were sampled to determine *Drunella doddsi* presence and abundance. Eight of the sampled streams were in the project area. The 2011 sampling occurred in late July. Project area streams include Slaughterhouse, Tenmile, Corral, Twelvemile, and Seymour creeks in the Seymour allotment, Mussigbrod Creek in the Mussigbrod allotment, Ruby Creek in the Ruby Creek allotment, and Hamby Creek in the Monument allotment. *Drunella doddsi* were present in the Slaughterhouse, Tenmile, and Seymour samples but not in the rest of the samples.

Analysis

Methodology

Spatial Scale

Direct and Indirect Effects Analysis Area

The direct/indirect analysis area is comprised of the aquatic habitats and populations within portions of the 25 sub-watersheds that occur within the 11 grazing allotments (Appendix A6). The analysis considers habitats and portions of populations that are within the grazing allotments but outside BDNF lands. For example, the Seymour allotment overlays lands under state and BLM jurisdiction in addition to BDNF lands. A list of sub-watersheds present in each allotment is listed in Table 1 below, along with the occurrence of sensitive species and a determination of whether they will be influenced by grazing management changes.

Cumulative Effects Analysis Area

The cumulative effects analysis area includes those portions of aquatic populations and their aquatic habitats to the extent of their distributions beyond the direct/indirect analysis area boundary to the lower-most boundary of the subwatershed they occur within. This is most easily described as the 25 sub-watersheds listed in Table 1 in their entirety. They reflect appropriately sized drainages for hydrologic characteristics of streams to reflect the cumulative effects influencing populations that are beyond those for these allotment management plans (Appendix A6).

Temporal Scale

Short term temporal bounds are considered to be one year, since allotments are inspected and reviewed on a yearly basis, and long term temporal bounds for this analysis are considered to be the next 10 years, the expected life of these allotment management plans.

Resource Indicators to be Analyzed and Units of Measure

The following outline lists the primary components of this analysis and the units of measure used to determine effects (See Table 15 below). The analysis focuses on sensitive species: Western Toad, Western Pearlshell Mussel, Westslope Cutthroat Trout, and Arctic Grayling. In addition, the existing condition of one aquatic management indicator species: a mayfly *Drunella doddsi* is described above in the Existing Condition section (pg. 659-660).

For each question we identified specific resource indicators. Resource indicators are elements to be addressed when considering the analysis questions, based on effects anticipated from the project. For example when we considered the question of whether there would be a "change in stream habitat conditions for westslope cutthroat trout", we assessed it through the indicator; "will channel functioning condition change". This indicator functions as a measurable surrogate for habitat quality. Similarly when we considered the question of

whether there would be "will there be a change in westslope cutthroat trout mortality", we used the indicator "would there be a change in frequency of cattle trampling WCT redds?"

For each indicator we chose specific units of measure. Units of measure are the quantifications (numbers) or logical assessments (Yes/No; High/Low; Positive/Negative) of project effects as they relate to the indicators. Measures allow magnitude, scope, duration and/or "direction of influence" of the effects to be assessed and defined.

Certain resource indicators are appropriately used to address more than one analysis question and the same units of measure can address different resource indicators.

Aquatic Analysis Questions

Aquatic analysis questions will outline the key characteristics of the aquatic resource to be described. Furthermore, answering these questions will describe anticipated effects of alternatives on aquatic resources in and around the project area and evaluate alternatives relative to desired aquatic conditions for the Forest. By answering them, we display differences in effects on aquatic resources between the alternatives; and disclose the over-all range of effects proposed by the alternatives.

Table 15: Analysis Questions, Resource Indicators, and Units of Measure

Analysis Question	Resource Indicator	Unit of Measure
1 - Will there be a change in western toad persistence?	*Will there be an increase in cattle trampling on toads?*	1: Will cattle have access to known western toad breeding locations?
		2: How many cattle have access to documented known western toad breeding locations?
		3: How many days will cattle have access to known western toad breeding areas during expected western toad breeding and emigration periods?
2 - Will there be a change in western pearlshell mussel persistence?	*Will there be an increase of cattle trampling on mussels?*	1: Will cattle have access to documented mussel locations.
		2: How many cattle have access to documented mussel locations?
		3: How many days will cattle have access to known mussel locations?
3 - Will there be a change in western pearlshell mussel habitat?	*Will channel functioning condition change?*	1: Will the channel functioning condition improve or worsen?
		2: How quickly would the channel functioning class change?
4 - Will there be a change in westslope cutthroat trout mortality?	*Frequency of cattle trampling on trout Redds.*	1: Miles of suitable grazing overlapping WCT spawning locations
		2: How many cattle have access to WCT spawning locations?
		3: How many days overlap of grazing and trout egg development period?

Table 15: Analysis Questions, Resource Indicators, and Units of Measure

Analysis Question	Resource Indicator	Unit of Measure
5 - Will there be a change in westslope cutthroat trout habitat?	*Will channel functioning condition change?*	1: Will the channel functioning condition improve or worsen?
		2: How quickly would the channel functioning class change?
6 - Will there be a change in Arctic grayling habitat?	*Will channel functioning condition change?*	1: Will the channel functioning condition improve or worsen?
		2: How quickly would the channel functioning class change?

Determinations made for the analysis questions describe effects of the proposed action on specific aquatic resources. They address resources and species of greatest public concern. However, we believe the summary of determinations, also reflects the range of effects on other resources not discussed. This is founded on the premise that land management actions which improve or degrade aquatic habitat conditions, similarly influence all populations that depend on them.

Analysis Methods and Assumptions

The presence of livestock near riparian areas can have direct impacts to aquatic organisms in the form of trampling. Livestock can step on aquatic organisms inadvertently causing direct harm to individuals. Less mobile organisms like western pearlshell mussels or developing embryos of westslope cutthroat trout may lack the ability to detect cattle presence and move out of harm's way. Alternatively, high dependence on a specific area like amphibian's dependence on a wetland for instance can be deleterious if overlapped with high cattle density in space and time.

Western toad trampling- We can assess the risk to aquatic organisms by examining the amount of overlap in time and space that cattle have with these aquatic organisms. Maxell 2000 suggests populations threatened by trampling mortality is most likely direct effect of grazing on amphibians; other things equal, an increase in AULs increases the likelihood of trampling mortality.

Adult toads congregate at breeding areas in the spring and then disperse from these areas. Late summer and early fall, the toad tadpoles metamorphose into toadlets and leave these areas. This period of development can result in thousands of small toads congregated in these breeding areas. Greater cattle densities in areas known to hold toads would lead to increased occurrence of cows walking on toads. Also, a shift in season of cattle use toward periods of time known to be congregation (May-June) or emigration of metamorphs (august-sept) periods near breeding locations increases the likelihood of trampling mortality. A shift away from overlapping grazing on these periods important to toads decreases the likelihood of trampling mortality.

WCT redd trampling- Similarly, Peterson et. al. (2010) predicted that under certain circumstances, redd trampling by cattle could contribute to population declines of cutthroat trout.

WCT spawning and embryo development timing can be predicted with water temperatures. Based on water temperature data we can predict the developmental stage of WCT eggs. The greater the duration of overlap of cattle grazing and the WCT development period, the greater the risk of cattle trampling WCT redds. This cattle trampling and disturbance can result in egg and embryo mortality.

We can use WCT population parameters to predict what effect on the egg and embryo mortality can have on the overall population trend. Characteristics like population stability and resilience can be used to help model the overall effect of trampling related egg and embryo mortality. This report will interpret fishery survey data to estimate WCT population stability and resilience. Factors such as eastern brook trout (EBT) presence, WCT: EBT trend over time, and relative abundance of WCT trend over time will be discussed to predict the WCT population stability and resilience.

Western pearlshell mussel trampling- greater spatial overlap and greater cattle access to areas known to hold mussels would lead to increase occurrence of cows walking on mussels. Greater cattle densities in areas known to hold mussels would lead to increased occurrence of cows walking on mussels: the longer cattle occupy these areas the greater the occurrence of cows walking on mussels.

Aquatic habitat to stream Proper Functining Condition (PFC) Assumptions

Livestock grazing can negatively affect aquatic habitats by decreasing the presence and abundance of desired riparian plant species, the availability of shade and overhead cover along water margins, and the abundance and complexity of stream pools. Grazing can also cause negative effects by increasing water temperatures, stream bank instability, and stream-side erosion and fine sediment levels in stream substrates. Aquatic organism populations have the greatest potential to be healthy when these negative effects are minimized and high quality habitat is widespread and abundant.

The abundance and quality of aquatic habitat are assumed to have approached potential when streams and riparian areas are in PFC. For this reason, PFC is the desired condition for aquatic habitats. Desired aquatic conditions, as they relate to function are described in the Forest Plan (USDA 2009) goals for Watersheds and Stream Channels (pg 13), and for Floodplains, Riparian Areas and Riparian Habitats (pg 14). The condition desired to provide the greatest benefit to all aquatic populations is PFC. Since some streams are not functioning properly, alternative rankings will be determined by how quickly PFC on streams might be achieved.

Life history requirements for western toad, western pearlshell mussel and sensitive fishes are distinctly different, but they share a common dependence on aquatic systems that function properly. Maxell (2000) described potential negative effects to amphibian habitats from livestock grazing as the elimination of bank-side vegetation, collapse of overhanging banks, increases in sediment and decreases in willows, which indirectly decreases the potential for creation and maintenance of ponds and wetlands by beaver. He also defined "heavy structural

impacts" to ponds and wetlands as those that would alter the hydrology of the wetland, such that wetland functions were likely being impaired (Maxell 2004). Pearlshell mussels are similarly dependent on properly functioning streams. They tend to occur in "stable" low gradient streams that with cool – cold temperatures (Stagliano 2010), and tend not to tolerate high fine sediment levels very well.

Even though these species vary regarding their preferred aquatic habitats they are similarly affected by how livestock management influences "how fast" PFC is attained. The faster and more fully this occurs, the greater the benefits for each of these species. This tendency is also applicable to all other desired aquatic species on the BDNF. For this reason, we believe the effects analyses displayed for toads, mussels, and cutthroat is applicable to other species of interest on the Forest. We also believe if the viability requirements for sensitive species are met, they will be met for other native and desired non-native species.

Increased disturbance to wetland edge vegetation (and departure from PFC) leads to decrease moist microhabitat and cover for metamorph toads. Toads and other amphibians frequently use streams, ponds, lakes and their associated wetlands for various life stage requirements. Indirect effects include management related changes to riparian vegetation or morphologic characteristics of streams, lakes ponds and wetlands.

The primary habitats for amphibians are ponds, lakes and wetlands, while those for fish and mussels are streams. The changes that constitute the majority of concern for these groups of species, however, are associated with riparian vegetation, banks and sediment. Except for "streambank" disturbance, the riparian AULs described for the action alternatives are equally applicable to areas around streams, ponds and wetlands. Thus, forage use and stubble height AULs will similarly restrict livestock use in all these habitats and will also similarly attain desired riparian conditions. For PFC ratings on the streams in the allotments, please see Table 3 in the Hydrology section of the DEIS, pgs. 557-561.

Tables 16 to 19 disclose the direct and indirect summeries by species by allotment by alternative by resource indicator for the four sensitive species, Western Toad, Western Pearlshell Mussel, Westslope Cutthroat Trout, and Arctic Grayling discussed above. Table 20 is a summary of the cumulative effects by speices, by allotment by alternative. See Appendix B6 for species specific cumulative effects activities tables.

Table 16: Summary of Direct and Indirect Effects to Western Toad and other Amphibians by Allotment by Alternative by Resource Indicator and Unit of Measure					
Species: *Western Toads and other Amphibians*					
Alternatives	**Resource Indicator: will there be an increase in cattle trampling on toads?**				
	Units of Measure				
	Cattle access to breeding locations?	**How many cattle? (C/c pairs)**	**How many days of cattle access to breeding locations?**	**Additional design features**	**Overall ranking of alternatives**
Seymour Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence
Current Grazing Management	Yes	323	Early pasture = 60 days; 1yr in 3 Late pasture = 51 days; 1yr in 3 Rest pasture = 0 days; 1yr in 3	No grazing in Tenmile pasture	Slightly less likelihood of toad persistence than no grazing alt
Proposed Action	Yes	398	Early pasture = 60 days; 1yr in 3 Late pasture = 51 days; 1yr in 3 Rest pasture = 0 days; 1yr in 3	Toad exclosure; Tenmile pasture grazed	Slightly less likelihood of toad persistence than current grazing alt.
Alternative 4	Yes	323	Early pasture = 60 days; 1yr in 3 Late pasture = 51 days; 1yr in 3 Rest pasture = 0 days; 1yr in 3	Toad exclosure; Tenmile pasture grazed 1 yr in 3 with modified late grazing season.	Slightly less likelihood of toad persistence than proposed action alt.
Fishtrap Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence
Current Grazing Management	Yes	152	91days; 1yr in 2		Slightly less likelihood of toad persistence than proposed action.

Table 16: Summary of Direct and Indirect Effects to Western Toad and other Amphibians by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Toads and other Amphibians***					
Alternatives	**Resource Indicator: will there be an increase in cattle trampling on toads?**				
	Units of Measure				
	Cattle access to breeding locations?	**How many cattle? (C/c pairs)**	**How many days of cattle access to breeding locations?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Yes	152	91days; 1yr in 2		Slightly less likelihood of toad persistence than Alt.4
Alternative 4	Yes	152	91days; 1yr in 3	Rest 1 year in 3	Less likelihood of toad persistence than no grazing alt.
Mudd Creek Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence
Current Grazing Management	Yes	137	91days; each year		Slightly less likelihood of toad persistence than proposed action.
Proposed Action	Yes	137	91days; each year		Less likelihood of toad persistence than Alt.4
Alternative 4	Yes	137	91days; 2 yrs in 3	Rest 1 year in 3	Less likelihood of toad persistence than no grazing alt
Pintlar Creek Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence

Table 16: Summary of Direct and Indirect Effects to Western Toad and other Amphibians by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Toads and other Amphibians***					
Alternatives	**Resource Indicator: will there be an increase in cattle trampling on toads?**				
	Units of Measure				
	Cattle access to breeding locations?	**How many cattle? (C/c pairs)**	**How many days of cattle access to breeding locations?**	**Additional design features**	**Overall ranking of alternatives**
Current Grazing Management	Yes	250	53days each year		Equal likelihood of toad persistence than proposed action
Proposed Action	Yes	250	53days each year		Slightly less likelihood of toad persistence than Alt.4
Alternative 4	Yes	250	49 days each year	Pintlar Meadows rested	Less likelihood of toad persistence than no grazing alt.
Mussigbrod Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence
Current Grazing Management	Yes	165	74 days each year		Less likelihood of toad persistence than proposed action.
Proposed Action	Yes	165	59days; 2 of 3 years	Portion of Bender Creek tributary fenced	less likelihood of toad persistence than Alt.4
Alternative 4	Yes	165	45 days; 2 of 3 years Mussigbrod Pasture only	Bender Pasture rested10 yrs minimum	Less likelihood of toad persistence than no grazing alt.

Table 16: Summary of Direct and Indirect Effects to Western Toad and other Amphibians by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Toads and other Amphibians***					
Alternatives	**Resource Indicator: will there be an increase in cattle trampling on toads?**				
	Units of Measure				
	Cattle access to breeding locations?	**How many cattle? (C/c pairs)**	**How many days of cattle access to breeding locations?**	**Additional design features**	**Overall ranking of alternatives**
Ruby Creek Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence
Current Grazing Management	Yes	283; 28 horses	106 days each year; 91days for horses in Butler Pasture		Less likelihood of toad persistence than proposed action.
Proposed Action	Yes	283; 28 horses	106 days each year; 91 days for horses 2 of 3 years in Butler Pasture	Butler rested 1 in 3 years	Slightly less likelihood of toad persistence than Alt.4
Alternative 4	Yes	283; 28 horses	92 days each year; 77 days for horses 2 of 3 years in Butler Pasture	Butler Pasture rested1in 3 yrs; Portion of Cow Creek pasture fenced	Less likelihood of toad persistence than no grazing alt.
Dry Creek Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence
Current Grazing Management	Yes	150	44 days each year	Known breeding site is fenced off from cattle access	Less likelihood of toad persistence than proposed action.
Proposed Action	Yes	150	44 days 2 of 3 years in	allotment rested1in 3 yrs	Same likelihood of toad persistence as Alt.4

Table 16: Summary of Direct and Indirect Effects to Western Toad and other Amphibians by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Toads and other Amphibians***					
Alternatives	**Resource Indicator: will there be an increase in cattle trampling on toads?**				
	Units of Measure				
	Cattle access to breeding locations?	**How many cattle? (C/c pairs)**	**How many days of cattle access to breeding locations?**	**Additional design features**	**Overall ranking of alternatives**
Alternative 4	Yes	150	44 days 2 of 3 years in	allotment rested1in 3 yrs	Less likelihood of toad persistence than no grazing alt.
Twin Lakes Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence
Current Grazing Management	No known breeding locations in allotment	166 Big Lake side; 174 Little Lake side	45 days each year Big Lake side; 62days for Little Lake side 4 of 6 years	None	Less likelihood of toad persistence than proposed action.
Proposed Action	No known breeding locations in allotment	166 Big Lake side; 174 Little Lake side	45 days 4 of 6 years Big Lake side; 62days for Little Lake side 4 of 6 years	Big Lake side rested 2 years in 6; defer entry to Aug 1 every other year	Same likelihood of toad persistence as Alt.4
Alternative 4	No known breeding locations in allotment	166 Big Lake side; 174 Little Lake side	45 days 4 of 6 years Big Lake side; 62days for Little Lake side 4 of 6 years	Big Lake side rested 2 years in 6; defer entry to Aug 1 every other year	Less likelihood of toad persistence than no grazing alt.
Monument Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence

Table 16: Summary of Direct and Indirect Effects to Western Toad and other Amphibians by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Toads and other Amphibians***					
Alternatives	**Resource Indicator: will there be an increase in cattle trampling on toads?**				
	Units of Measure				
	Cattle access to breeding locations?	**How many cattle? (C/c pairs)**	**How many days of cattle access to breeding locations?**	**Additional design features**	**Overall ranking of alternatives**
Current Grazing Management	No known breeding locations in allotment	300	87 days each year	None	Less likelihood of toad persistence than proposed action.
Proposed Action	No known breeding locations in allotment	300	87 days each year	Site specific use levels based on functioning and trend calls in stream condition	Slightly better likelihood of toad persistence than current grazing
Alternative 4	No known breeding locations in allotment	300	87 days 3 of 4 years	Allotment rested 1 years in 4	Less likelihood of toad persistence than no grazing alt.
Pioneer Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence
Current Grazing Management	No known breeding locations in allotment	250	65 days each year	None	Less likelihood of toad persistence than proposed action.
Proposed Action	No known breeding locations in allotment	250	65 days each year	Site specific use levels based on functioning and trend calls in stream condition	Slightly better likelihood of toad persistence than current grazing

Table 16: Summary of Direct and Indirect Effects to Western Toad and other Amphibians by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Toads and other Amphibians***					
Alternatives	**Resource Indicator: will there be an increase in cattle trampling on toads?**				
	Units of Measure				
	Cattle access to breeding locations?	**How many cattle? (C/c pairs)**	**How many days of cattle access to breeding locations?**	**Additional design features**	**Overall ranking of alternatives**
Alternative 4	No known breeding locations in allotment	250	65 days 3 of 4 years	Allotment rested 1 years in 4	Less likelihood of toad persistence than no grazing alt.
Saginaw Allotment					
No Action	No	0	0	None	Greatest likelihood of toad persistence
Current Grazing Management	No known breeding locations in allotment	300	69 days each year	None	Less likelihood of toad persistence than proposed action.
Proposed Action	No known breeding locations in allotment	300	69 days each year	Site specific use levels based on functioning and trend calls in stream condition	Slightly better likelihood of toad persistence than current grazing
Alternative 4	No known breeding locations in allotment	300	62 days 3 of 4 pastures; 22 days for pasture 4	Decrease in days and avoidance period for pasture 4	Less likelihood of toad persistence than no grazing alt.

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***								
Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Seymour Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts
Current Grazing Management	Yes	323	0	No grazing in Tenmile pasture	30% streambank disturbance expected in 2 of 3 pastures; 0% in 3rd pasture every year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches in Seymour and Sullivan pastures.	Fastest recovery rate for Tenmile pasture; slowest recovery for Seymour and Sullivan pastures
Proposed Action	Yes	398	0	Tenmile pasture grazed	30% streambank disturbance expected in 2 of 3 pastures every year and 2 of 3 years for each pasture	Improve	Improve toward functioning at slowest recovery rate for functioning stream reaches in all pastures and slightly faster rate for less than functioning reaches.	Slowest recovery rate for functioning stream reaches in all pastures and slightly faster rate for less than functioning reaches.

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: *Western Pearlshell Mussels*								
Alternatives	**Resource Indicator: *will there be an increase of cattle trampling on mussels?***					**Resource Indicator: *will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Alternative 4	Yes	323	0	Tenmile pasture grazed 1 yr in 3 with modified late grazing season.	30% streambank disturbance expected in 2 of 3 pastures every year and 1 of 3 years for Tenmile pasture	Improve	Improve at slowest recovery rate in Seymour and Sullivan pastures; improve slightly faster in Tenmile pasture	Slowest recovery rate in Seymour and Sullivan pastures; improve slightly faster in Tenmile pasture
Fishtrap Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts
Current Grazing Management	Yes	152	0	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: *Western Pearlshell Mussels*								
Alternatives	**Resource Indicator: *will there be an increase of cattle trampling on mussels?***					**Resource Indicator: *will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Proposed Action	Yes	152	0		30% streambank dis disturbance expected each year in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at slowest recovery rate for functioning stream reaches in all pastures and slightly faster rate for less than functioning reaches.	Slightly faster recovery rate than current grazing mgt.
Alternative 4	Yes	152	0	Rest 1 year in 3	30% streambank disturbance expected each year in functioning reaches and 25% in less than functioning reaches	Improve	Improve at fastest recovery rate of the "grazing" alternatives	Fastest recovery rate of the "grazing" alternatives
Mudd Creek Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Current Grazing Management	Yes	137	0	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts
Proposed Action	Yes	137	0		30% streambank dis disturbance expected each year in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at slowest recovery rate for functioning stream reaches in all pastures and slightly faster rate for less than functioning reaches.	Slightly faster recovery rate than current grazing mgt.
Alternative 4	Yes	137	0		30% streambank dis disturbance expected each year in functioning reaches and 25% in less than functioning reaches	Improve	Improve at fastest recovery rate of the "grazing" alternatives	Fastest recovery rate of the "grazing" alternatives

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Pintlar Creek Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts
Current Grazing Management	Yes	250	0	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts
Proposed Action	Yes	250	0	None	30% streambank disturbance expected each year in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at slowest recovery rate for functioning stream reaches in all pastures and slightly faster rate for less than functioning reaches.	Slightly faster recovery rate than current grazing mgt.

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***								
Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Alternative 4	Yes	250	0	Rest Pintlar Meadows	30% streambank disturbance expected each year in functioning reaches and 25% in less than functioning reaches	Improve	Improve at fastest recovery rate of the "grazing" alternatives	Fastest recovery rate of the "grazing" alternatives
Mussigbrod Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts
Current Grazing Management	Yes	165	37 days every year	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Proposed Action	Yes	165	29 days each for 2 years then 0 days 3rd year	30% streambank disturbance expected each year in functioning reaches and 25% in less than functioning reaches; rest allotment 1 year of 3	Least amount of overlap duration of cattle access and mussel habitat specifically	Improve	Improve toward functioning at recovery rate for all stream reaches faster than the current management scenario	Slightly faster recovery rate than current grazing mgt.
Alternative 4	Yes	165	up to 45 days each for 2 years then 0 days 3rd year	Rest Bender Pasture for 10 yrs minimum	Less overlap duration of cattle access and mussel habitat specifically than the current grazing scenario	Improve	Improve the largest amount of aquatic habitat at fastest recovery rate of the "grazing" alternatives	Fastest recovery rate of the "grazing" alternatives

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Ruby Creek Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts
Current Grazing Management	Yes	283 Cows and 28 horses	0	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts
Proposed Action	Yes	283 Cows and 28 horses	0	rest Butler Pasture 1 year of 3	Less overlap duration of cattle access and aquatic habitat than the current grazing scenario; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve the largest amount of aquatic habitat at fastest recovery rate of the "grazing" alternatives	Fastest recovery rate of the "grazing" alternatives

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Alternative 4	Yes	283 Cows and 28 horses	0	rest Butler Pasture 1 year of 3; exclude portion of Cow Cr Pasture; harden 3 stream crossings	Least amount of overlap duration of cattle access and aquatic habitat; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at recovery rate for all stream reaches faster than the current management scenario	Slightly faster recovery rate than current grazing mgt.
Dry Creek Allotment								
No Action	Yes	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts
Current Grazing Management	Yes	150	0	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Proposed Action	Yes	150	0	rest allotment 1 year of 3	Less overlap duration of cattle access and aquatic habitat than the current grazing scenario; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at recovery rate for all stream reaches faster than the current management scenario, but the same as the Alternative 4.	Recovery rate faster than the current management scenario, but the same as the Alternative 4

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Alternative 4	Yes	150	0	rest allotment 1 year of 3	Less overlap duration of cattle access and aquatic habitat than the current grazing scenario; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at recovery rate for all stream reaches faster than the current management	Recovery rate faster than the current management scenario
Twin Lakes Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts
Current Grazing Management	Yes	166 Big Lake side; 174 Little Lake side	0	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Proposed Action	Yes	166 Big Lake side; 174 Little Lake side	0	Big Lake side rested 2 years in 6; defer entry to Aug 1 every other year	Less overlap duration of cattle access and aquatic habitat than the current grazing scenario; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at recovery rate for all stream reaches faster than the current management scenario; same as alt 4.	Recovery rate faster than the current management scenario, but the same as the Alternative 4

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Alternative 4	Yes	166 Big Lake side; 174 Little Lake side	0	Big Lake side rested 2 years in 6; defer entry to Aug 1 every other year	Less overlap duration of cattle access and aquatic habitat than the current grazing scenario; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at recovery rate for all stream reaches faster than the current management scenario	Recovery rate faster than the current management scenario
Monument Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts
Current Grazing Management	Yes	300	44 days every year	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Proposed Action	Yes	300	44 days every year	Site specific use levels based on stream functioning and trend condition	Slightly less overlap duration of cattle access and mussel habitat specifically than the current grazing scenario	Improve	Improve toward functioning at recovery rate for all stream reaches faster than the current management scenario	Recovery rate faster than the current management scenario
Alternative 4	Yes	300	44 days each for 3 years then 0 days 4th year	rest allotment 1 year of 4	Least amount of overlap duration of cattle access and mussel habitat specifically	Improve0	0Improve the largest amount of aquatic habitat at fastest recovery rate of the "grazing" alternatives	Recovery rate fastest of the "grazing" alts.
Pioneer Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Current Grazing Management	Yes	250	0	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts
Proposed Action	Yes	250	0	Site specific use levels set by stream condition and trend	Less overlap duration of cattle access and aquatic habitat than the current grazing scenario; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at recovery rate for all stream reaches slightly faster than the current management scenario.	Recovery rate slightly faster than the current management scenario

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Alternative 4	Yes	250	0	rest allotment 1 year of 4	Less overlap duration of cattle access and aquatic habitat than the current grazing scenario; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at recovery rate for all stream reaches faster than the proposed action alternative	Recovery rate fastest of the "grazing" alts.
Saginaw Allotment								
No Action	No	0	0	None	Greatest likelihood of best mussel habitat	Improve	Improve toward functioning at fastest recovery rate	Fastest recovery rate of all alts
Current Grazing Management	Yes	300	0	None	30% streambank disturbance expected each year	Improve	Improve toward functioning at slowest recovery rate for all stream reaches	Slowest recovery rate for all alts

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Proposed Action	Yes	300	0	Site specific use levels set by stream condition and trend	Less overlap duration of cattle access and aquatic habitat than the current grazing scenario; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at recovery rate for all stream reaches slightly faster than the current management scenario.	Recovery rate slightly faster than the current management scenario

Table 17: Summary of Direct and Indirect Effects to Western Pearllshell Mussel by Allotment, by Alternative by Resource Indicator and Unit of Measure

Species: ***Western Pearlshell Mussels***

Alternatives	**Resource Indicator:** ***will there be an increase of cattle trampling on mussels?***					**Resource Indicator:** ***will channel functioning condition change?***		
	Units of Measure							
	Will cattle have access to documented locations	**# of cattle (C/c pairs) with access to documented locations**	**# days of cattle access to known locations**	**Additional design features**	**Overall ranking of alternatives**	**Will the channel functioning condition improve or worsen?**	**How quickly would the channel functioning class change?**	**Overall ranking of alternatives**
Alternative 4	Yes	300	0	Decrease use by 7 days in pastures 1 through 3 and by 47 days in pasture 4	Less overlap duration of cattle access and aquatic habitat than the current grazing scenario; 30% streambank disturbance in functioning reaches and 25% in less than functioning reaches	Improve	Improve toward functioning at recovery rate for all stream reaches faster than the proposed action alternative.	Recovery rate fastest of the "grazing" alts.

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure				
Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Seymour Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate for all stream reaches in Seymour and Sullivan pastures.	No grazing in Tenmile pasture	No WCT redd trampling; 30% streambank disturbance expected in 2 of 3 pastures; 0% in Tenmile pasture every year
Proposed Action	Improve	At slowest recovery rate for functioning stream reaches in all pastures and slightly faster rate for less than functioning reaches.	Tenmile pasture grazed	Slight risk of WCT redd trampling; 30% streambank disturbance expected in 2 of 3 pastures every year and 2 of 3 years for each pasture
Alternative 4	Improve	At slowest recovery rate in Seymour and Sullivan pastures; improve slightly faster in Tenmile pasture	Tenmile pasture grazed 1 yr in 3 with modified late grazing season.	No WCT redd trampling; 30% streambank disturbance expected in 2 of 3 pastures every year and 1 of 3 years for Tenmile pasture

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Fishtrap Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	No WCT redd trampling; 30% streambank disturbance expected in pastures every year
Proposed Action	Improve	At slightly faster rate than current grazing	None	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Alternative 4	Improve	At fastest recovery rate of the grazing	Rest 1 year in 3	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 2 of 3 years
Mudd Creek Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	2.6 miles of grazing and WCT redd overlap, but low liklihood; 30% streambank disturbance expected in pastures every year
Proposed Action	Improve	At slightly faster rate than current grazing	None	2.6 miles of grazing and WCT redd overlap, but low liklihood; 30% and 25% streambank

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
				disturbance expected in functioning and less than functioning streams, respectively
Alternative 4	Improve	At fastest recovery rate of the grazing alternatives	Rest 1 year in 3	2.6 miles of grazing and WCT redd overlap, but low liklihood; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 2 of 3 years
Pintlar Creek Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	No WCT redd trampling; 30% streambank disturbance expected in pastures every year

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Improve	At slightly faster rate than current grazing	None	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Alternative 4	Improve	At fastest recovery rate of the grazing alternatives	Pintlar Meadows rested	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Mussigbrod Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	No WCT redd trampling; 30% streambank disturbance expected in pastures every year

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Improve	At slightly faster rate than current grazing	Portion of Bender Creek tributary fenced and Rest allotment 1 of 3 years;	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Alternative 4	Improve	At fastest recovery rate of the grazing alternatives	Bender Pasture rested10 yrs minimum and Rest allotment 1 of 3 years;	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Ruby Creek Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Current Grazing Management	Improve	At slowest recovery rate	None	1.3 miles of grazing and WCT redd overlap, but low likelihood; 30% streambank disturbance expected in pastures every year
Proposed Action	Improve	At slightly faster rate than current grazing	Butler rested 1 in 3 years	1.3 miles of grazing and WCT redd overlap, but low liklihood; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Alternative 4	Improve	At fastest recovery rate of the grazing alternatives	Butler Pasture rested1in 3 yrs and Fence excluding cattle from Ruby trib 2	0.8 miles of grazing and WCT redd overlap, but very low liklihood; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Dry Creek Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	Known breeding site is fenced off from cattle access	No WCT redd trampling; 30% streambank disturbance expected in pastures every year
Proposed Action	Improve	At slightly faster rate than current grazing; same as alt. 4.	Allotment rested1in 3 yrs	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
				less than functioning streams, respectively
Alternative 4	Improve	At slightly faster rate than current grazing	allotment rested1in 3 yrs	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Twin Lakes Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	No WCT redd trampling; 30% streambank disturbance expected in pastures every year
Proposed Action	Improve	At slightly faster rate than current grazing; same as alt. 4.	Big Lake side rested 2 years in 6; defer entry to Aug 1 every other year	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: ***Westslope Cutthroat Trout***				
Alternatives	**Resource Indicator:** ***Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
				less than functioning streams, respectively
Alternative 4	Improve	At slightly faster rate than current grazing	Big Lake side rested 2 years in 6	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Monument Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	No WCT redd trampling; 30% streambank disturbance expected in pastures every year
Proposed Action	Improve	At slightly faster rate than current grazing	None	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
				less than functioning streams, respectively
Alternative 4	Improve	At faster rate than proposed action	Allotment rested 1 years in 4	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Pioneer Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	No WCT redd trampling; 30% streambank disturbance expected in pastures every year

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Improve	At slightly faster rate than current grazing	Site specific use levels based on functioning and trend calls in stream condition	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Alternative 4	Improve	At faster rate than proposed action	Allotment rested 1 years in 4	No WCT redd trampling; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Saginaw Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	2.75 miles of grazing and WCT redd overlap; 30% streambank disturbance expected in

Table 18: Summary of Direct and Indirect Effects to Westslope Cutthroat Trout by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Westslope Cutthroat Trout*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
				pastures every year
Proposed Action	Improve	At slightly faster rate than current grazing	Site specific use levels based on functioning and trend calls in stream condition	2.75 miles of grazing and WCT redd overlap; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Alternative 4	Improve	At fastest recovery rate of the grazing alternatives; no redd trampling risk	Avoidance period excluding cattle from pasture 4 during WCT development period	0 miles of grazing and WCT redd overlap during vulnerable period; 30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure				
Species: ***Arctic Grayling***				
Alternatives	**Resource Indicator:** ***Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Seymour Allotment				
No Action	Arctic grayling do not occupy the national forest portion of this allotment but do occur in Deep Creek down Stream. We do not expect habitat deterioration especially to the extent that grayling habitat would be impacted by grazing in this allotment in any alternative.			
Current Grazing Management	Same as the No Action.			
Proposed Action	Same as the No Action.			
Alternative 4	Same as the No Action.			
Fishtrap Allotment				
No Action	Arctic grayling do not occupy the national forest portion of this allotment but do occur in Fishtrap Creek down Stream. We do not expect habitat deterioration especially to the extent that grayling habitat would be impacted by grazing in this allotment in any alternative.			
Current Grazing Management	Same as the No Action.			
Proposed Action	Same as the No Action.			
Alternative 4	Same as the No Action.			
Mudd Creek Allotment				
No Action	Arctic grayling do not occupy the national forest portion of this allotment. Grayling are present in York Gulch and the Big Hole River downstream from the project area. We do not expect habitat deterioration especially to the extent that grayling habitat would be impacted by grazing in this allotment in any alternative.			

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: ***Arctic Grayling***				
Alternatives	**Resource Indicator:** ***Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Current Grazing Management	Same as the No Action.			
Proposed Action	Same as the No Action.			
Alternative 4	Same as the No Action.			
Pintlar Creek Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	30% streambank disturbance expected in pastures every year
Proposed Action	Improve	At slightly faster rate than current grazing	None	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Arctic Grayling*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Alternative 4	Improve	At fastest recovery rate of the grazing alternatives	Pintlar Meadows rested	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 2 of 3 years
Mussigbrod Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	30% streambank disturbance expected in pastures every yea
Proposed Action	Improve	At faster rate than current grazing	Portion of Bender Creek tributary fenced rest allotment 1of 3 yrs	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 2 of 3 years; least cattle overlap with Arctic grayling habitat

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: ***Arctic Grayling***				
Alternatives	**Resource Indicator:** ***Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Alternative 4	Improve	At fastest recovery rate of the grazing alternatives	Bender Pasture rested10 yrs minimum and rest allotment 1of 3 yrs	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 2 of 3 years; slightly more cattle overlap with Arctic grayling habitat than the proposed action alt
Ruby Creek Allotment				
No Action	Improve	aA fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	30% streambank disturbance expected in pastures every year

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Arctic Grayling*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Improve	At slightly faster rate than current grazing	Butler rested 1 in 3 years	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 2 of 3 years
Alternative 4	Improve	At fastest recovery rate of the grazing alternatives	Butler Pasture rested1in 3 yrs; and exclude portion of Cow Creek Pasture	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 2 of 3 years
Dry Creek Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	30% streambank disturbance expected in pastures every yea

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Arctic Grayling*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Improve	At faster rate than current grazing; same as alt 4	allotment rested1in 3 yrs	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 2 of 3 years
Alternative 4	Improve	At faster rate than current grazing	Allotment rested1in 3 yrs	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 2 of 3 years
Twin Lakes Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	30% streambank disturbance expected in pastures every year

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Arctic Grayling*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Improve	At faster rate than current grazing; same as alt 4.	Big Lake side rested 2 years in 6;	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 4 of 6 years
Alternative 4	Improve	At faster rate than current grazing	Big Lake side rested 2 years in 6;	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 4 of 6 years
Monument Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	30% streambank disturbance expected in pastures every year

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Arctic Grayling*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Improve	At recovery rate slightly faster than the current grazing alternative	Site specific use levels based on functioning and trend calls in stream condition	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Alternative 4	Improve	At faster rate than proposed action	Allotment rested 1 years in 4	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 3 of 4 years; least cattle overlap with Arctic grayling habitat
Pioneer Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	30% streambank disturbance expected in pastures every year

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Arctic Grayling*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Improve	At slightly faster rate than current grazing	Site specific use levels based on functioning and trend calls in stream condition	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Alternative 4	Improve	At faster rate than proposed action	Allotment rested 1 years in 4	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively, 3 of 4 years
Saginaw Allotment				
No Action	Improve	At fastest recovery rate	None	Greatest likelihood of best aquatic habitat
Current Grazing Management	Improve	At slowest recovery rate	None	30% streambank disturbance expected in pastures every year

Table 19: Summary of Direct and Indirect Effects to Arctic Grayling by Allotment by Alternative by Resource Indicator and Unit of Measure

Species: *Arctic Grayling*				
Alternatives	**Resource Indicator: *Will channel functioning condition change?***			
	Units of Measure			
	Will the channel functioning condition improve or worsen?	**How quickly would the channel functioning class change?**	**Additional design features**	**Overall ranking of alternatives**
Proposed Action	Improve	At slightly faster rate than current grazing	Site specific use levels based on functioning and trend calls in stream condition	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively
Alternative 4	Improve	At faster rate than proposed action	One week decrease in use in pastures 1 through 3; 47 day decrease in pasture 4	30% and 25% streambank disturbance expected in functioning and less than functioning streams, respectively

Table 20 below summarizes the cumulative effects by species by alternative.

Table 20: Cumulative Effects by Species by Allotment by Alternative

Species	Allotment	Cumulative effects by Alternative
Western Toad and other Amphibians	All allotments	Our data indicate that western toads are limited in their distribution within the analysis area. Their occurrence is not substantially different than other places on the Forest and the belief is that disease, not habitat, is limiting them. Constraints unrelated to habitat quality and availability and their spotty occurrence helps limit their exposure to the management actions proposed. Nonetheless, **all of the alternatives** should allow recovery of stream, wetland and riparian areas (albeit at different rates). In this light, the effects of grazing management when considered cumulatively with other past, present and reasonably foreseeable actions/events should not cause further decreases in species abundance or distribution. It is expected, rather, that habitats will show improvement over time and populations may expand; provided disease and other natural inhibitors allow it.
Western Pearlshell Mussel	Seymour	Our data indicate that western pearlshell mussels are limited in their distribution within the analysis area. Downstream from the project area their **occurrence is relatively high** compared to other places on and near the Forest and the belief is that habitat is limiting them. Constraints related to habitat quality and availability and their spotty occurrence helps limit their exposure to the management actions proposed. Nonetheless, **all of the alternatives** should allow recovery of stream, wetland and riparian areas (albeit at different rates). In this light, the effects of grazing management when considered cumulatively with other past, present and reasonably foreseeable actions/events should not cause further decreases in species abundance or distribution. It is expected, rather, that habitats will slowly show improvement over time and populations may expand; provided other natural inhibitors allow it.
	All other allotments	Our data indicate that western pearlshell mussels are limited in their distribution within the analysis area. Downstream from the project area their **occurrence is uncommon** compared to other places on and near the Forest and the belief is that habitat is limiting them. Constraints related to habitat quality and availability and their spotty occurrence helps limit their exposure to the management actions proposed. Nonetheless, **all of the alternatives** should allow recovery of stream, wetland and riparian areas (albeit at different rates). In this light, the effects of grazing management when considered cumulatively with other past, present and reasonably foreseeable actions/events should not cause further decreases in species abundance or distribution. It is expected, rather, that habitats will slowly show improvement over time and populations may expand; provided other natural inhibitors allow it.
Westslope	All	Our data indicate that westslope cutthroat trout are limited in their distribution within the analysis area.

Table 20: Cumulative Effects by Species by Allotment by Alternative

Species	Allotment	Cumulative effects by Alternative
Cutthroat Trout	Allotments	Their occurrence is fairly comparable to other places on and near the Forest and the belief is that non-native trout distribution is limiting them. Constraints related to non-native salmonids and their spotty occurrence helps limit their exposure to the management actions proposed. Nonetheless, **all of the alternatives** should allow recovery of stream, wetland and riparian areas (albeit at different rates). In this light, the effects of grazing management when considered cumulatively with other past, present and reasonably foreseeable actions/events should not cause further decreases in species abundance or distribution. It is expected, rather, that habitats will show improvement over time and populations may expand; provided other natural inhibitors allow it.
Arctic Grayling	All allotments	Our data indicate that Arctic grayling are absent or very limited in distribution within the analysis area. The belief is that grayling find larger, lower gradient streams and rivers more suitable habitat than smaller high gradient streams typically found on National Forest. In the Big Hole River, their abundance is thought to be limited mostly by habitat quality. Constraints related to habitat and their spotty occurrence helps limit their exposure to the management actions proposed. Nonetheless, all of the alternatives should allow recovery of stream, wetland and riparian areas (albeit at different rates). In this light, the effects of grazing management when considered cumulatively with other past, present and reasonably foreseeable actions/events should not cause further decreases in species abundance or distribution. It is expected, rather, that habitats will show improvement over time and populations may expand; provided other natural inhibitors allow it.

Comparison of Alternatives

The following tables compare the effects of the alternatives on each of the four sensitive species discussed in detail by Allotment.

Table 21: Comparison of Alternatives by Species by Allotment by Alternative

Resource Indicator and Unit of Measure	**Alternatives**			
	No Action (No Grazing) Alternative	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Seymour Allotment				
Western toad persistence	Greatest likelihood of persistence	Slightly less likelihood of persistence than no grazing alt.	Slightly less likelihood of persistence than current grazing alt.	Slightly less likelihood of persistence than proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	Slightly less likelihood of persistence than no grazing alt.	Same as current grazing alt.	Same as current grazing alt.
Westslope cutthroat trout persistence	Greatest likelihood of persistence	Least likelihood of persistence	Slightly greater likelihood of persistence than current grazing alt.	Greatest likelihood of persistence of the grazing alternatives
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	The most rapid rate of recovery	Slowest rate of recovery	Recovery slightly faster than current grazing alt.	Fastest recovery of the grazing alternative
Fishtrap Allotment				
Western toad persistence	Greatest likelihood of persistence	Less likelihood of persistence than no grazing alt.	A little less likelihood of persistence than alt. 4.	Slightly less likelihood of persistence than proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	Less likelihood of persistence than no grazing alt.	A little less likelihood of persistence than alt. 4	Slightly less likelihood of persistence than proposed action alt.
Westslope	Not present in	Not present in	Not present in	Not present in

Table 21: Comparison of Alternatives by Species by Allotment by Alternative

Resource Indicator and Unit of Measure	**Alternatives**			
	No Action (No Grazing) Alternative	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
cutthroat trout persistence	allotment, greatest likelihood of best potential habitat	allotment, less likelihood of best potential habitat	allotment, slower habitat recovery than alt. 4	allotment, slightly slower habitat recovery than proposed action
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	greatest likelihood of best potential habitat	less likelihood of best potential habitat	slower habitat recovery than alt. 4	slightly slower habitat recovery than proposed action
Mudd Creek Allotment				
Western toad persistence	Greatest likelihood of persistence	Less likelihood of persistence than no grazing alt.	A little less likelihood of persistence than alt. 4.	Slightly less likelihood of persistence than proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	Less likelihood of persistence than no grazing alt.	A little less likelihood of persistence than alt. 4	Slightly less likelihood of persistence than proposed action alt.
Westslope cutthroat trout persistence	Not present in allotment, greatest likelihood of best potential habitat	Not present in allotment, less likelihood of best potential habitat	Not present in allotment, slower habitat recovery than alt. 4	Not present in allotment, slightly slower habitat recovery than proposed action
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	greatest likelihood of best potential habitat	less likelihood of best potential habitat	slower habitat recovery than alt. 4	slightly slower habitat recovery than proposed action
Pintlar Creek Allotment				
Western toad persistence	Greatest likelihood of persistence	Less likelihood of persistence than no grazing	A little less likelihood of persistence than	Slightly less likelihood of persistence than

Table 21: Comparison of Alternatives by Species by Allotment by Alternative

Resource Indicator and Unit of Measure	Alternatives			
	No Action (No Grazing) Alternative	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
		alt.	alt. 4.	proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	Less likelihood of persistence than no grazing alt.	A little less likelihood of persistence than alt. 4	Slightly less likelihood of persistence than proposed action alt.
Westslope cutthroat trout persistence	Not present in allotment, greatest likelihood of best potential habitat	Not present in allotment, less likelihood of best potential habitat	Not present in allotment, slower habitat recovery than alt. 4	Not present in allotment, slightly slower habitat recovery than proposed action
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	greatest likelihood of best potential habitat	less likelihood of best potential habitat	slower habitat recovery than alt. 4	slightly slower habitat recovery than proposed action
Mussigbrod Allotment				
Western toad persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	A little less likelihood of persistence than alt. 4.	Less likelihood of persistence than proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	A little less likelihood of persistence than proposed action	Best likelihood of persistence of grazing alternatives	Less likelihood of persistence than alt. 4
Westslope cutthroat trout persistence	Not present in allotment, greatest likelihood of best potential habitat	Not present in allotment, slightly slower habitat recovery than proposed action	Not present in allotment, best potential habitat of the grazing alternatives	Not present in allotment, slowest habitat recovery
Channel function condition change- to	greatest likelihood of best potential habitat	Slightly slower habitat recovery than proposed	Fastest habitat recovery of the grazing alternatives	slowest habitat recovery

Table 21: Comparison of Alternatives by Species by Allotment by Alternative

Resource Indicator and Unit of Measure	Alternatives			
	No Action (No Grazing) Alternative	Current Grazing Alternative	Proposed Action	Alternative 4
include Arctic grayling, mussel, and WCT habitat		action		
Ruby Creek Allotment				
Western toad persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	A little less likelihood of persistence than alt. 4.	Less likelihood of persistence than proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	A little less likelihood of persistence than alt. 4.	Less likelihood of persistence than proposed action alt
Westslope cutthroat trout persistence	greatest likelihood of best potential habitat	Best likelihood of persistence of grazing alternatives	A little less likelihood of persistence than alt. 4	slowest habitat recovery
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	greatest likelihood of best potential habitat	Fastest habitat recovery of the grazing alternatives	A little slower recovery rate than alt. 4	slowest habitat recovery
Dry Creek Allotment				
Western toad persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	Same as alt. 4.	Less likelihood of persistence than proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	Same as alt. 4.	Less likelihood of persistence than proposed action alt
Westslope cutthroat trout persistence	greatest likelihood of best potential habitat	Best likelihood of persistence of grazing alternatives	Same as alt. 4	slowest habitat recovery

Analysis
Aquatics

Table 21: Comparison of Alternatives by Species by Allotment by Alternative

Resource Indicator and Unit of Measure	Alternatives			
	No Action (No Grazing) Alternative	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	greatest likelihood of best potential habitat	Fastest habitat recovery of the grazing alternatives	Same as alt. 4	slowest habitat recovery
Twin Lakes Allotment				
Western toad persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	Same as alt. 4.	Less likelihood of persistence than proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	Same as alt. 4.	Less likelihood of persistence than proposed action alt
Westslope cutthroat trout persistence	greatest likelihood of best potential habitat	Best likelihood of persistence of grazing alternatives	Same as alt. 4	slowest habitat recovery
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	greatest likelihood of best potential habitat	Fastest habitat recovery of the grazing alternatives	Same as alt. 4	slowest habitat recovery
Monument Allotment				
Western toad persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	A little less likelihood of persistence than alt. 4.	Less likelihood of persistence than proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	A little less likelihood of persistence than alt. 4	Less likelihood of persistence than proposed action alt
Westslope cutthroat trout persistence	Not present in allotment, greatest	Not present in allotment, best potential	Not present in allotment, slightly faster	Not present in allotment, slowest habitat recovery

Table 21: Comparison of Alternatives by Species by Allotment by Alternative

Resource Indicator and Unit of Measure	**Alternatives**			
	No Action (No Grazing) Alternative	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
	likelihood of best potential habitat	habitat of the grazing alternatives	habitat recovery than current grazing	
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	greatest likelihood of best potential habitat	Fastest habitat recovery of the grazing alternatives	Slightly faster habitat recovery than current grazing	slowest habitat recovery
Pioneer Allotment				
Western toad persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	Slightly more likelihood of persistence than current grazing scenario	Less likelihood of persistence than proposed action alt.
Western pearlshell mussel persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	Slightly more likelihood of persistence than current grazing scenario	Less likelihood of persistence than proposed action alt
Westslope cutthroat trout persistence	greatest likelihood of best potential habitat	Best likelihood of persistence of grazing alternatives	Slightly more likelihood of persistence than current grazing scenario	Less likelihood of persistence than proposed action alt
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	greatest likelihood of best potential habitat	Fastest habitat recovery of the grazing alternatives	Slightly more likelihood of persistence than current grazing scenario	slowest habitat recovery
Saginaw Allotment				
Western toad persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	Slightly more likelihood of persistence than current grazing	Less likelihood of persistence than proposed action alt.

Table 21: Comparison of Alternatives by Species by Allotment by Alternative

Resource Indicator and Unit of Measure	**Alternatives**			
	No Action (No Grazing) Alternative	**Current Grazing Alternative**	**Proposed Action**	**Alternative 4**
			scenario	
Western pearlshell mussel persistence	Greatest likelihood of persistence	Best likelihood of persistence of grazing alternatives	Slightly more likelihood of persistence than current grazing scenario	Less likelihood of persistence than proposed action alt
Westslope cutthroat trout persistence	greatest likelihood of best potential habitat	Best likelihood of persistence of grazing alternatives	Slightly more likelihood of persistence than current grazing scenario	Less likelihood of persistence than proposed action alt
Channel function condition change- to include Arctic grayling, mussel, and WCT habitat	greatest likelihood of best potential habitat	Fastest habitat recovery of the grazing alternatives	Slightly more likelihood of persistence than current grazing scenario	slowest habitat recovery

Terrestrial Wildlife

Existing Condition

Regulatory Framework

The Endangered Species Act of 1973
The Endangered Species Act of 1973 requires federal agencies to ensure that any agency actions (any action unauthorized, funded or carried out by the agency) are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat. The Threatened grizzly bear (*Ursus arctos horribilis*), Canada Lynx (*Lynx Canadensis*) and Proposed for Threatened wolverine (*Gulo gulo luscus*) are present and/or have suitable habitat within the allotments analyzed in this project. These species and their habitats will be analyzed in detail to ensure compliance with the Endangered Species Act.

Forest Service Manual 2672.42
The sensitive species analysis in this document meets the requirements for a biological evaluation as outlined in FSM 2672.42. Forest Service sensitive species are designated by the Forest Service regional office and often include state species of concern or other species for which population viability is a concern. The Forest Service is directed to address Sensitive Species according to the following objectives (from Forest Service Manual 2600, Chapter 2670.22):

1. Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
2. Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.
3. Develop and implement management objectives for populations and/or habitat of sensitive species.

The general descriptions of sensitive species that follow were adapted from the Montana Animal Field Guide, an on-line cooperative project of the Montana Natural Heritage Program (MTNHP) and MFWP; and the Forest Plan Biological Evaluation (USDA 2009c).

Conservation Recommendations for Greater Sage-grouse
In March 2010, the U.S. Fish and Wildlife Service (FWS) published its petition decision for the Greater Sage-Grouse (hereinafter sage-grouse) as "Warranted but Precluded" for listing under the Endangered Species Act. The FWS identified habitat loss and fragmentation from wildfire, invasive plants, energy and infrastructure development, urbanization, and agricultural conversion as the primary threats to the species throughout its range. Inadequacy of regulatory mechanisms and conservation measures in state and federal land management plans was also identified as one of the major factors in the FWS's finding on sage-grouse. The Forest Service (FS) is engaged in a planning process, which includes NEPA disclosure and public input, to determine whether to amend 20 LRMP's, including the BDNF, to incorporate sage-grouse conservation measures, with a target decision date of September

2014. The goals of this planning process are: to reduce risks to sage-grouse and its habitat; maintain ecosystems on which sage-grouse depends and to conserve habitat necessary to sustain sage-grouse populations to an extent that precludes the need for its listing under the Endangered Species Act. The Greater sage-grouse is listed as a Regional Foresters Sensitive Species for the B-DNF (See Appendix B8). In addition to the requirements in FSM 2670 for sensitive species, the Forest Service recently released additional sage-grouse and sage-grouse habitat recommendations. Conservation recommendations for Greater sage-grouse and sage-grouse habitat were supplied by the Chief of the Forest Service on October 6, 2012. These recommendations are incorporated into this project as applicable.

Executive Order 131866
A Memorandum of Understanding (MOU) between the USFS and FWS was signed in December of 2008 (USDA FS and USDI FWS 2008). This MOU meets the requirements of Executive Order 131866. This MOU outlines a collaborative approach to promote the conservation and reduce the take of migratory birds. The purpose of the MOU is to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds. Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple scales and ensuring that bird conservation is addressed when planning for land management activities.

Forest Service responsibilities relative to project level planning are as follows: Within the NEPA process, evaluate the effects of agency actions on migratory birds, focusing first on species of management concern along with their priority habitat and key risk factors. To the extent practical: evaluate and balance long-term benefits of projects against any short-term or long-term adverse effects; pursue opportunities to restore or enhance the composition, structure, and juxtaposition of migratory bird habitats in the project area; consider approaches for identifying and minimizing incidental take (altering season of activities; retaining snags where underrepresented; retaining integrity of known breeding sites); and coordinate with FWS when a project is likely to have a negative effect on migratory bird populations.

Wildlife Species Considered

Species considered in this analysis include terrestrial species listed as federally threatened, endangered, candidate or experimental/non-essential on the Beaverhead-Deerlodge National Forest, and R1 Forest Service sensitive species, listed for the BDNF, hereafter called TES. In addition, management indicator species (MIS) designated in the Forest Plan are addressed. Lastly, several other species, or groups of species are addressed in the Migratory Birds section.

Threatened and Endangered Species

The only federally listed wildlife species for the BDNF is the grizzly bear (threatened) and the Canada Lynx (threatened). Candidate species include yellow-billed cuckoo and the greater sage-grouse. None of the substantive or procedural provisions of the Act apply to candidate species (USDI FWS 2012). Table 1 displays the current Threatened, Endangered and

Candidate species list for the Forest (USDI FWS 2013). Of the species listed below, the grizzly bear and Greater sage-grouse have the potential to occur within the analysis area. Sage-grouse are analyzed in detail in the sensitive species section below.

Table 1: Terrestrial, Threatened, Endangered, and Candidate Species for BDNF

Species	Status	Habitat/Ranges	Additional Analysis
Grizzly bear (*Ursus arctos horribilis*)	Threatened	Resident, transient; Alpine/subalpine coniferous forest.	Yes, see below
Canada Lynx (*Lynx Canadensis*)	Threatened	Transient - secondary/peripheral lynx habitat	Yes, see below
Yellow-billed cuckoo (*Coccyzus americanus)*	Candidate	West of Continental Divide; riparian areas with willows	No, outside of species range.
Greater sage-grouse (*Centrocercus urophasianus*)	Candidate	Eastern, central and southwestern Montana in sagebrush, sagebrush-grasslands, and associated agricultural lands.	Yes, see sensitive species section below.
Wolverine (*Gulo gulo luscus*)	Proposed Threatened	High elevation alpine and boreal forests that are cold and receive enough winter precipitation to reliably maintain deep persistent snow late into the warm season	Yes, see below

Note: None of the substantive or procedural provisions of ESA apply to candidate species

Grizzly Bear

Biological Information for Grizzly Bear

Home Range Size

Home range sizes of grizzly bears vary in relation to food availability, weather conditions, and interactions with other bears. In addition, individual bears may extend their range seasonally or from one year to the next (USDI FWS 1993) and the home ranges of adult grizzly bears frequently overlap. The annual home range of adult male grizzly bears in the lower 48 States is typically 2-3 times the size of an adult female's annual home range whereas the lifetime home range of an adult male grizzly bear is typically 3-5 times that of an adult female. The average lifetime home range of adult male grizzlies is approximately 341 mi2 for females and 1,450 mi2 for males in the GYE (Blanchard and Knight 1991 and USDI FWS 2011b). In general, home range sizes of females are less variable than those of males. Generally, females with cubs-of-the-year have the smallest home range sizes (Blanchard and Knight 1991). In the lower 48 States, annual home range sizes for female grizzly bears are approximately 150 sq. mi (LeFranc et al. 1987). For males, annual home ranges vary from 110-540 sq. mi but average approximately 309 sq. mi (LeFranc et al. 1987). The large home ranges of grizzly bears, particularly males, enhance genetic diversity in the population by

enabling males to mate with numerous females (Blanchard and Knight 1991; Craighead et al. 1995).

Dispersing young males apparently leave their mother's home ranges and their dispersal may be mediated by the avoidance of the home ranges of established adults. Grizzly bear mothers may tolerate female offspring and may shift their home ranges to accommodate them (USFWS 1993). Grizzly bears display a behavior called natal philopatry in which dispersing young establish home ranges within or overlapping their mother's (Schwartz et al. 2003). This type of movement makes dispersal across landscapes a slow process. Females establish home ranges an average of 6.1-8.9 mi away from the center of their mother's home range, whereas males generally disperse further, establishing home ranges roughly 18.6-26.0 mi away from the center of their mother's.

Food Habits

Bears feed on animal matter or vegetable matter that is highly digestible and high in starch, sugars, protein, and stored fat. Grizzly bears must avail themselves of foods rich in protein or carbohydrates in excess of maintenance requirements in order to survive denning and post-denning periods. The search for food has a primary influence on grizzly bear movements. Upon emergence from the den, they seek lower elevations, drainage bottoms, avalanche chutes, and ungulate winter ranges where their food requirements can be met. Throughout late spring and early summer, they follow plant maturity back to higher elevations. In late summer and fall, there is a transition to fruit and nut sources, as well as other plant materials. This is a generalized pattern, however, and it should be kept in mind that bears are individuals trying to survive and will go where they can best meet their food requirements.

Denning Chronology and Habitat

Grizzly bears in the lower 48 States spend between 4 and 6 months in dens beginning in October or November. During this period, they do not eat, drink, urinate, or defecate. Hibernating grizzly bears exhibit a marked decline in heart and respiration rate, but only a slight drop in body temperature. Due to their relatively constant body temperature in the den, hibernating grizzly bears can be easily aroused and have been known to exit dens when disturbed by seismic or mining activity or by human activity. Both males and females have a tendency to use the same general area to hibernate year after year, but the same exact den is rarely used twice by an individual. Females display stronger area fidelity than males and generally stay in their dens longer, depending on reproductive status. Livestock grazing does not overlap in time with grizzly bear denning period, so no impacts to this habitat or behavior are expected and will not be analyzed further.

Overall Population and Habitat Status and Distribution

Grizzly bears are well distributed throughout the NCDE and Yellowstone recovery zones and someone would expect to encounter a grizzly bear there (USDI FWS 2011b). Based on conflicts and mortalities, it is now known that NCDE and Yellowstone grizzly bear range has expanded outside of their recovery zone boundaries (Appendix A7).

A male grizzly bear was documented approximately 80 miles east of the NCDE recovery zone boundary in 2009, and both males and females are becoming increasingly common in river bottoms between the recovery zone boundaries and Interstate 15 to the east. At the southern

end of this ecosystem, there have been three male grizzly bears documented south of Interstate 90 since 2002. The Grizzly Bear Management Plan for Western Montana (MTFWP 2006) identifies 14,463 sq. mi of the NCDE as occupied by grizzly bears. This acreage likely underestimates the lands where someone may possibly encounter a grizzly bear as it was written 6 years ago and the NCDE grizzly bear population has been increasing approximately 3% a year and as a result, bears are moving into new areas. The most current distribution of grizzly bears outside of the NCDE and Yellowstone Recovery Zone can be found in Appendix A7.

Kendall et al. (2009) estimated there were 765 grizzly bears in the NCDE in 2004 and in 2011, Mace and Roberts (2011) used these and other data to determine the NCDE grizzly bear population was increasing at a rate of 3% per year during 2004-2009.

Grizzly bears in the GYA have expanded their range approximately 48% since the 1970s. Currently there are an estimated 593 bears in the GYA 2011 (van Manen et al. 2012). Results indicated that annual population growth rate for the period 2002-2011 was stable (0%/year) to slightly increasing (2%/year), compared with annual growth rates for the period 1983-2001 of 4 to 7%. Potential causes of this change in population trajectory include 1) density-dependent effects, 2) decline in available resources (i.e. whitebark pine decline), or 3) a combination of density dependence and changes in available resources (van Manen et al. 2012).

Table 2: Estimated Grizzly Bear Population Size and Population Growth Rate by Recovery Zone

Recovery Zone	Estimated Population Size	Trend (% Annually)
Greater Yellowstone Area*	593	+0-2%
Northern Continental Divide Ecosystem**	765	+3%

Grizzly Bears on the BDNF

On the BDNF, the grizzly bear is known to occur on the Madison Ranger District in the Greater Yellowstone Ecosystem (GYE) and on the Butte and Jefferson District in the Northern Continental Divide Ecosystem (NCDE). The area of the proposed North West Big Hole AMP Project is not currently known to be used by grizzly bears within either of the grizzly bear ecosystems. There have been non-verified sightings of grizzly bears in the Anaconda-Pintler Mountains; however this mountain range and the Beaverhead Mountain range (including the project area) are not known to be currently used by grizzly bears. Additionally, the project area is not within the current distribution of the Yellowstone or the NCDE grizzly bear (Schwartz et al. 2006 and Mace and Roberts 2011). However, based on the proximity of the project area to the current distribution of bears and the large home range of the grizzly bear, there is potential for grizzly bears to utilize the project area and this species will be analyzed in detail.

Grizzly bears are not known in the project area due to current distribution of grizzly bears in Montana (Mace and Roberts 2011 and van Manen et al. 2012). The closest known observation of a grizzly bear to the project area is approximately 7 miles to the northwest of the Seymour Allotment. In 2005, a young male grizzly bear was found killed in Cabbage Gulch on the Mount Haggin game range near Anaconda (Gevock 2010 and pers. com Jonkel 2012). Expansion of grizzly bears outside of recovery zones is not surprising, as grizzly bears have large home ranges and as the population increases, young bears can move into new areas if they are pushed out of territories claimed by older bears.

Canada Lynx

Status of Canada Lynx Habitat on the BDNF

In 2000, lynx habitat was mapped across the Forest, based on region wide protocol. In addition to this habitat mapping in 2000, The Beaverhead-Deerlodge Rapid Assessment (Ecosystem Research Group. 2010) was conducted in 2010. This assessment notes that the potential for multi-storied habitat sustaining Canada lynx populations on the BDNF is low, largely because the spruce-fir cover type that is strongly preferred over lodgepole pine (Ruediger et al. 2000) is uncommon. ERG (2010) found that currently, only 0.1% of the forested landscape on the BDNF provides multi-storied potential habitat for lynx (spruce-fir-lodgepole pine stands >5" dbh/2-storied or multi-storied stands). This is due to 1) eastside lodgepole pine (BDNFs predominant cover type) seldom has multi-storied stands; 2) mesic spruce/fir stands are a minor type on the BDNF.

Currently only 2% of the forested landscape on the BDNF meets the criteria (sp/fir/lpp 1-5" dbh) for lynx stand initiation potential habitat (foraging habitat). This is because there has been very little disturbance in the last 50 years. The current small level of potential habitat can be attributed to logging during the 1960s and 1970s because re-growth is now larger than 5" dbh.

Squires et al. (2010) was published for the specific purpose of documenting lynx habitat use. This paper documented the seasonal patterns in resource selection of Canada lynx from 1998 to 2002 based on backtracking in winter and radio-telemetry in summer. The paper discloses the two habitat signatures (both winter and summer habitat) used by lynx with a key finding being the importance of multistoried structure to lynx in winter in Montana. In summary, the study stated:

- "Regenerating forests used by lynx in Montana during winter were old enough to have developed a multistoried structure with high horizontal cover that supported hares.
- During summer, however, lynx broadened their resource use to include early succession forest with high horizontal cover from abundant shrubs, abundant small-diameter trees, and dense spruce-fir saplings."

Regarding management implications, Squires et al. (2010) conclude: "Lynx in the Northern Rockies exhibited a strong selection for spruce-fir forests. Managers should prioritize retention of a habitat mosaic of abundant and spatially well-distributed patches of mature, multilayer spruce-fir forests and younger forest stands." Similarly, Squires et al. (2010) also state that, "Given that lynx in Montana exhibit seasonal differences in resource selection, we

encourage managers to maintain habitat mosaics. Because winter habitat may be most limiting for lynx, these mosaics should include abundant multistory, mature spruce–fir forests with high horizontal cover that are spatially well-distributed." Additioanlly, all new science as summarized in USDA FS 2013 was reviewed and incorporated into this analysis as appropriate.

Status of Canada Lynx on the BDNF

Prior to the decision declaring the Forest to be unoccupied, lynx surveys were done across the Region. In the late 1990s a non-invasive hair snag pad DNA survey was conducted on grids across the Region. Lynx detection hair snare surveys were conducted on the BDNF from 1999-2001; no lynx were detected on these hair snare grids. The eighteen hair samples collected from 9 transects in 1999 were determined to be bobcat, coyote and black bear.

Squires et al. (2003) began what was to be a lynx survey in the Pioneer, Anaconda-Pintler and Flint Creek mountain ranges in 2001 (to the south, west and north of the project area). Rigorous winter snow track surveys were conducted as a first step to determine the presence and distribution of lynx. They only found a single lynx track throughout the three mountain ranges. Although data show that lynx were historically present in the area, the area did not support a resident population at the time of their survey. Because lynx were at such low densities, and they detected numerous wolverines, that study shifted to wolverines.

In the spring of 2009, two different groups did lynx surveys on the Forest. Nate Berg (Greater Yellowstone Lynx Study) identified and surveyed a few areas of lynx habitat using track surveys. Two routes were run in the Flint Creek mountain range, two routes in the Sapphire/Anaconda-Pintler, one route in the Boulder Mountains, two routes in the Pioneers and one route on Mt Haggin WMA (east of Anaconda). One possible set of lynx tracks were found on the West Fork Rock Creek (Sapphire Mountains). Of the other routes, he felt that the Pioneers might be capable of supporting lynx, while the other routes were likely incapable of supporting resident lynx (Berg 2009). Another group, Wildthings Unlimited; conducted hair snares and remote camera systems in the Flint Creek, Pioneer and Boulder mountains. None of the surveys resulted in confirmation of lynx presence (Porco 2009).

In the summer of 2012, the BDNF conducted lynx surveys as per the terms and conditions in the Biological Opinion and ROD for the Lynx Amendment. The surveys followed the National Lynx Detection Protocol (McKelvey et al 1999) which utilizes transects comprised of 5 scent stations with hair snares placed 100 meters apart. Based on previous monitoring information, the Upper Rock Creek landscape contains some of the most likely lynx habitat on the forest, so 26 transects were deployed for 14 days across the landscape at a density of approximately 1 transect per 2 miles, as per the protocol. This sampling density was not always feasible due to the discontinuous nature of lynx habitat on the BDNF. Hair samples were collected from two scent stations and sent to the Rocky Mountain Research Station for identification through DNA analysis. Five cameras were also randomly deployed. Two transects were also deployed in the Boulder landscape in the vicinity of the Saratoga mine, for 28 days. No hair was present at any of the scent stations after 14 days. The stations were re-baited and collected after a second 14-day period. One station had hair at the end of the second 14-day period. This hair was collected and sent to the Rocky Mountain Research

Station for identification through DNA analysis. Results from this sampling effort were all returned as Black Bear (Pilgrim and Schwartz 2013). This past field season, 2013, 26 more lynx survey transects following the same protocol were placed in and near the Anaconda Pintler wilderness, on the western edge of the northern allotments in this project. Results from this survey effort will be available later this year.

Devineau et al. (2010) published a paper with a map showing lynx satellite locations following reintroduction of lynx in Colorado. While the map does show numerous locations in Montana, including southwest Montana, these locations are from 8 lynx. None of these lynx stayed in Montana for longer than 217 days (average of 91 days). Six moved into Yellowstone/Wyoming, two into Idaho and one was killed on Highway 93 south of Stevensville (Ivan, CDOW, 2011). Based on the best available science and data discussed above, there is no reason to believe the BDNF is occupied by Canada lynx.

On July 2, 2013 however the U.S. Fish and Wildlife Service updated the "Threatened, Endangered and Candidate Species for the Beaverhead-Deerlodge National Forest" that it was added to the BDNF list as "Transient; secondary/peripheral lynx habitat" (USDI FWS, 2013). This project, as well as the entire BDNF, is within secondary/peripheral lynx habitat where evidence of reproduction, recent or historic, does not exist. It is unknown if the apparent lack of reproduction is due to a shortage of habitat that supports high densities of snowshoe hares, food supply (snowshoe hare), other lynx or other factors. Individuals if found in the project area are considered transient ("passing through or by a place with only a brief stay", Merriam-Webster online dictionary at www.merriam-webster.com/dictionary/transient) or short-term residents. These lynx generally do not establish home ranges and do not attempt or are unsuccessful at reproduction.

Lynx Management Direction

The Canada Lynx Conservation Assessment and Strategy was revised in 2013. This updated document (ILBT, 2013) indicated that "the discussion of geographic areas and the development of conservation measures were informed by the Remanded Rule, the Recovery Outline, and the revised final critical habitat rule", as well as other information that has become available since 2000. Of particular note for this project is the draft revised LCAS stratifies the objectives and conservation measures by core areas and secondary/peripheral areas to help managers prioritize their conservation efforts. The conservation strategy in the draft revised LCAS (ILBT, 2013) states it is "not necessary to delineate LAUs in secondary/peripheral areas." The strategy indicates that secondary or peripheral areas might contribute to lynx persistence by supporting successful dispersal or exploratory movements and habitat in these areas appears to be inherently more patchy and less productive (ILBT, 2013). They further speculate that "the amount and quality of habitat required to support an independent adult or subadult disperser is less than is necessary to support reproduction and sustain a local population" (ILBT, 2013). The conservation strategy (*ibid.,* page 83) indicates that the focus of management in secondary areas is on "providing a mosaic of forest structure to support snowshoe hare prey resources for individual lynx that infrequently may move through or reside temporarily in the area" and that landscape connectivity should be maintained to allow for movement and dispersal.

Direction on occupied and unoccupied Canada lynx habitat was provided in 2009 to Region 1 Forests in a letter from the Regional Forester (Tidwell 2009). This letter directs unoccupied forests to consider lynx management direction using the "Northern Rockies Lynx Management Direction Standards and Guidelines Consistency Evaluation Table for Project Specific Activities" (Appendix B8). There is one vegetation standard that applies directly to this type of project, Standard ALL S1. For livestock management direction, there is one object and 4 grazing guidelines (See Table 3 below). A discussion of all Standards and Guidelines can be found in Table 3 below. There is no critical lynx habitat on the forest or in the project area (Fed Register, Vol. 74, No. 36, February 25, 2009, pp. 8616 to 8702).

In the Northern Rockies Lynx Management Direction (NRLMD) FEIS (USFS 2007) impacts to lynx from livestock grazing are discussed. The NRLMD Objectives and Guidelines pertaining to livestock management activities (NRLMD ROD 2007) are intended to provide direction to manage grazing so it does not adversely impact lynx habitat. See Appendix B8 for details and compliance.

Livestock grazing may change, reduce or eliminate snowshoe hare habitat in aspen, willows and riparian areas. Shrub-steppe habitats provide forage for lynx prey as well as cover for lynx movement. In shrub-steppe habitat, grazing may change plant composition where shrubs provide cover and connectivity between blocks of lynx habitat. However, the US Fish and Wildlife Service (USFWS), using the best available science and commercial data available, has no information to indicate that grazing is a threat to lynx at this time. Additionally, the NRLMD FEIS details that direction found in the Inland Native Fish Strategy (INFISH) includes requirements for maintaining and limiting livestock use in riparian areas. Many BDNF Forest Plan Aquatic Goals, Objective and Standards incorporate INFISH Direction (See Aquatics section of the DEIS). The INFISH direction generally provides enough direction to manage grazing so it does not adversely impact lynx habitat. Little change would be needed to meet the standards and guidelines as proposed in the NRLMD (NRLMD FEIS 2007 Volume 1, p. 227). Many BDNF Forest Plan Aquatic Goals, Objective and Standards incorporate INFISH Direction. Compliance with these standards can be found in the Aquatics section of the DEIS (pgs. 635-722).

Table 3: Northern Rockies Lynx Management Direction: Livestock Management

Standard, Objective, or Guideline	NRLMD Direction
Standard ALL S1	New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area
Objective GRAZ 01	Manage livestock grazing to be compatible with improving or maintaining lynx habitat
Guideline GRAZ G1	In fire and harvest-created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating.
Guideline GRAZ G2	In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.
Guideline GRAZ G3	In riparian areas and willow cars, livestock grazing should be managed to contribute to maintain or achieving a

Table 3: Northern Rockies Lynx Management Direction: Livestock Management	
Standard, Objective, or Guideline	**NRLMD Direction**
	preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.
Guideline GRAZ G4	In shrub-steppe habitats, livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.

North American Wolverine

On February 4, 2013 the USFWS proposed to protect the North American wolverine as a threatened species under the ESA. They also proposed a special rule that would limit protections of the ESA only to those necessary to address the threats to the species. In the case of the wolverine, human activities in wolverine habitat such as snowmobiling, backcountry skiing, and land management activities like timber harvest and infrastructure development, which do not constitute threats to the species, would not be prohibited or regulated. However, intentional killing of wolverines would be prohibited. The 90-day comment period, beginning February 4, 2013, is currently being provided to allow the public and stakeholders an opportunity to comment on these proposals. The USFWS will make a final determination in a year on whether to add the wolverine to the Federal List of Endangered and Threatened Wildlife based on the best available science. The Service will also decide whether or not it is prudent to designate critical habitat for the wolverine, and whether such a designation would be beneficial to this species given the threat to its habitat is climate change.

Biological Information for Wolverine

Historically in the lower 48 states, the wolverine once inhabited forests from Maine to Washington and south along the Rocky Mountains into Arizona and New Mexico. Trapping in the late 1800s and early 1900s decreased numbers and distribution. Today, the last remaining stronghold in the lower 48 states is in western Montana and parts of Idaho. Wolverines occur at naturally low densities of about 1 wolverine per 58 sq mi with a reported range from 1 per 25 to 130 sq mi (Copeland and Yates 2008). No systematic population census exists over the entire current range of wolverines in the contiguous United States, so the current population level and trends remain unknown. However, based on current knowledge, the USFWS estimates that the wolverine population in the contiguous US numbers approximately 250 to 300 individuals (USDI FWS 2010).

Wolverine habitat can be characterized by deep, persistent and reliable spring snow cover (April 15 to May 14) and is the best overall predictor of wolverine occurrence, combined with elevation, in the contiguous US (USDI FWS 2010, pg 78035, Copeland et al 2010). The high elevations provide the conditions necessary for the presence and maintenance of late winter reproductive dens (Aubry et al. 2007, Copeland et al. 2010). Elevation was the key variable for distinguishing wolverine presence. It was the strongest and most consistent variable across

all logistic regression models. Wolverines preferred higher elevations in almost all models in which it was present. Use of high elevation was most notable during summer when all elevations >2,400 m were used more than expected and elevations <2,200 m used less than expected. During winter, use shifted to the 2,400–2,600-m elevation zone with only the lowest elevations used less than expectation (Copeland et al 2007).

In their proposed ruling last year (2013), the USFWS determined that global climate change is the primary threat to the species, and that legal and incidental trapping of wolverines are substantial threats in concert with climate change. Management activities of land management agencies, for example, winter recreation and timber harvest, were not identified as threats (78 FR 7877-7879).

Overall Population and Habitat Status and Distribution

No systematic population census exists over the entire current range of wolverines in the contiguous United States, so the current population level and trends remain unknown. However, based on current knowledge, the USFWS estimates that the wolverine population in the contiguous US numbers approximately 250 to 300 individuals (USDI FWS 2010).

In Montana, natal dens occur above 7,874 feet and are located on north aspects in avalanche debris, typically in alpine habitats near timberline. Dens are typically used through late April or early May and after using natal dens, wolverines use rendezvous dens through early July. These sites are characterized by natural cavities formed by large boulders, downed logs (avalanche debris) and snow (USDI FWS 2010, pg 78031). Copeland et al (2010) overlaid known den sites on the spring snow coverage and 97.9% of the den sites occurred in pixels that were snow-covered in at least 1 of 7 years and 69% of the dens were located in areas with persistent spring snow 6-7 years out of 7 years (Copeland et al, 2010). In the southern part of their range (which includes Montana), wolverines move up in elevation is summer to avoid high summer temperatures. McKelvey (R1 Regional Biologists Meeting, December 2010) stated that wolverines are 20 times more likely to stay in the area of persistent spring snow during dispersal.

A denning habitat model was developed for the forest during Forest Plan revision based on Heinemeyer et al 2001. This model incorporated slope, elevation, cover types and patch size preferred by wolverine. Forest-wide there appears to be a fairly good correlation with denning habitat, Copeland et al (2010) persistent snow, and elevational needs, as expected. At the Forest-scale, summer and winter non-motorized areas were established across the Forest (USDA Forest Service 2009) and wolverine and modeled denning habitat were one of the criteria used to select winter non-motorized areas. The Plan restricts winter motorized use on over 70% of the modeled wolverine habitat on the Forest (USDA Forest Service 2009a).

Because wolverine habitat in the Rocky Mountains is not contiguous, wolverines need linkage zones to move between areas of suitable habitat. Wolverines prefer to travel in habitat that is most similar to habitat they use for home range establishment. The level of development in linkage zones that wolverines can tolerate is unknown, but it appears that the current landscape does allow for wolverine dispersal (USDI FWS 2010). Therefore linkage zones for

this species are not thought to be a limiting factor and will not be discussed in detail in the effects analysis for this species.

In 2006, winter wolverine surveys (Ulizio et al 2006) completed 445 km of surveys in the southern portion of the BDNF between February 23rd and March 16th and identified 4 putative wolverine tracks based on track characteristics. Nineteen (19) genetic samples along the 4 tracks were collected with 3 tracks verified as wolverine using genetic analysis, 2 of which produced individual genotypes (1 male, 1 female). Due to the known homerange of wolverines, this corresponds to the appropriate density expected for this species.

Greater Sage grouse

As identified in Table 1 above, the Greater Sage grouse is a candidate species under the Endangered Spices Act (ESA). None of the substantive or procedural provisions of ESA apply to candidate species. Greater Sage grouse are also a Forest Service Region 1 Sensitive Species. It will be discussed in detail under that section.

Forest Service Reguion 1 Sensitive Species

The Region 1 Sensitive Species list was last updated in February 2011 and species listed for the Beaverhead-Deerlodge National Forest are shown in Appendix B8. Information on sensitive species status and distribution, biological requirements and habitat and use on the BDNF was compiled in the Revised Biological Evaluation for the Forest Plan FEIS (USDA Forest Service, 2009c). This document was used, as was the Montana Natural Heritage Programs' "Tracker" database, and personal communication with Montana Fish, Wildlife and Parks biologists. Species not analyzed in detail can be found in Appendix B8. For this project there are four species that will be analyzed in detail, Gray wolf (*Canis lupis*), Greater Sage grouse (*Centrocercus urophasianus*), Northern bog lemming (*Synaptomys borealis*), and Pygmy rabbit (*Brachylagus idahoensis*).

Gray Wolf

Biological Information for Gray Wolf

In Montana, packs average around 6 to 7 wolves (Bradley et al. 2013). Packs typically occupy large distinct territories from 200 to 500 square miles and defend these areas from other wolves or packs. Once a given area is occupied by resident wolf packs, it becomes saturated and wolf numbers become regulated by the amount of available prey, intra-species conflict, other forms of mortality, and dispersal. Dispersing wolves may cover large areas as they try to join other packs or attempt to form their own pack in unoccupied habitat.

Pack social structure is very adaptable and resilient. Breeding members can be quickly replaced either from within or outside the pack and pups can be reared by another pack member should their parents die. Consequently, wolf populations can rapidly recover from severe disruptions, such as very high levels of human-caused mortality or disease. After severe declines, wolf populations can more than double in just 2 years if mortality is reduced;

increases of nearly 100 percent per year have been documented in low-density suitable habitat (Fuller et al. 2003).

In Montana, deer, elk and moose make up the majority of wolf diets. Smaller mammals can be an important alternative to large game in the snow free months. Wolves die from a variety of causes: malnutrition, disease, injuries, interpack aggression and human factors. Human factors have accounted for 89% of reported wolf deaths in Montana since 2003 (USDA Forest Service, 2009c).

Overall Population ad Habitat Status and Distribution

Wolf recovery in began in the early 1980's. Gray wolves increased in number and expanded their distribution in Montana because of natural emigration from Canada and a successful federal effort that reintroduced wolves into Yellowstone National Park and the wilderness areas of central Idaho (Hanauska-Brown et. al 2012). The biological and temporal requirements for wolf recovery in the northern Rocky Mountains of Montana, Idaho, and Wyoming were met in December 2002 and in 2003, all three states submitted wolf management plans to the USFWS for review. The USFWS accepted Montana and Idaho's state plans and are the documents guiding wolf management in these states today. In addition to state population estimates which are used for management, wolf recovery numbers are also addressed by recovery area estimates. The three federal recovery areas are the Northwest Montana Recovery Area (NWMT), the Central Idaho Experimental Area (CID), and the Greater Yellowstone Experimental Area (GYA). This project area is within the CID so population numbers will be presented by state, since wolves cross the Idaho/Montana boarder frequently in the project area, and by recovery area numbers.

Each northern rocky mountain state estimates the number of individual wolves in each pack when possible, conducts ground tracking and flies to locate collard animals and determine localized use throughout the year and the number of wolves traveling together. The statewide minimum wolf population is estimated by adding up the number of observed wolves in verified packs, plus known lone animals as of December 31 each year. This is a minimum count, not a population estimate, because as the wolf population increases in size and distribution, it is increasingly difficult to obtain pack counts and to determine the breeding pair status of known packs and conduct a true population estimate. The minimum estimate is used to make decisions to address wolf-livestock conflicts and to set wolf hunting and trapping regulations and are also adequate to demonstrate maintenance of a recovered population (Bradley et al. 2013).

At the statewide level, and across northwest, southwest and western Montana, wolf counts and pack numbers have an upwards to stable trend and continue to be well distributed. In 2012, the Montana minimum wolf count decreased by about 4% from a minimum count of 653 in 2011 to a minimum count of 625 in 2012 (Figure 1 below).

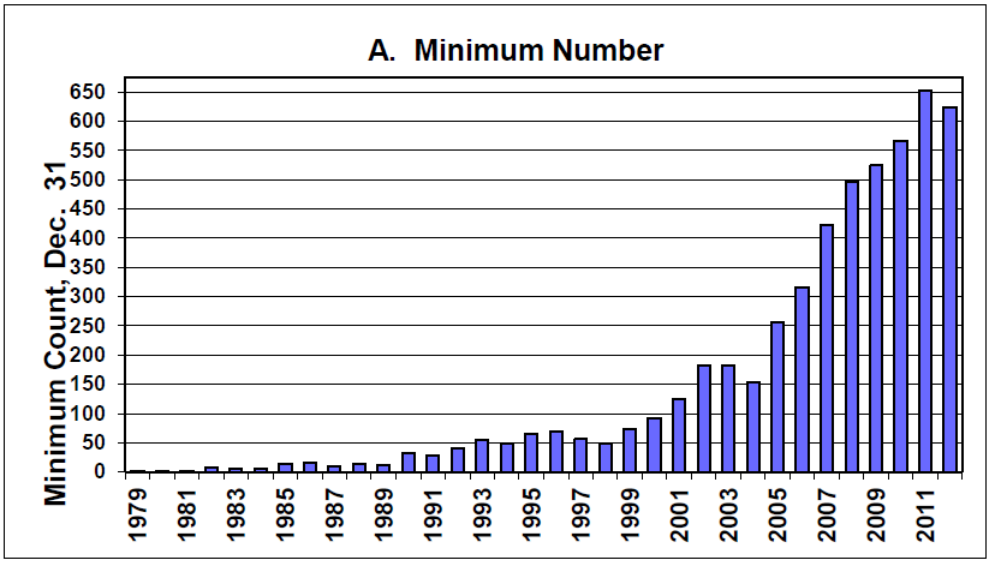


Figure 1. Estimated minimum number of wolves in Montana (1979-2012) (Bradley et al. 2013)

The Idaho wolf population expanded in numbers since initial reintroductions in 1995 and 1996. Although the number of documented packs increased between 2011 and 2012, the estimated year-end population count declined approximately 11%, primarily due to a reduction in the pack size in 2012 as compared to 2011. Average pack size may be smaller than in past years due to harvest seasons, effective depredation control, or potentially other factors. The population estimate for 2011 was 746 wolves and in 2012 683 wolves (Figure 2 below) (IDGF and Nez Perce Tribe 2012).

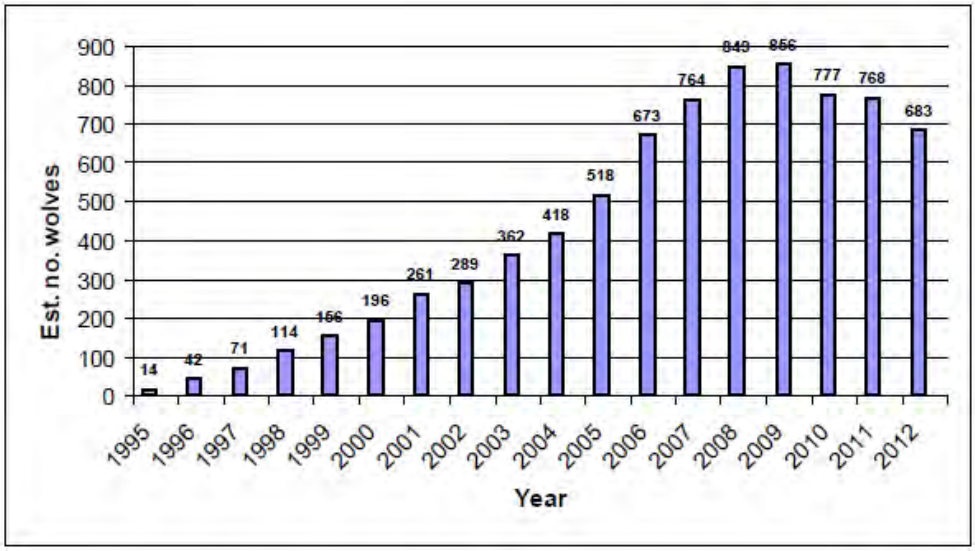


Figure 2. Estimated minimum number of wolves in Idaho (1995-2012) (IDGF and Nez Perce Tribe 2013)

Wolf-Livestock Interactions

Montana wolves routinely encounter livestock on both public grazing allotments and private land. Wolves are opportunistic predators, most often seeking wild prey. However, some

wolves "learn" to prey on livestock and teach this behavior to other wolves. Wolf depredations are very difficult to predict in space and time. Between 1987 and 2012, the majority of cattle and sheep wolf depredation incidents occurred on private lands.

Montana

Most cattle depredations occur in the spring or fall months while sheep depredations occur more sporadically throughout the year. Approximately 19% of wolf packs that were in 2012 were confirmed to have killed livestock. This is up from 17% in 2011 (Bradley et al. 2013).

USDA Wildlife Service's (WS) workload has increased over the last 10 years as the wolf population increased and distribution expanded. The number of suspected wolf complaints received by WS increased steadily from federal fiscal year 1997 to 2009. The number of complaints received since those years have steadily declined from 233 complaints in 2009 to 201 in 2012. About 50% of the complaints received by WS are verified as wolf-caused (Bradley et al. 2013).

In 2012 wolves were under full management authority of the state and wolf-livestock conflict resolution was guided by a combination of Montana's approved state plan and the administrative rules of Montana. Federal and state regulations since 2009 have allowed private citizens to kill wolves seen in the act of attacking, killing or threatening to kill livestock. In 2009, 14 wolves were taken by private citizens, 17 were taken in 2010, 7 in 2011 and 5 in 2012. The remainder of wolves killed in control situations were removed by federal agency personnel.

WS confirmed that statewide 67 cattle, 37 sheep, 1 domestic dog, 1 llama and 2 foals were killed by wolves in 2012. Total confirmed cattle losses are down from 2011 levels and are the lowest recorded in the last six years.

Agency control was higher in 2012 than 2011 but also lower than losses during 2008-2010. This overall decrease in livestock depredations in 2011 and 2012 may be a result of several factors including a trend toward more aggressive wolf control in response to depredations, effects of wolf harvest or both. To address livestock conflicts, 108 wolves were killed in 2012.

Idaho

Wildlife Services (WS) recorded 92 cattle, 337 sheep and 2 dogs that were classified as confirmed or probable wolf depredations (killed by wolves) during the 2012 calendar year. In 2012, wolf depredations and cattle losses were highest in the Southern Mountains and McCall-Weiser Zones. During 2012, 59 wolves were killed by WS, or killed legally by livestock producers or private citizens to resolve wolf conflicts with livestock or dogs in Idaho. This is an increase of 16% from 2011.

Status of Wolves in the Project Area

Distribution of this species within the Big Hole Valley and the project area has varied throughout the years. As of 2012, there were 6 wolf packs documented to use the Big Hole

Valley that are known or suspected to use the allotments in this project area. These packs are Mt. Haggin (136), Pintler (139), Beaverhead (256), Pyramid (287), Bloody Dick (129) and Trail Creek (145) (See Figure 3 below).

The Mt. Haggin pack was first documented in 2007. Its territory is south of Anaconda, mainly on the MFWP Mount Haggin and Fleecer wildlife management areas, near the Seymour Allotment. In 2010, hunters reported visuals or tracks of 6 wolves. This pack did not show signs of denning for several years. An increase in a total count this year may be explained by denning or dispersal into the area. At the end of 2010, this pack was estimated at 6 wolves, was not documented as a breeding pair no depredations were reported. In 2011, this pack was still estimated at 6 wolves. In 2012, this pack was estimated at 3 wolves after 2 management removals. One calf was confirmed killed by a wolf in the Mt. Haggin Wildlife Management Area and one wolf was harvested. It was not known if it was a lone wolf or one associated with the Mt. Haggin pack.

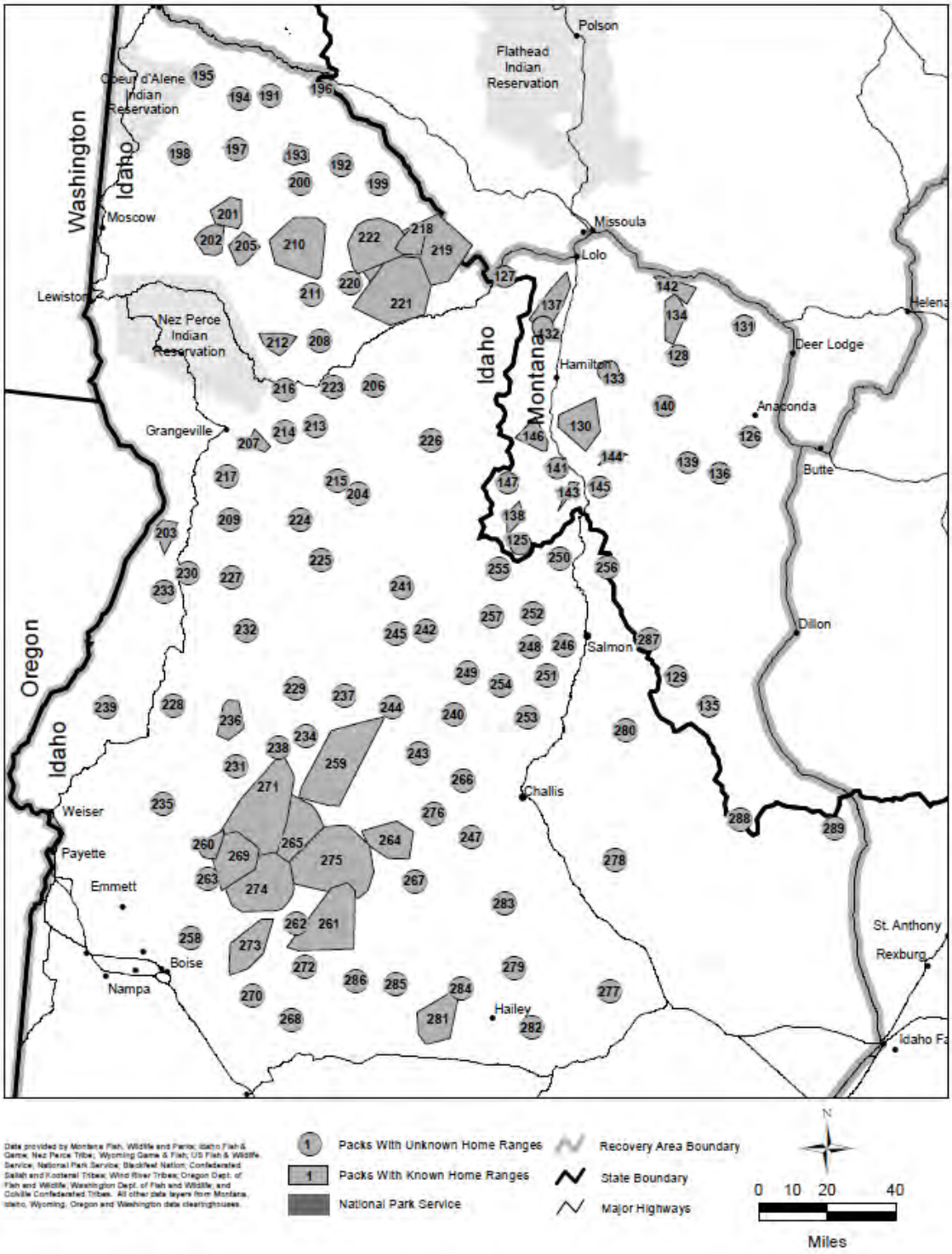
The Pintler pack was first documented in 2007. Its territory is on the south side of the Anaconda-Pintler Wilderness Area near the Pintler, Mudd Creek and Fish Trap Allotments. At the end of 2008, collared wolf SW217 was believed to be in the Pintler pack but had not been detected in 2009 or 2010. MFWP trapping efforts to replace the collar were unsuccessful however; MFWP field surveys and hunter reports in the fall and winter consist of visuals or tracks of 8 wolves. In 2011, this pack had confirmed reproduction, 2 confirmed cattle losses and 3 wolves legally harvested. At the end of 2011, this pack was estimated at 8 wolves. In 2012, this pack had confirmed reproduction and 1 confirmed cattle loss. At the end of 2012 this pack had a minimum of 3 wolves as 3 were harvested, 4 were lethally removed from management actions and one was killed due to another human cause.

The Beaverhead and Pyramid packs are packs that spend the majority of their time in Idaho, but are known to visit Montana. The Pyramid pack was a newly documented pack in 2011. This pack is documented as occasionally using the Twin Lakes area in the Big Hole Valley, which corresponds to the Dry Creek Allotment. Reproduction in this pack was verified by a harvest of a juvenile wolf. The pack count was considered incomplete at the end of 2011 at 2 wolves. In 2012, the number of wolves in this pack was unknown. The Beaverhead pack was counted at 7 wolves at the end of 2011 and is documented east of Salmon and over the continental divide into Montana. It is likely this packs territory overlaps the Pioneer or Monument allotments. In 2012, the number of wolves in this pack was unknown.

The Trail Creek pack was suspected to not exist and could not be verified in 2011, but was documented again in 2012. This pack occupied the MT/ID border near Trail Creek. The closest allotments to this pack are Mussigbrod and Ruby Creek. This pack was known to den in Montana. The estimated pack size at the end of 2012 was 2 wolves with one documented wolf mortality. The cause of the mortality was unknown.

The Bloody Dick pack was a newly documented pack in 2012 and was known to occupy the MT/ID boarder near the southern end of the project area. The closest allotments to this pack are Saginaw and Pioneer. The minimum estimated pack size in 2012 was 3 wolves. There were no documented moralities.

Figure 3: 2012 Wolf Packs for the Central Idaho Wolf Recovery Area (USFWS et. Al 2012)



Livestock Producers on Federal Lands

Specific regulations for livestock producers on Federal Land are noted as follows:

- Livestock producers or outfitters/guides with an active federal use permit that includes or requires livestock use may kill a wolf that is seen biting, wounding or killing or a wolf that is seen actively chasing, molesting or harassing livestock or livestock herding or guarding animals or domestic dogs on their active allotment:
- no permit is required
- report the incident to FWP within 24 hours
- physical evidence of the wolf attack or that an attack was imminent is required (injured or dead
- livestock, broken fences, trampled vegetation and wolf sign); wolves cannot be intentionally baited, fed or deliberately attracted
- Anyone can kill a wolf in self-defense or defense of others. Report the incident to FWP within 24 hours.

Greater Sage-grouse

Biological Information for Greater Sage-grouse

The sage-grouse is native to the sagebrush steppe of western North America, and their distribution closely follows that of sagebrush, primarily big sagebrush. Important seasonal habitat includes breeding, nesting, brood-rearing and winter. Breeding grounds (leks) are key activity areas and most often consist of clearings surrounded by sagebrush cover. Sage grouse invariably prefer sagebrush for nesting cover, and quality of nesting cover directly influences nest success. Successful nesting requires concealment provided by a combination of shrub and residual grass cover. Sage grouse most frequently select nesting cover with a sagebrush canopy of 15-31 percent. Areas that provide abundance and diversity of succulent forbs, an important summer food source for young sage grouse, provide key brood-rearing habitat. Research in central Montana indicated that sage grouse broods prefer relatively open stands of sagebrush during summer, generally with a canopy ranging from 1-25 percent (Montana Sage Grouse Plan 2005). Wintering areas in central Montana include sagebrush stands on relatively flat sites with a 20-percent canopy and an average height of 10 inches. The importance of shrub height increases with snow depth. Thus, snow depth can limit the availability of wintering sites to sage-grouse.

Courtship begins in early March and persists to nesting in May. Breeding occurs at lek sites which most often consist of clearings surrounded by sage brush cover. After breeding, females move away from the leks to nest but males often remain in the area for weeks. Average distances between nests and the nearest leks vary from <1 mile to about 3.9 miles. A female may move over 12 miles from the lek where she was bred but she will build her nest within the average distance of <1 to 3.9 miles of another lek (Connelly et al., 2000). A review of the MT sage grouse conservation plan (2005) also confirms that researchers in SW Montana found more than 80% of nests occur within 3.2 km (2 mi) of a lek.

Overall Population and Habitat Status and Distribution

The species has incurred notable declines from historical levels. Connelly and Braun (*in Connelly et al. 2004*) compared long-term averages to data obtained from 1985-94 and concluded that sage-grouse breeding populations have declined by 17% to 47% (see figure 4

below). They also examined sage-grouse production data for 6 states (CO, ID, MT, OR, UT, WY) and reported that production declined by an overall rate of 25%, comparing long-term averages to 1985-94 data (Connelly et al. 2004).

Connelly and Braun (1997 *in Connelly et al 2004*)) reported that populations in southeastern and southwestern Montana declined by about 30% when they compared average lek sizes from 1985- 94 to long-term averages. Additionally, production declined by 17% (Connelly and Braun 1997 *in Connelly et al 2004*).

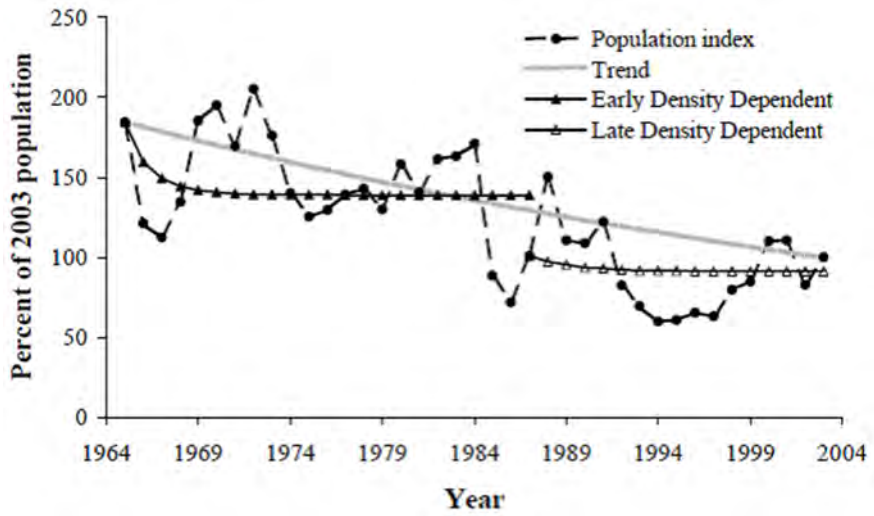


Figure 4: Montana Sage Grouse Population Index 1965-2003 (Connelly et. Al 2004)

Sage grouse only occur on the Beaverhead portion of the Forest and there are no breeding grounds (leks), no known records of sage grouse nesting on the Forest and no known wintering. Some birds are known to winter on the surrounding valley floors south of Dillon. All known active and inactive leks are located on the valley floors on a mixture of State, BLM, and private ownership. Two distinct sage grouse populations have been identified near the project area: the Wisdom population and the Bannack Population (Figure 5) and these populations have been trending upwards in the past decade (Figure 6 and Figure 7). None of these populations contain active or inactive lek sites on National Forest lands.

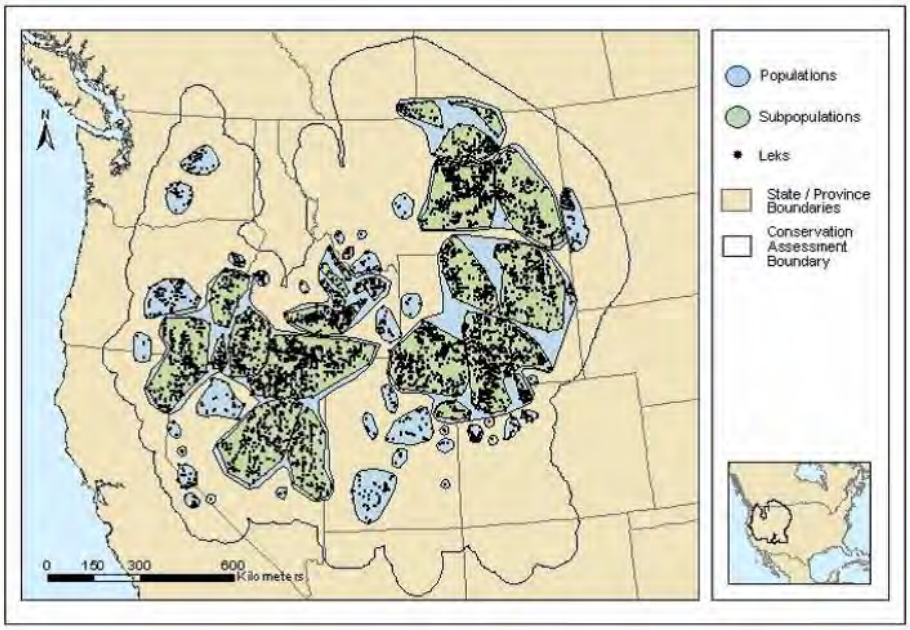


Figure 5: Discrete Sage Grouse Populations (Connelly et. Al 2004)

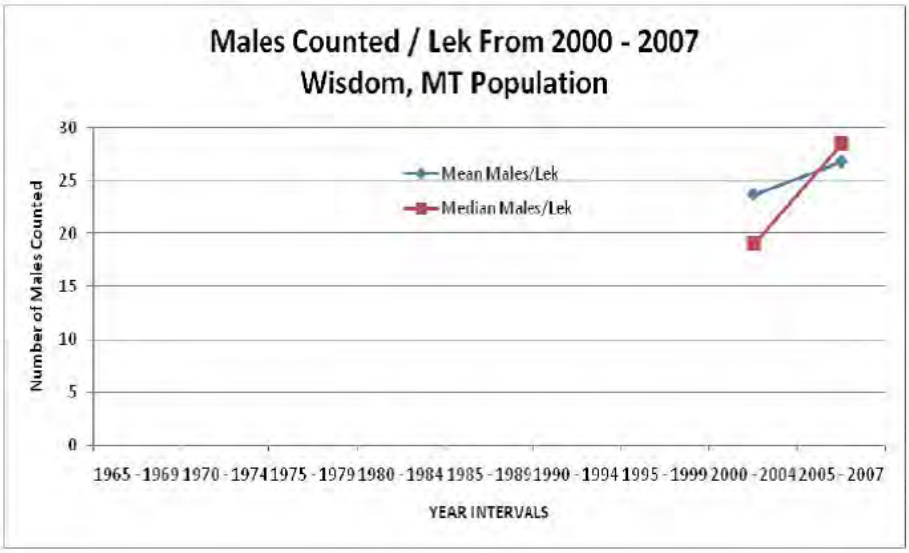


Figure 6: The mean and median number of males counted on leks during intervals from 2000-2007 in Wisdom, MT population (WAFWA 2008)

Personal communication with MTFWP Biologist V. Boccadori and multiple years or lek count data suggests that the Wisdom sage-grouse population is currently stable (Pers. com Boccadori 2/2013). See Analysis section, pgs. 804-829, for more details.

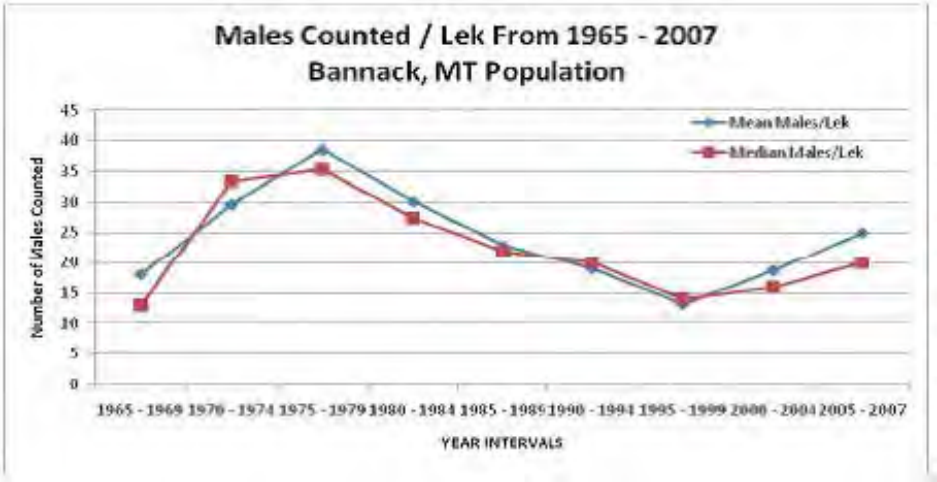


Figure 7: The mean and median number of males counted on leks during intervals from 1965-2007 in Bannack, MT population (WAFWA 2008)

Northern Bog Lemming

Biological Information for Northern Bog Lemming
Bog lemming populations occur primarily in sedge or alder-willow bogs on the edge of spruce-fir and/or lodgepole pine forest, and sphagnum bog mats are considered important (Hart et al. 1998). Large, thick moss mats (> 1 ac), particularly sphagnum moss is the best habitat predictor for potential northern bog lemming sites (Reichel and Corn 1997).

The bog lemming is an herbivore, thus serving a role in ecosystem process and function through plant seed dispersal creating changes in plant species composition and density; however, little is known about the specific food habits of the bog lemming.

This species maintains a home range of less than 1 acre, although data regarding movements are unavailable. Population densities may range up to 36 per acre. It is very sociable and may be found in small colonies.

Overall Population and Habitat Status and Distribution
In Montana, the northern bog lemming is at the southern margin of global distribution in the Rocky Mountains. Records are available for six counties (Beaverhead, Flathead, Lewis and Clark, Lincoln, Missoula, Ravalli), with all but two sites (one in Beaverhead County - Lost Trail Pass, one in Lewis and Clark County) occurring west of the Continental Divide. Elevation of these sites ranges from 3340 to 6520 feet, but a 2003 record from a new site in Ravalli County extends the upper elevation limit to 7400 feet. During 1992-93, 10 northern bog lemming sites were found, with locations ranging from the northwestern corner of Montana south to just north of Lost Trail Pass in Beaverhead County and east to the Rocky Mountain Front. The northern bog lemming may eventually be found to occur locally across much of western Montana (Hart et al. 1998**).**

Northern bog lemmings are not known within the allotments in this project. The only known bog lemming location on the BDNF is within Maybee Meadows, approximately 3 miles to the southwest of the Mussigbrod Allotment and 6 miles to the northwest of the Ruby Allotment. This individual was found in 1992 with confirmed evidence of reproduction. This wetland/bog complex is the most southern documented location of the Northern Bog Lemming in Montana. Based on field surveys of the allotments, Hamby Swamp in the Monument allotment contains thick moss mats, a preferred habitat for this species. Hamby swamp is approximately 460 acres and roughly 30% of this contains sphagnum bog mats (pers. com K. Greenwood, District Range Specialist), the best habitat predictor for this species. No other allotments are known or suspected to have this type of habitat. Therefore, effects to this species by alternative would be limited to the changes in management of the Monument Allotment.

Pygmy Rabbit

Biological Information for Pygmy Rabbit
Pygmy rabbits are limited to areas where big sagebrush grows in dense, tall stands. Occupied dense, tall thickets of sage are laced with runways and burrows (Forseman 2012). Little information is available on movements. At one site, pygmy rabbits had to cross about 500 meters of relatively open terrain to occupy a coulee-bottom stringer of dense sagebrush (Rauscher 1997). Information from other portions of its range suggests that pygmy rabbits are non-migratory with daily winter movements usually less than 100 meters (averaged 30 meters in Wyoming). Individuals have been documented to disperse beyond 2 miles (MTNHP 2009).

Occupied habitats in Montana include shrub-grasslands on alluvial fans, floodplains, plateaus, high mountain valleys, and mountain slopes, where suitable sagebrush cover and soils for burrowing are available. Some occupied sites may support a relatively sparse cover of sagebrush and shallow soils, but these usually support patches of dense sagebrush and deeper soils. Big sagebrush was the dominant shrub at all occupied sites, averaging 21.3 to 22.6% coverage; bare ground averaged 33% and forbs 5.8%. Average height of sagebrush in occupied sites was 0.4 meter (Rauscher 1997).

Big sagebrush (*Artemisia tridentata*) is the primary food source (up to 99% of the winter diet), but grasses and forbs are eaten in mid- to late summer, and can comprise up to 40% of the diet during that season. Diet in Montana has not been reported, although samples have been collected for analysis (Rauscher 1997); browsing on big sagebrush near burrows was noted, however. During the day, they use forms under vegetation in a manner similar to other rabbits and hares (Green and Flinders 1980 *in* Rauscher 1997).

Annual mortality can be quite high, but has not been quantified satisfactorily. Predators include weasels (*Mustela* spp.), coyote, red fox, bobcat, Northern Harrier, Long-eared Owl, and Great Horned Owl. Predators reported in Montana include coyote and long-tailed weasel (Rauscher 1997).

Overall Population and Habitat and Distribution

Montana lies on the northeastern edge of pygmy rabbit distribution. Southwestern Montana in particular is at the periphery of the species range with little known overlap onto National Forest Ownership. There are confirmed records dating back to 1918 from three southwestern counties (Beaverhead, Jefferson, Madison), with most of the Montana range in Beaverhead County (MTNHP 2009, Pygmy Rabbit Species Account). Montana records are between 4500 – 6700 feet in elevation (USDA 2009, Lenard et al. 2005).

The loss of habitat through fire, grazing, invasion of exotic annuals, and agricultural conversion is probably the most significant factor contributing to pygmy rabbit population declines. Sagebrush cover is critical to pygmy rabbits and sagebrush eradication is detrimental. Fragmentation of sagebrush communities also poses a threat to populations of pygmy rabbits because dispersal potential is limited (NatureServe 2013).

No special management activities have been developed or implemented in Montana specifically for pygmy rabbits (MTNHP 2009). The loss of habitat from conversion to cropland and pasture is probably not great in southwestern Montana. Burning and other methods of sagebrush removal, however, have been used in past and recent years to improve rangeland for livestock. Such activity will make the landscape unsuitable for pygmy rabbits. This species is found where grazing occurs, so long as sagebrush cover is maintained, but overgrazing could result in loss of forbs and grasses that are summer foods to pygmy rabbits, and livestock could damage sagebrush structure by trampling plants and thinning the shrub canopy. Dense stands of sagebrush along streams, fence lines, and borrow ditches are probably essential avenues for dispersal of pygmy rabbits. If sagebrush is removed, it may isolate or eliminate pygmy rabbits in some areas, unless it is done in such a way as to maintain a mosaic of patches of relatively large size isolated only by narrow expanses of unsuitable habitat.

Management Indicator Species (MIS)

Table 4 below identifies the three Management Indicator Species (MIS) identified in the Forest Plan.

Table 4: Terrestrial Management Indicator Species for the BDNF

Species	Habitat Preference	Presence in Analysis Area
Rocky Mountain Elk	Habitat generalist. Winter range in lower elevation conifer/shrub/grassland mix. Security during hunting season is measured by open motorized road and trail densities over the hunting unit.	Yes
North American Wolverine	Higher elevations, rugged terrain, spring snowpack, the presence of conifer forests and edge associated with alpine habitat. Deep and persistent snow into May need denning habitat free from human disturbance.	Yes
Mountain goat	High elevation, rugged, steep terrain. There is no suitable or occupied habitat for mountain goats in the project area and this species will not be analyzed further.	No

Rocky Mountain Elk

Elk is the terrestrial MIS selected in the Forest Plan (USDA Forest Service 2009a, page 47) that is addressed in this analysis (See Table 4 below). Elk are a commonly hunted species important to the public. Additional information on elk population conditions and habitat on the Forest is found in the Plan FEIS and project record.

Overall Population and Habitat Status and Distribution

Elk are a premier wildlife species for hunters in addition to people who enjoy seeing wildlife. Southwestern Montana is home to over 40% of the state elk population and gets the bulk of hunting pressure and harvest (MTFWP 2004). Elk predominantly use calving areas and summer and fall ranges National Forest System (NFS) lands and southwest Montana supports approximately 26- 32% of the State's elk.. It's estimated that 20,000-25,000 elk spend a majority of their life cycle here on the BDNF (USDA Forest Service 2009c). Viability of this species was not identified as a reason for selecting this species as a MIS.

The table in Appendix B8 contains the Elk Management Units and Hunting Districts that are on the BDNF. The MTFWP population objectives and the population estimates are listed for most years between 2003 and 2011, as well as the population objectives from the 2004 and 1992 Elk Plans. As noted in the table, the 2011 estimates elk numbers for those Hunting Units encompassing BDNF lands have reached 139% of the 2004 MT Elk Plan objectives for those units. In 2011 in hunting districts 333 and 320, there are over 1,500 elk, which is over objective. Statewide, post-season elk numbers have increased from an estimated 8,000 in 1922 to 22,000 in 1940, 40,000 in 1951, 55,000 in 1978, and an estimated 130,000 to 160,000 today"(MTFWP 2004).

This population information, along with the information for all the hunting districts, supports the statement that elk are widely throughout the forest and are stable to increasing numbers in every unit. According to MTFWP and detailed in Figure 8 below, elk are widely distributed across the national forests of Montana, including the BDNF and this project area.

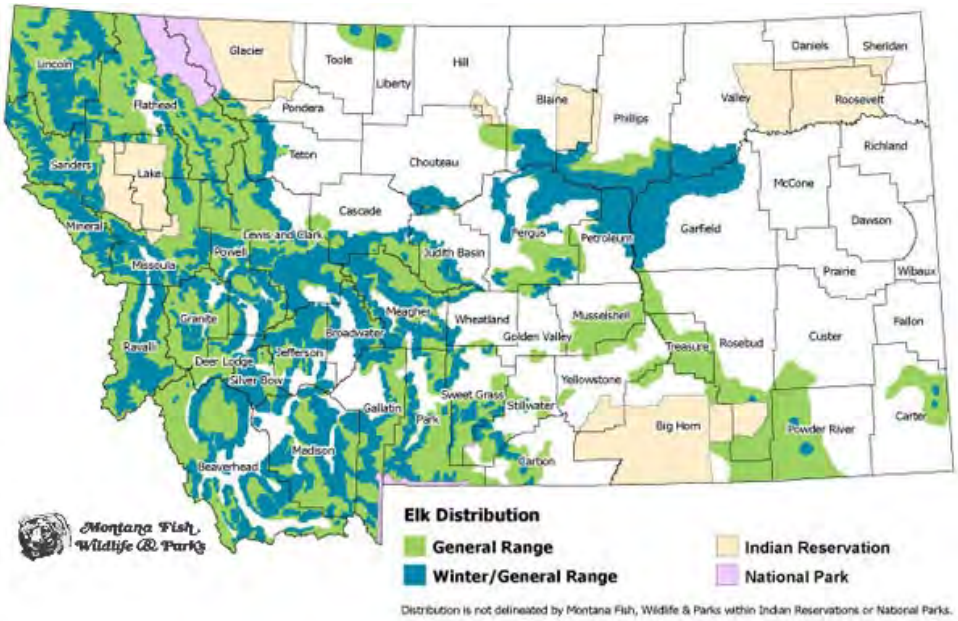


Figure 8: Montana Fish, Wildlife, and Parks Elk Distribution

Elk Hunting Districts in the Project Area

Numerous studies have found that open motorized roads and trails are the greatest consideration on summer range relating to habitat effectiveness (Proffit et al. 2012 and Rowland et al 2000). References to habitat effectiveness and road density management suggest that elk are a useful management indicator species to monitor the effectiveness of motorized use management and secure habitat changes especially since elk occur in every habitat type and virtually every elevation across the Forest. Elk were also selected as an MIS because they are one of the most popular hunted species in Montana and were not selected as an MIS due to population viability concerns. Open, motorized roads and trails are managed at the Hunting District and Landscape Scale.

The 11 allotments in this project lie within Hunting Districts 321, 334, 319 and 329. Recently, Hunting District 319 was divided into two Hunting Districts and the southern portion from Pintlar Pass to Lost Trail Pass, now identified as Hunting District (HD) 334. All allotments are within the Big Hole Landscape. Open motorized roads and trail objectives for HD 319, 321 and 329 are 0.6, 1.1 and 0.8 during the fall hunting season. The motorized route density objective for the Big Hole Landscape is 1.3mi/ sq. mi (Table 5). The desired condition at the hunting district scale matches the Christiansen et al (1993) caveat "For areas where elk are one of the primary resource considerations habitat effectiveness should be 50 percent or greater." Habitat effectiveness at this level equates to 1.75 – 1.8 mi/ sq mi and all three HDs and the Big Hole Landscape desired conditions are below this level (Table 5).

Table 5: Desired Open Motorized Route Density for HD 321, 319, and 329 and the Big Hole Landscape

Landscape or Hunting District	Desired OMRTD Miles/Sq. Mi.
Big Hole Landscape	1.4
HD 319	0.6
HD 321	1.1
HD 329	0.8

North American Wolverine

Wolverine was selected as an MIS to measure the effectiveness of maintaining winter denning habitat secure from snowmobile impacts. Public comments revealed concerns about adverse impacts to this species in a stressful time of year (Forest Plan EIS p. 489). Viability of this species was not identified as a reason for selecting this species as a MIS.

At the Forest-scale, summer and winter non-motorized areas were established across the Forest (USDA Forest Service 2009b). Wolverines and modeled wolverine denning habitat were one of the criteria used to select winter non-motorized areas and the Plan restricts winter motorized use on over 70% of the modeled wolverine denning habitat (USDA Forest Service 2009b). None of the alternatives impact winter non-motorized areas or wolverine denning habitat.

Mountain Goat

As identified in Table 4 above there are no Mountain Goats in the analysis area, therefore no further discussion is needed.

Migratory Birds

A Memorandum of Understanding (MOU) between the USFS and FWS was signed in December of 2008 (USDA FS and USDI FWS 2008). This MOU outlines a collaborative approach to promote the conservation and reduce the take of migratory birds. Because of the direction in the MOU, this analysis incorporates birds of conservation concern that have been identified by the FWS (USDI FWS 2008). Their report identifies criteria for selection, as well as their rationale for selection of Bird Conservation Regions (BCRs) as the smallest geographic scale.

The project area lies in BCR 10. The birds of conservation concern for BCR 10 can be found in Appendix B8. Three of these species have already been addressed as sensitive species (bald eagle, peregrine falcon and flammulated owl, See Appendix B8 for R1 Regional Foresters Sensitive Species List.). Of the remaining species, found in the analysis area based on known distribution and habitats present in the analysis area. Details of possible impacts to these species for each of the alternatives are detailed in the analysis section below.

Analysis

Methodology

Species considered in this analysis include terrestrial species listed as federally threatened, endangered, candidate or experimental/non-essential on the Beaverhead-Deerlodge National Forest, and R1 Forest Service sensitive species, listed for the BDNF, hereafter called TES. In addition, management indicator species (MIS) designated in the Forest Plan are addressed. Lastly, several other species, or groups of species are addressed as other species of interest.

Spatial and Temporal Scales

The analysis area used for direct and indirect and cumulative effects analysis area varies greatly by species. Analysis areas were chosen by species based on an area that 1) encompasses the affected areas where the proposed actions would be located and 2) is large enough to evaluate the ability of the habitat to support the species but small enough to not obscure the effects of the actions. For example, the analysis areas used to assess impacts to grizzly bears are Hunting Districts and the analysis areas for lynx are Lynx Analysis Units (LAUs). LAUs, which have been mapped According to the Lynx Conservation Assessment Strategy (LCAS) (Ruediger et al. 2000), are intended to provide the fundamental or smallest scale with which to begin evaluation and monitoring of the effects of management actions on lynx habitat.

Part of the analysis focuses on changes in vegetation, as this proposal would result in changes to upland and riparian vegetation through livestock grazing. The other part of the analysis focuses on impacts from the presence of livestock and humans in the allotments and the impacts from the proposed range improvements. Timeframes for grazing and other range improvements vary by allotment and alternative. In general, short-term impacts from the project will be considered as the annual impact from the presence of cattle within the allotments and annual reduction of forage. Long term impacts to species will generally be considered the life of the proposal, which is 10 years because disturbance to the species analyzed would be underestimated if a longer timeframe is used. Impacts from the alternatives could be underestimated as forage regrows annually and succession naturally occurs which could obscure the effects of grazing on wildlife species within the allotments using a longer timeframe. Additionally, 10 years is the life of the decision when made, and impacts to species and habitat analyzed in the project have the potential to change after the life of the project.

Resource Indicators to be Analyzed and Units of Measures

Each species analyzed in detail will have certain indicators that will be used to assess impacts associated with the alternatives in this project. Only species that are known or suspected to occur in the project area and have the potential to be impacted by the action alternatives will be analyzed in detail and have identified indicators. All sensitive species that were not analyzed in detail can be found in Appendix B8. Indicators for each species analyzed in detail

were chosen based on the natural history of each species and the potential for each action alternative to impact the species or species habitat in the project area.

As mentioned previously, this proposal would result in changes to upland and riparian vegetation through livestock grazing and result in changes to the allotments by the presence of livestock and humans and proposed range improvements. Several species or groups of species are potentially affected by disturbance such as grizzly bears and wolves and others more impacted by the change in vegetation such as Canada lynx, sage-grouse, pygmy rabbit and Northern bog lemming. One species discussed above, the North American Wolverine, is proposed for protection as a threatened species. Although the wolverine is known to use the Big Hole Landscape, it will not be analyzed in detail because land management activies such as livestock grazing were not identified as threats in the USFWS proposed ruling (See rational below).

Table 6 below displays the species that are analyzed in detail and the indicators that will be used to compare impacts to these species by alternative.

Table 6: Indicators for Species Analyzed in Detail

Species *	Indicator	Measure
Grizzly Bear	Change in Secure Habitat	1) Number of active Allotments and pastures
Canada Lynx	Quality of foraging habitat and riparian movement corridors	1) Species composition of upland sites 2) Species composition of riparian sites 3) Riparian shrub cover
Gray Wolf	Change in Secure Habitat	1) Number of active Allotments and pastures
Greater Sage-grouse	Quality of nesting and summer brood rearing habitat	1) Preferred forb availability 2) Perennial Grass and Forb Canopy Cover 3) Percent canopy cover of sagebrush 4) Miles of fencing constructed
Northern Bog Lemming	Integrity of available bog habitat	1) Acres of bog habitat that overlaps with grazed acres
Pygmy Rabbit	Quality of habitat	1) Grass and Forb Availability 2) Percent canopy cover of sagebrush

Analysis Methods and Assumptions

Pre-field reviews were conducted to determine which species are known to occur in the area or have suitable habitat present and could potentially occur. Sources reviewed include Montana Natural Heritage Program (MTNHP), Forest occurrence information, Forest Plan FEIS Appendix B (Biological Evaluation) and species distribution information. Surveys that have been done in the analysis area are general habitat surveys and pygmy rabbit surveys in each allotment.

There are several types of activities proposed in this project. Because each species has specific habitat requirements, not all types of activities have the potential to affect each species. This will be discussed for each species. Table 7 below identifies past, present, and reasonably foreseeable future activities that are considered in the cumulative effects analysis.

Generally, short-term effects are associated with disturbance from activities, and immediate changes to habitat. Long-term effects will consider changes to potential habitat over time, dependent on specific species habitat needs. Explanation of how this habitat was identified can be found in the appropriate species or habitat section.

Table 7: Past, Present, and Reasonably Foreseeable Future Actions

Activity	Decade/Year	Past	Present	Reasonably Foreseeable Future
NFS lands within the allotment boundaries				
Grazing(domesticand native ungulates)	1800-2012	x	x	x
Noxious Weed Control (use of herbicides)		x	x	x
Sagebrush manipulation (burning, spraying)		x		
Prescribed Fire		x	x	x
Wildland Fire Suppression		x	x	x
Timber Management – All Harvest types	1960-2012	x		Fleecer,Pintler Face
Hazard Tree Removal – Developed sites and roadsides	2009-2012	Roadside 5	Roadside 7	Roadside 7
Pre-commercial Thinning				
Public Firewood cutting		x		
Water Impoundments		x	x	
Fish barriers		x	x	
Road and Trail Maintenance		x	x	x
Road Construction		x		
Insect and Disease outbreak (bark beetle, Spruce Bud worm, etc.)		x	x	x
Conifer encroachment treatment		x		
Range Improvements (fences, water tanks, spring development, etc.)		x	x	x
Dispersed Recreation		x	x	x
Irrigation Withdrawals		x	x	
Natural disturbances (Flooding and Mass Wasting)		x	x	x
Travel Management		x		x
Motorized Vehicle Travel permits (off route or behind closed gates)		x	x	x
Mining		x	x	
BLM lands within the allotment boundaries				
Prescribed burning		x		
Livestock Grazing		x	x	x
Range Improvements		x	x	x
Fire Suppression		x	x	x
Noxious Weed Control		x	x	x
Road Maintenance		x	x	x
Road Construction		x		
Timber Sales		x		x

Table 7: Past, Present, and Reasonably Foreseeable Future Actions

Activity	Decade/Year	Past	Present	Reasonably Foreseeable Future
State lands (Fish, Wildlife , and Parks) within the allotment boundaries				
Livestock Grazing		x	x	x
Range Improvements		x	**x**	**x**
Road Maintenance		x	**x**	**x**
Noxious Weed Control		x	**x**	**x**
Fire Suppression		x	**x**	**x**
Timber Sale		x		**x**
Arctic Grayling Re-colonization In Upper Big Hole River	2013			**x**
Private lands within the allotment boundaries				
Livestock grazing		x	x	x
Range Improvements		x	x	
Road Maintenance		x	**x**	**x**
Road Construction		x	**x**	
Noxious Weed Control		x	**x**	**x**
Fire Suppression		x	**x**	**x**

Wolverine

Wolverine Habitat and Use of the Analysis Area

Wolverines are known to use the Big Hole Landscape, particularly the Beaverhead Mountains and the Anaconda-Pintler Wilderness.

Wolverine Summary and Determination

This project and associated alternatives were analyzed for effects to wolverines based on vegetation changes, movements across the landscape, and disturbance from other human activities associated with the alternatives. I have determined that implementation of any of the alternatives ***will not jeopardize the wolverine***. My determination is based on the following rationale, consistent with the findings of the proposed rule.

The proposed rule states: "Little scientific or commercial information exists regarding effects to wolverines from development or human disturbances associated with them. What little information does exist suggests that wolverines can adjust to moderate habitat modification, infrastructure development, and human disturbance. In addition, large amounts of wolverine habitat are protected from human disturbances and development, either legally through wilderness and National Park designation, or by being located at remote and high-elevation sites. Therefore, wolverines are afforded a relatively high degree of protection from the effects of human activities by the nature of their habitat. Wolverines are known to successfully disperse long distances between habitats through human dominated landscapes and across transportation corridors. The current level of residential, industrial, and transportation development in the western United States does not appear to have precluded the long-distance dispersal movements that wolverines require for maintenance of genetic diversity. We do not have information to suggest that future levels of residential, industrial and transportation development would be a significant conservation concern for the DPS. The available scientific and commercial information does not indicate that other potential stressors

such as land management, recreation, infrastructure development, and transportation corridors pose a threat to the DPS."

Based on a review of the proposed listing and the best available science regarding the wolverine, livestock grazing as proposed in any of the alternatives is not documented to have an effect to this species. All alternatives will not impact any factors that are essential to wolverine persistence, such as areas with persistent spring snow and high elevations. Additionally all alternatives will not change open motorized access to the area for trappers, a known cause of human-related mortality. Little scientific or commercial information exists regarding effects to wolverines from development or human disturbances associated with them. What little information does exist suggests that wolverines can adjust to moderate habitat modification, infrastructure development, and human disturbance. As mentioned earlier, in their proposed ruling, the USFWS determined that global climate change is the primary threat to the species, and that legal and incidental trapping of wolverines are substantial threats in concert with climate change. Management activities of land management agencies, for example, livestock grazing, were not identified as threats (78 FR 7877-7879). Therefore, all alternatives when compared with past, ongoing and future will ***have no cumulative effects*** to this species. Based on this information **this species will not be analyzed further.**

Grizzly Bear

Grizzly Bear Habitat and Use of the Analysis Area

Spatial Bounds of Analysis Area for Grizzly Bear

The analysis area for grizzly bear is a modified area derived from the Hunting Units where the allotments are located: 321, 319, 334 and 329 (See Appendix A7 for the map). This analysis area was chosen because it is large enough to evaluate the ability of the habitat to support grizzly bears (includes multiple home ranges and secure habitat), but small enough to not obscure the effects of the proposed actions.

Secure Habitat for Grizzly Bear

Security for wildlife is measured at the Landscape level by the density of open, motorized roads and trails (OMRTD). The Landscape in the analysis area is the Big Hole Landscape and it is within the Forest Plan direction for OMRTD with an average of 1.5 mi/sq. mi of open motorized roads and trails.

The Anaconda-Pintler Wilderness expanse is approximately 159,000 acres. This area encompasses the western portion of the Wise Ranger District and extends north and west of the project area into the Bitterroot National Forest.

This project will not change the density of open motorized roads and trails so impacts to secure habitat related to OMRTD will not be analyzed further.

Livestock Allotments in the Analysis Area for Grizzly Bear

Other than availability of secure habitat, there are other human-use activities that have the

potential to impact grizzly bears. Livestock grazing , as proposed in the action alternatives, has the potential to impact grizzly bears by placing an unnatural food source in grizzly bear habitat. Knight and Judd (1983) reported most grizzly bears that encountered cattle did not make kills, however, conflicts between livestock and grizzly bears have resulted in the relocation, removal, or direct mortality of grizzly bears. Conflicts with livestock have increased in recent years in the GYA as the grizzly bear population has increased. Anderson et al. (2002) reported that translocating grizzly bears appears to be a viable option for reducing losses, since translocation could prevent the occasional depredator, which appears to be common among grizzlies, from being unnecessarily removed from the population. Removing cattle carcasses from allotments also appeared to reduce bear densities, but it could not be determined whether this would reduce depredations.

Currently, there are 40 Forest Service allotments within the analysis area. Because grizzly bears are not known in the analysis area, there have been no documented grizzly bear/livestock interactions.

Direct and Indirect Effects to Grizzly Bear

Other than availability of secure habitat, other human-use activities that have the potential to impact grizzly bears are 1) impacts to grizzly bear food sources, 2) presence of livestock allotments and 3) human-caused mortality which includes exposure to unnatural food sources and human-related self-defense situations. Annually, the Interagency Grizzly Bear Study Team monitors demographics, habitat (including major foods such as whitebark pine), changes in secure habitat, livestock allotments and developed sites.

Impacts to developed sites, major food sources and secure habitat will not be analyzed in detail in this analysis, as the action alternatives do not propose vegetation treatments that would impact major food sources, change developed sites or change open motorized routes (secure habitat). Livestock grazing, as proposed in the action alternatives, has the potential to impact grizzly bears by placing an unnatural food source in potential grizzly bear habitat.

Tables 8 and 9 below summarize the effects to the Grizzly Bear by allotment, by alternative, by Resource Indicator and Unit of Measure.

Table 8: Summary for Grizzly Bear of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative Resource Indicator and Units of Measure**	**Current Grazing Management Alternative Resource Indicator and Units of Measure**
	Change in Secure Habitat as measured by Number of active Allotments and pastures	Change in Secure Habitat as measured by Number of active Allotments and pastures
Seymour	0 Allotment 0 Pastures	1 Allotment 9 Pasture Rest Rotation
Fishtrap	0 Allotment 0 Pastures	1 Allotment 2 Pastures, Deferred Rotation

Table 8: Summary for Grizzly Bear of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative Resource Indicator and Units of Measure**	**Current Grazing Management Alternative Resource Indicator and Units of Measure**
	Change in Secure Habitat as measured by Number of active Allotments and pastures	Change in Secure Habitat as measured by Number of active Allotments and pastures
Mudd Creek	0 Allotment 0 Pastures	1 Allotment 1 Pasture Deferred Rotation
Pintlar Creek	0 Allotment 0 Pastures	1 Allotment 1 Pasture Partly Deferred Rotation
Mussigbrod	0 Allotment 0 Pastures	1 Allotment 2 Pasture Deferred Rotation
Ruby Creek	0 Allotment 0 Pastures	1 Allotment 3 Pasture Partially Deferred Rotation
Dry Creek	0 Allotment 0 Pastures	1 Allotment 2 Pasture Deferred Rotation
Twin Lakes	0 Allotment 0 Pastures	1 Allotment 2 Pasture Deferred Rotation in Big Lake and 2 pasture Modified Rest with rest 2 years out of 6 in Little Lake areas
Monument	0 Allotment 0 Pastures	1 Allotment 2 Pastures, Deferred Rotation
Pioneer	0 Allotment 0 Pastures	1 Allotment 3 Pastures, Deferred Rotation
Saginaw	0 Allotment 0 Pastures	1 Allotment 4 Pastures, Rest Rotation

Table 9: Summary for Grizzly Bear of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**	**Alternative 4 Resource Indicator and Units of Measure**
	Change in Secure Habitat as measured by Number of active Allotments and pastures	Change in Secure Habitat as measured by Number of active Allotments and pastures
Seymour	1 Allotment 9 Pasture Rest Rotation	1 Allotment 9 Pasture Rest Rotation with Tenmile pasture only grazed once every 3 years

Table 9: Summary for Grizzly Bear of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**	**Alternative 4 Resource Indicator and Units of Measure**
	Change in Secure Habitat as measured by Number of active Allotments and pastures	Change in Secure Habitat as measured by Number of active Allotments and pastures
Fishtrap	1 Allotment 2 Pastures, Deferred Rotation	1 Allotment rested 1 in 3 years 2 Pasture Deferred Rotation
Mudd Creek	1 Allotment 1 Pasture Deferred Rotation	1 Allotment rested 1 in 3 years 1 Pasture Deferred Rotation
Pintlar Creek	1 Allotment 1 Pasture Deferred Rotation every other year	1 Allotment 1 Pasture Deferred Rotation every other year, Entire Pintlar Meadows rested for 10 years
Mussigbrod	1 Allotment 2 Pasture Deferred Rotation with complete rest of allotment 1 out of 3 years	1 Allotment 1 Pasture Deferred Rotation every other year, Entire Bender Pasture rested for a minimum of 10 years
Ruby Creek	1 Allotment 3 Pasture Partially Deferred Rotation with Butler pasture rested 1 year out of 3	1 Allotment 3 Pasture Partially Deferred Rotation with Butler pasture rested 1 year out of 3
Dry Creek	1 Allotment 2 Pasture Deferred Rotation with entire allotment rested 1 year out of 3	1 Allotment 2 Pasture Deferred Rotation with entire allotment rested 1 year out of 3
Twin Lakes	1 Allotment 2 Pasture Modified Rest Rotation for Big and Little Lake	1 Allotment 2 Pasture Modified Rest Rotation for Big and Little Lake
Monument	1 Allotment 2 Pastures, Deferred Rotation	1 Allotment rested 1 in 4 years 2 Pasture Deferred Rotation
Pioneer	1 Allotment 3 Pastures, Deferred Rotation	1 Allotment rested 1 in 4 years 3 Pasture Deferred Rotation
Saginaw	1 Allotment 4 Pastures, Rest Rotation	1 Allotment 4 Pastures, Rest Rotation

No Action Alternative for Grizzly Bear

The direct, indirect, and cumulative effects for the grizzly bear are the same for all allotments under the No Action Alternative.

Direct/Indirect Effects for Grizzly Bear

Under the No Action alternative, grazing would not be authorized in the 11 allotments. There would be no impact to grizzly bear food sources or impacts to grizzly bears from exposure to unnatural food sources, such as livestock. Eleven fewer allotments would be grazed in the

grizzly bear analysis area, including this allotment. This would reduce the number of active allotments in the analysis area by 39%, reducing the potential that grizzly bears would come in contact with an unnatural food source and potentially reducing the probability of future grizzly bear/livestock conflicts. Reducing the potential for grizzly bear/ livestock conflicts would have a beneficial impact on the species, however at the population level, would likely be unmeasureable. This effect is unmeasureable due to lack of confirmed evidence that the species uses or is present in the analysis area.

Cumulative Effects for Grizzly Bear

Under the No Action alternative there are a multitude of past, present and future actions activities in the analysis area in the absence of an action that have the potential to or are currently negatively affecting the grizzly bear and grizzly bear habitat. A majority of these effects are from the use of the road network in the area, developed recreation sites and the presence of private inholdings and neighboring private property that have dispersed recreation and livestock grazing. The effects to grizzly bear and grizzly bear habitat from these actions include potential disturbance or displacement due to human presence, motorized use and other mechanized equipment, presence of livestock (an unnatural food source), change in forested condition classes (depending on type of timber harvest) and potential hunting related grizzly bear/human conflicts All of these activities had or have the potential to impact grizzly bears and/or grizzly bear habitat in the analysis area. The presence of these activities may lead grizzly bears to avoid otherwise suitable habitat. This alternative does not proposed any activities, so there would be no cumulative effects to the grizzly bear.

The remaining analysis for grizzly bear by alternative is in Table 10 below. The cumulative effects to the grizzly bear are analyzed at a scale larger than the individual allotment. Beause of this, the cumulative effects are analyzed by alternative at the end of Table 10 for all the alternatives except the No Action.

Table 10: Direct, Indirect, and Cumulative Effects to Grizzly Bears by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Seymour	Not all grizzly bears that come in contact with cattle make kills; however, conflicts between livestock and grizzly bears can and do occur, which can result in management actions. These actions include hazing and harassment, relocation, or euthanization, a direct impact to the species. The Seymour allotment under this alterative includes a grazing system that includes rest for certain pastures each year. Reducing the area that is grazed by livestock in this allotment may reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to not including rest (a time when livestock is not in certain areas). Presence of livestock in this allotment exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area	Impacts to grizzly bears under this alternative are similar to the Current Management alternative. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears as a result of this alternative. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.	There are no mitigation/design features in this alternative that minimize impacts to the grizzly bear or impact the grizzly. Impacts to grizzly bears under this alternative are similar to the Current Management and Proposed Action alternatives, as there is still a 9 pasture rest rotation system in place, however additional rest was added to the Tenmile pasture. This pasture will only be grazed once every three years which will reduce the area that is grazed by livestock in any given year than the other action alternatives. This may further reduce the potential for future grizzly bear/livestock conflicts in these allotments when compared to the other action alternatives. Direct impacts to grizzly bears could still occur if management actions need to be implemented against nuisance or habituated bears as a result of this alternative. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.

Table 10: Direct, Indirect, and Cumulative Effects to Grizzly Bears by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Fishtrap	Not all grizzly bears that come in contact with cattle make kills; however, conflicts between livestock and grizzly bears can and do occur, which can result in management actions. These actions include hazing and harassment, relocation, or euthanization, a direct impact to the species. The Fish Trap allotment under this alterative includes a grazing system that does not include rest of the allotment or a pasture as it is under a deferred rotation. Presence of livestock in this entire allotment annually exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area.	Impacts to grizzly bears under this alternative are similar to the Current Management alternative. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears as a result of this alternative. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.	There are no mitigation/design features in this alternative that minimize impacts to the grizzly bear or impact the grizzly.Impacts to grizzly bears under this alternative are less than the Current Management and the Proposed Action, as there is still a 2 pasture deferred rotation system in place, however the entire allotment will be rested 1 year in 3. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to the other action alternatives. Direct impacts to grizzly bears could still occur in the years where cattle are present if management actions need to be implemented against nuisance or habituated bears. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.
Mudd Creek	This allotment under this alterative includes a grazing system that does not include rest of the allotment or a pasture as it is under a single pasture deferred rotation. Presence of livestock in this entire allotment annually exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area.	The effects under this allotment are the same as the Current Grazing Alternative	There are no mitigation/design features in this alternative that minimize impacts to the grizzly bear or impact the grizzly. Impacts to grizzly bears under this alternative are less than Alternate 2 and 3 above, as there is still a 1 pasture deferred rotation system in place, however the entire allotment will be rested 1 year in 3. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to the other action alternatives. Direct impacts to grizzly bears could still occur in the years where cattle are present if

Table 10: Direct, Indirect, and Cumulative Effects to Grizzly Bears by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
			management actions need to be implemented against nuisance or habituated bears. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.
Pintlar Creek	This allotment under this alterative includes a grazing system that does not include rest of the allotment or pasture as it is under a single pasture partly deferred rotation. Presence of livestock in this entire allotment annually exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area	The effects under this alternative are similar as the Current Grazing Alternative above however every other year the pasture will have a deferred entry. This change in the grazing system does not have any additional effect to the grizzly bear as livestock would remain present in the allotment and pasture annually	There are no mitigation/design features in this alternative that minimize impacts to the grizzly bear or impact the grizzly. Impacts to grizzly bears under this alternative are less than the Current Management or Proposed Action alternatives, as there is still a 1 pasture deferred rotation system in place; however the entire Pintlar Meadow portion of the allotment will be rested for a minimum of 10 years. Additionally there is a special area location that will be grazed 1 out of 3 years. This will reduce the area that is grazed by livestock annually which will further reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to the other action alternatives. Direct impacts to grizzly bears could still occur in the years where cattle are present if management actions need to be implemented against nuisance or habituated bears. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area
Mussigbrod	This allotment under this alterative includes a grazing system that does not include rest of the allotment or pasture as it is under a single pasture deferred rotation. Presence of livestock in this entire allotment annually exposes grizzly bears to an unnatural food source and modifies the habitat	Impacts to grizzly bears under this alternative are less than the Current Management Alternative , as there is still a 2 pasture deferred rotation system in place, however the entire allotment will be rested 1 year in 3. This will reduce the area that is grazed by livestock during the rest year which will	There are no mitigation/design features in this alternative that minimize impacts to the grizzly bear or impact the grizzly. Impacts to grizzly bears under this alternative are less than the Current Management Alternative and the Proposed Action Alternative, as there is still a deferred rotation

Table 10: Direct, Indirect, and Cumulative Effects to Grizzly Bears by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	that is available to them. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area	further reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to the other action alternatives. Direct impacts to grizzly bears could still occur in the years where cattle are present if management actions need to be implemented against nuisance or habituated bears. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.	system in place; however the entire Bender Pasture portion of the allotment will be rested for a minimum of 10 years, resulting in a 1 pasture deferred rotation. Additionally the entire pasture will be rested 1 year out of 3. This will reduce the area that is grazed by livestock annually which will further reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to the other action alternatives. Direct impacts to grizzly bears could still occur in the years where cattle are present if management actions need to be implemented against nuisance or habituated bears. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area
Ruby Creek	This allotment under this alterative includes a grazing system that does not include rest of the allotment or pasture as it is under a 3 pasture deferred rotation with Butler pasture grazed season long for horses. Presence of livestock in this entire allotment annually exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area	Impacts to grizzly bears under this alternative are less than the Current Management Alternative, as there is still a 3 pasture deferred rotation system in place, however Butler pasture will be rested 1 year out of 3. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to the other action alternatives. Direct impacts to grizzly bears could still occur in the years where cattle are present if management actions need to be implemented against nuisance or habituated bears. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the	There are no mitigation/design features in this alternative that minimize or reduce impacts to the grizzly bear. Impacts to grizzly bears under this alternative are the same as the Proposed Action Alternative above, as there is still a 3 pasture partially deferred rotation system in place with the Butler pasture rested 1 year out of 3. Under this alternative entry into Cow Creek pasture would be deferred to August 1 every year however the measure for this species is the number of active allotments and pastures, which will remain the same.

Table 10: Direct, Indirect, and Cumulative Effects to Grizzly Bears by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
		analysis area	
Dry Creek	This allotment under this alterative includes a grazing system that does not include rest of the allotment or pasture as it is under a 2 pasture deferred rotation. Presence of livestock in this entire allotment annually exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area.	Impacts to grizzly bears under this alternative are less than the Current Management Alternative, as there is still a 2 pasture deferred rotation system in place, however the entire allotment will be rested 1 year out of 3. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to the other action alternatives. Direct impacts to grizzly bears could still occur in the years where cattle are present if management actions need to be implemented against nuisance or habituated bears. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.	There are no mitigation/design features in this alternative that minimize or reduce impacts to the grizzly bear. Impacts to grizzly bears under this alternative are the same as the Proposed Action Alternative, as there is still a 2 pasture partially deferred rotation system in place with the entire allotment rested 1 year out of 3.
Twin Lakes	Both the Big Lake and Little Lake pastures in this alternative operate under a 2 pasture grazing system. The Big Lake pastures operate a 2 pasture deferred system while the Little Lake pastures utilize modified rest rotation with rest 2 years out of 6. Minimizing the area that is grazed by livestock in this allotment annually may reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to not including rest (a time when livestock is not in certain areas). Presence of livestock in this allotment exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to grizzly bears could occur if	Both the Big Lake and Little Lake pastures in this alternative operate under a 2 pasture grazing system, however both areas will operate under a modified rest schedule with rest 2 years out of 6. This will reduce the area that is grazed by livestock in this allotment annually when compared to the Current Management Alternative; which may reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to not including rest (a time when livestock is not in certain areas). Presence of livestock in this allotment exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to grizzly bears could occur if	There are no mitigation/design features in this alternative that minimize or reduce impacts to the grizzly bear. This allotment under this alternative is the same as the Proposed Action; therefore the effects are the same.

Table 10: Direct, Indirect, and Cumulative Effects to Grizzly Bears by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area.	management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area.	
Monument	This allotment under this alterative includes a grazing system that does not include rest of the allotment or a pasture as it is under a 2 pasture deferred rotation. Presence of livestock in this entire allotment annually exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area.	Impacts to grizzly bears under this alternative are similar to the Current Management Alternative because this alternative proposed the same grazing system. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears as a result of this alternative. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.	There are no mitigation/design features in this alternative that minimize or reduce impacts to the grizzly bear. Impacts to grizzly bears under this alternative are less than the Current Management Alternative and the Proposed Action Alternative, as there is still a 2 pasture deferred rotation system in place, however the entire allotment will be rested 1 year in 4. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to the other action alternatives. Direct impacts to grizzly bears could still occur in the years where cattle are present if management actions need to be implemented against nuisance or habituated bears. However, the likelihood of this is low due to the extensive history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.
Pioneer	This allotment under this alterative includes a grazing system that does not include rest of the allotment or a pasture as it is under a 3 pasture deferred rotation. Presence of livestock in this entire allotment annually exposes grizzly bears to an unnatural food source and modifies the habitat that is available to them. Direct impacts to grizzly bears could occur if management actions need to	Impacts to grizzly bears under this alternative are similar to the Current Management Alternative because this alternative proposed the same grazing system. Direct impacts to grizzly bears could occur if management actions need to be implemented against nuisance or habituated bears as a result of this alternative. However, the likelihood of this is low due to the extensive	There are no mitigation/design features in this alternative that minimize or reduce impacts to the grizzly bear. Impacts to grizzly bears under this alternative are less than the Current Management or the Proposed Action Alternative, as there is still a 3 pasture deferred rotation system in place, however the entire allotment will be rested 1 year in 4. This will reduce the area that is grazed by

Table 10: Direct, Indirect, and Cumulative Effects to Grizzly Bears by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	be implemented against nuisance or habituated bears. The likelihood of this is low due to the extensive history of cattle in this allotment with no history of bear depredation and grizzly bears are not known in the analysis area.	history of cattle in these allotments with no history of bear depredation and grizzly bears are not known in the analysis area.	livestock during the rest year which will further reduce the potential for future grizzly bear/livestock conflicts in this allotment when compared to the other action alternatives. Direct impacts to grizzly bears could still occur in the years where cattle are present if management actions need to be implemented against nuisance or habituated bears. However, the likelihood of this is low due to the extensive history of cattle in these. allotments with no history of bear depredation and grizzly bears are not known in the analysis area.
Saginaw	Not all grizzly bears that come in contact with cattle make kills; however, conflicts between livestock and grizzly bears can and do occur, which can result in management actions. These actions include hazing and harassment, relocation, or euthanization, a direct impact to the species. This allotment in this alternative is grazed under a 4 pasture rest rotation, which incorporates a period of time where there are not cattle in each of the pastures. This reduces the area that cattle are distributed, which may reducethe potential that grizzly bears would come in contact with an unnatural food source and may potentially reduce the probability of future grizzly bear/livestock conflicts. Reducing the potential for grizzly bear/ livestock conflicts would have a beneficial impact on the species, however at the population level, allotments with no history of bear depredation and grizzly bears are not known in the analysis area.	This alternative has the same proposal of this allotment as the Current Grazing alternative; therefore the effects are the same.	There are no mitigation/design features in this alternative that minimize impacts to the grizzly bear or impact the grizzly. This alternative has the same grazing system proposal in this allotment as the Current Grazing and Proposed Action alternative; therefore the effects are the same
Cumulative Effects For All	There are a multitude of past, present and future actions activities in the analysis when considered with this alternative that have the potential to or	The cumulative effects to grizzly bears from this alternative is similar to the Current Management Alternative, however slightly less negative due to	The cumulative effects to grizzly bears from this alternative is similar to the Current Management Alternative and the Proposed Action Alternative,

Table 10: Direct, Indirect, and Cumulative Effects to Grizzly Bears by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Allotments	are currently negatively affecting the grizzly bear and grizzly bear habitat (Table 7above). A majority of these effects are from the use of the road network in the area, recreation at numerous developed recreation sites and the presence of private inholdings and neighboring private property that have dispersed recreation, livestock grazing and vegetation management. The effects to grizzly bear and grizzly bear habitat from these actions include potential disturbance or displacement due to human presence, motorized use and other mechanized equipment, presence of livestock (an unnatural food source), change in forested condition classes (depending on type of timber harvest), potential hunting related grizzly bear/human conflicts and potential access to unnatural food sources (human food, garbage, beehives, etc…) All of these activities have the potential to impact grizzly bears and/or grizzly bear habitat in the analysis area. The presence of these activities may lead grizzly bears to avoid otherwise suitable habitat and may increase the potential for management removal or grizzly bear mortality. Livestock grazing as proposed under this alternative, when compared to these past, present and future actions mentioned above, will add negative cumulative effects to grizzly bears in the analysis area by increasing the potential for management removal from livestock depredation. The likelihood of this is low due to the extensive history of cattle in these allotments with no conflicts and grizzly bears are not known in the project area. Additionally, the analysis area is not	the increased rest which results in a smaller area grazed by livestock in 6 of the 11 allotments. All of the activities listed in the Current Management Alternative cumulative effects analysis have the potential to impact grizzly bears and/or grizzly bear habitat in the analysis area. The presence of these activities may lead grizzly bears to avoid otherwise suitable habitat and may increase the potential for management removal or grizzly bear mortality. Livestock grazing as proposed under this alternative, when compared to these past, present and future actions mentioned above, will add negative cumulative effects to grizzly bears in the analysis area by increasing the potential for management removal from livestock depredation, however less than the Current Management Alternative. The likelihood of this is low due to the extensive history of cattle in these allotments with no conflicts and grizzly bears are not known in the project area. Additionally, the analysis area is not within the Recovery Zone for the Yellowstone DPS or within the NCDE, the habitat that was identified to specifically to provide enough habitat to maintain viable grizzly bear populations. The Biological Opinion from the USFWS in May, 2013 analyzed the effects of the 2009 revision of the Beaverhead-Deerlodge National Forest Land and Resource Management Plan (Revised Forest Plan) on grizzly bears. Actions analyzed included livestock grazing management projects such as this one proposed. It described key areas of Forest management that affect the grizzly bears' environment, mainly:	however less negative due to the increased rest in all 11 allotments, which results in a smaller area grazed by livestock. All of the activities listed in the Current Management Alternative and the Proposed Action Alternative cumulative effects analysis have the potential to impact grizzly bears and/or grizzly bear habitat in the analysis area under this alternative. The presence of these activities may lead grizzly bears to avoid otherwise suitable habitat and may increase the potential for management removal or grizzly bear mortality. Livestock grazing as proposed under this alternative, when compared to these past, present and future actions mentioned above, will add negative cumulative effects to grizzly bears in the analysis area by increasing the potential for management removal from livestock depredation, however less than the Current Management Alternative . The likelihood of this is low due to the extensive history of cattle in these allotments with no conflicts and grizzly bears are not known in the project area. Additionally, the analysis area is not within the Recovery Zone for the Yellowstone DPS or within the NCDE, the habitat that was identified to specifically to provide enough habitat to maintain viable grizzly bear populations. The Biological Opinion from the USFWS in May, 2013 analyzed the effects of the 2009 revision of the Beaverhead-Deerlodge National Forest Land and Resource Management Plan (Revised Forest Plan) on grizzly bears. Actions analyzed included livestock grazing management projects such as this one proposed. It described key areas of Forest

Table 10: Direct, Indirect, and Cumulative Effects to Grizzly Bears by Allotment by Alternative			
Allotment	**Current Grazing Management Alternative**	**Proposed Action Alternative**	**Alternative 4**
	within the Recovery Zone for the Yellowstone DPS or within the NCDE, the habitat that was identified to specifically to provide enough habitat to maintain viable grizzly bear populations. The Biological Opinion (BO) from the USFWS in May, 2013 analyzed the effects of the 2009 revision of the Beaverhead-Deerlodge National Forest Land and Resource Management Plan (Revised Forest Plan) on grizzly bears. Actions analyzed included livestock grazing projects such as this one proposed. The BO described key areas of Forest management that affect the grizzly bears' environment, mainly: access management, attractant management and developed sites, livestock management, vegetation management, fire management, and oil and gas leasing. Livestock management has the potential to result in adverse impacts to grizzly bears if livestock/grizzly bear conflicts occur. The USFWS concluded that implementing the Revised Forest Plan would not have negative effects on the status of the Yellowstone or NCDE grizzly bear populations (USDI FWS 2013, p. 74).	access management, attractant management and developed sites, livestock management, vegetation management, fire management, and oil and gas leasing. Livestock management has the potential to result in adverse impacts to grizzly bears if livestock/grizzly bear conflicts occur. The USFWS concluded that implementing the Revised Forest Plan would not have negative effects on the status of the Yellowstone or NCDE grizzly bear populations (USDI FWS 2013, p. 74).	management that affect the grizzly bears' environment, mainly: access management, attractant management and developed sites, livestock management, vegetation management, fire management, and oil and gas leasing. Livestock management has the potential to result in adverse impacts to grizzly bears if livestock/grizzly bear conflicts occur. The USFWS concluded that implementing the Revised Forest Plan would not have negative effects on the status of the Yellowstone or NCDE grizzly bear populations (USDI FWS 2013, p. 74).

Canada Lynx

Canada Lynx Habitat in the Analysis Area

The allotments in the project are located throughout 26 Lynx Analysis Units (LAUs) and a majority of each allotment is mapped as lynx general habitat. As mentioned previously, livestock grazing has the potential to change, reduce or eliminate snowshoe hare habitat in aspen, willows and riparian areas. Grazing may change plant composition where shrubs provide cover and connectivity between blocks of lynx habitat. These shrub-steppe habitats provide forage for lynx prey as well as cover for lynx movement. Livestock grazing does not impact multi-storied, mature spruce-fir forests therefore impacts to this mapped lynx habitat will not be analyzed in detail.

As mentioned previously, livestock grazing has the potential to change, reduce or eliminate snowshoe hare habitat in aspen, willows and riparian areas. Grazing may change plant composition where shrubs provide cover and connectivity between blocks of lynx habitat. These shrub-steppe habitats provide forage for lynx prey as well as cover for lynx movement. Impacts to other aspects of lynx natural history or habitat are not analyzed in detail because livestock grazing is not suspected to impact these aspects of lynx habitat or biology. Livestock grazing does not impact multi-storied, mature spruce-fir forests therefore impacts to this mapped lynx habitat will not be analyzed in detail.

Spatial and Temporal Bounds for Canad Lynx

The spatial bounds for this lynx analysis are the 26 LAUs where the allotments are located. The temporal bound of this analysis is 10 years. Long term impacts to species will generally be considered the life of the proposal, which is 10 years because disturbance to the species analyzed would be underestimated if a longer timeframe is used. Impacts from the alternatives could be underestimated as forage regrows annually and succession naturally occurs which could obscure the effects of grazing on wildlife species within the allotments using a longer timeframe. Additionally, 10 years is the life of the decision when made, and impacts to species and habitat analyzed in the project have the potential to change after the life of the project.

A summary of the effects by allotment by Resource Indicator and Unit of Measure and by alternative can be found in tables 11 and 12 below.

The direct, indirect, and cumulative effects by alternative, is disclosed in the tables 13 and 14 below for the Canada Lynx.

Table 11: Summary for Canada Lynx of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative Resource Indicator and Units of Measure**			**Current Grazing Management Resource Indicator and Units of Measure**		
	Species composition of upland sites	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**	**Species composition of upland sites**	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**
Seymour	Most rapid improvement	Most rapid improvement	Static	Slow improving trend	Slow improving trend	Static
Fishtrap	More rapid improvement	More rapid improvement	Localized increases, but overall static	Static to very slow improvement	Static to very slow improvement	Static
Mudd Creek	More rapid improvement	More rapid improvement	Localized increases, as sites move towards higher ecological status	Static to very slow improvement	Static to very slow improvement	Static
Pintlar Creek	More rapid improvement	More rapid improvement	Static overall, potential increases in Pintler Meadows	Static to downward trend	Static to downward trend	Static
Mussigbrod	More rapid improvement	More rapid improvement	Static overall, increases in Bender Pasture and areas burned in the 2000 Mussigbrod fire	Static trend	Static trend	Increases in burned sites, mostly static overall
Ruby Creek	Most rapid improvement	Most rapid improvement	Some potential for increased cover	Static trend	Static trend	Static

Table 11: Summary for Canada Lynx of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative Resource Indicator and Units of Measure**			**Current Grazing Management Resource Indicator and Units of Measure**		
	Species composition of upland sites	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**	**Species composition of upland sites**	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**
Dry Creek	Most rapid improvement	Most rapid improvement	Some potential for increased cover, overall static	Slow to improvement	Static	Static
Twin Lakes	Most rapid improvement	Most rapid improvement	Some potential for increased cover, overall static	Slow improvement	Slow improvement	Static, but continue to decline in coniferous sites
Monument	Most rapid improvement	Most rapid improvement	Some potential for increased cover, overall static	Little to no change	Slow improvement	Mostly static
Pioneer	Most rapid improvement	Most rapid improvement	Mostly static	Little to no change	Little to no change	Mostly static
Saginaw	Most rapid improvement	Some potential for improvement	Appreciable increases over time	Little to no change	Little to no change	Mostly static

Table 12: Summary for Canada Lynx of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**			**Alternative 4 Resource Indicator and Units of Measure**		
	Species composition of upland sites	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**	**Species composition of upland sites**	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**
Seymour	Slow but potentially more rapid improving trend	Slow but potentially more rapid improving trend	Static	Slow but potentially more rapid improving trend	Slow but potentially more rapid improving trend. Improvement may occur at a faster rate in Tenmile pasture	Static
Fishtrap	Slow improvement	Slow improvement	Static	Potential for more rapid improvement	Potential for more rapid improvement	Potential for localized increases
Mudd Creek	Slow improvement	Slow improvement	Some potential for increase in willow cover, overall static	Potential for more rapid improvement	Potential for more rapid improvement	Greater potential for localized increases in willow
Pintlar Creek	Slow improvement	Slow improvement	Static	Slow improvement	Potential for rapid improvement in Pintler Meadows	Greater potential for increases in willow in Pintler Meadows

Table 12: Summary for Canada Lynx of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**			**Alternative 4 Resource Indicator and Units of Measure**		
	Species composition of upland sites	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**	**Species composition of upland sites**	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**
Mussigbrod	Slow improvement	Slow improvement	Increases in burned sites and exclosure site, mostly static overall	Slow improvement	Potential for rapid improvement in Pintler Meadows	Greater potential for increases in willow in Bender pasture and burned areas, mostly static overall
Ruby Creek	Static	Static	Static	Potential for some improvement	Potential for some improvement	Static
Dry Creek	Potential for faster rate of improvement	Potential for faster rate of improvement	Some potential for increased cover, overall static	Potential for faster rate of improvement	Potential for faster rate of improvement	Some potential for increased cover, overall static
Twin Lakes	Potential for faster rate of improvement	Potential for faster rate of improvement	Potential for increased cover, overall static	Potential for faster rate of improvement	Potential for faster rate of improvement	Potential for increased cover, overall static
Monument	Little to no change	Potential for faster rate of improvement	Mostly static	Potential for faster rate of improvement	Potential for faster rate of improvement	Mostly static

Table 12: Summary for Canada Lynx of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**			**Alternative 4 Resource Indicator and Units of Measure**		
	Species composition of upland sites	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**	**Species composition of upland sites**	**Species Composition of Riparian Sites**	**Riparian Shrub Cover**
Pioneer	Little to no change	Little to no change	Mostly static	Potential for faster rate of improvement	Potential for faster rate of improvement	Mostly static
Saginaw	Little to no change	Little to no change	Mostly static	Potential for faster rate of improvement	Potential for faster rate of improvement	Mostly static

Table 13: No Action Alternative Direct/Indirect. And Cumulative Effects for Canada Lynx by Allotment

Allotments	Direct/Indirect and Cumulative Effects for Canada Lynx
Seymour	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, upland sites in this allotment show that some important grass species were below desired amounts and riparian sites had high cover and frequency of native species; however the composition of some species were below desired amounts. Additionally, important riparian shrubs were below desired amounts expected for this type, but within the range of variability expected. Improving species composition under this alternative would maintain and improve available lynx foraging habitat and improve cover in valuable travel corridors which would benefit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area.
Fishtrap	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, upland sites in this allotment show that upland sites were meeting desired conditions for species composition. Species composition for riparian sites was unknown however there is an apparent trend towards desirable shrubs and grasses based on photo point monitoring. Improving species composition under this alternative would maintain and improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benefit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area. Riparian shrub cover is anticipated to remain mostly static for the long term and is currently showing a trends towards increased shrub cover.
Mudd Creek	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, upland sites in this allotment show that upland sites were meeting desired conditions for species composition. Species composition for riparian sites was unknown however there is an apparent trend towards desirable shrubs and grasses based on photo point monitoring. Improving species composition under this alternative would maintain and improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area. Riparian shrub cover is anticipated to remain mostly static for the long term and is currently showing a trend towards increased shrub cover.
Pintlar Creek	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, upland sites in this allotment show that upland sites were meeting desired conditions for species composition. Species composition for riparian sites was unknown however there is an apparent trend towards desirable shrubs and grasses based on photo point monitoring. Improving species composition under this alternative would maintain and improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. Riparian shrub cover is anticipated to remain mostly static in the long term and may increase locally in Pintlar Meadows and is currently showing a trend towards increased shrub cover.This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area.

Table 13: No Action Alternative Direct/Indirect. And Cumulative Effects for Canada Lynx by Allotment

Allotments	Direct/Indirect and Cumulative Effects for Canada Lynx
Mussigbrod	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, upland sites in this allotment show an apparent trend away from desirable species composition. Species composition for riparian sites was meeting desired composition for grasses and sedges but shrub composition was low. Improving species composition under this alternative would improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area. With the exception of the areas burned in the Mussigbrod Riparian shrub cover is anticipated to remain mostly static for the long term and is currently showing a trend towards increased shrub cover. Shrub cover in areas burned in the Mussigbrod fire is considered to be very low but will continue to recover in this alternative. These effects are expected to be beneficial however small to lynx habitat as lynx and are not known to occupy the BDNF or the project area.
Ruby Creek	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, upland sites in this allotment show an apparent trend away from desirable species composition. Species composition for riparian sites was meeting desired composition. Improving species composition under this alternative would improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area. Riparian shrub cover is considered to be below desired conditions. Removal of livestock impacts would likely result in some increased cover over time. These effects are expected to be beneficial however small to lynx habitat as lynx and are not known to occupy the BDNF or the project area.
Dry Creek	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, upland sites in this allotment show that upland sites were meeting desired conditions for species composition. Species composition for riparian sites was not meeting desired conditions. Riparian shrub cover was considered to be well below desired amounts. Overtime, riparian shrub cover is expected to increase in areas. Overall the percent cover would remain mostly static for the long term. Improving species composition under this alternative would improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area.
Twin Lakes	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, upland sites in this allotment show that upland sites were meeting desired conditions for species composition. Species composition for riparian sites is either forested or trending towards a more forested plant community. This alternative would result in a trend towards desirable species composition and would maintain and improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area. Riparian shrub cover is anticipated to decline due to an increase in conifer cover and trend towards a more forested plant community. Nonforested riparian sites are expected to increase in willow cover. Increasing cover and maintaining riparian vegetation providing late successional vegetation habitat will benifit transient lynx travel corridor habitat and foraging habitat over time.

Table 13: No Action Alternative Direct/Indirect. And Cumulative Effects for Canada Lynx by Allotment

Allotments	Direct/Indirect and Cumulative Effects for Canada Lynx
Monument	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, upland sites in this allotment show an apparent trend away from desirable species composition. Species composition for riparian sites was meeting desired composition for grasses and sedges but shrub composition was low. Improving species composition under this alternative would improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area. Riparian shrub cover is considered below desired levels and under this alternative would likely increase over time. These effects are expected to be beneficial however small to lynx habitat as lynx are not known to occupy the BDNF or the project area.
Pioneer	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, composition on upland sites is meeting desired conditions overall however there was a trend towards increased desirable species. Sampled riparian areas are considered to have high frequency and cover of desired plants however cover for willow is well below desired levels. This is thought to be a result of site characteristics or misclassification of the habitat types and not livestock related. Therefore, this alternative would not change cover from existing conditions. Improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas would have beneficial effects to lynx foraging and travel corridor habitat by enhancing these habitats over time. These effects to lynx are expected to be small as lynx are not known to occupy the BDNF or the project area.
Saginaw	Under this alternative, forage plants would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term for upland and riparian areas. Currently, composition on upland sites is meeting desired conditions overall. Sampled riparian areas are considered be meeting desired levels. Shrub cover in riparian areas for willows was below desired amounts and removal of livestock would result in increased shrub cover over time. Improved vigor, seed production increase trend in desirable species composition and riparian shrub in the long term would have beneficial effects to lynx foraging and travel corridor habitat by enhancing these habitats over time. These effects to lynx are expected to be small as lynx are not known to occupy the BDNF or the project area.
Cumulative Effects For All Allotments	There are multiple past, present and reasonably foreseeable actions in the analysis area that have the potential to impact transient Canada lynx, lynx secondary/peripheral habitat and snowshoe hare habitat. These are vegetation management projects, wildfire, insect and disease outbreak, livestock grazing, private land development, and human interactions associated with roads such as poaching, trapping or vehicle collisions. Of the 26 LAUs in the analysis area, a majority of the habitat lynx secondary/peripheral habitat and snowshoe hare habitat is found on Forest Service ownership, minimizing the impact of activities on private land on this habitat. Additionally, the lynx habitat present is classified as both unoccupied and secondary lynx habitat indicating it has minimal value of lynx, other than dispersing or transient individuals. Since there are no actions in this alternative, this alternative is not expected to add cumulative effects to this species or habitat.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Seymour	Continued implementation of cooperative grazing management on the Seymour allotment and MTFWP lands is expected to result in a slow improving trend in species composition on upland and riparian sites. Livestock grazing effects to shrubs, such as willow, would be negligible and the composition of these plants is expected to remain mostly static for the long term. Localized impacts to willow cover will remain. Maintaining current condition of the allotment would have slight negative effects to lynx foraging and travel corridor habitat as current condition is somewhat below desired condition for riparian shrubs. Riparian shrub cover is not expected to change over time, which will maintain the current condition which is slightly less than desired.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Effects to vegetation and therefore lynx foraging and travel corridor habitat are expected to be very similar to the Current Grazing alternative.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Effects to vegetation and therefore lynx foraging and travel corridor habitat are expected to be very similar to the Current Grazing alternative above; however this alternative would likely result in less livestock use within the Forest Service's Tenmile pasture. This could potentially result in improved species composition on riparian sites within this pasture. This alternative would have the greatest positive effect on lynx foraging and travel corridor habitat than the other action alternatives.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Fishtrap	Continued implementation of the current grazing management alternative is expected to result in a very slow improving trend in species composition on upland sites and maintain existing conditions on riparian sites. Shrub cover on riparian sites is not expected to change appreciable in the long term, except in localized areas such as the Swamp Creek RPP site. Improving or maintaining species composition and shrub cover under this alternative would maintain and slightly improve available lynx foraging habitat and improve cover in valuable riparian travel corridors in the allotment which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Effects to vegetation and therefore lynx foraging and travel corridor habitat are expected to be very similar to the Current Grazing alternative.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Effects to vegetation and therefore lynx foraging and travel corridor habitat are expected to be very similar to the Current Grazing alternative above; however this alternative would likely result in more rapid recovery of upland and riparian sites that are in less than desirable condition. This could potentially result in improved species composition and shrub cover on riparian sites which would have the greatest positive effect on lynx foraging and travel corridor habitat than the other action alternatives.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Mudd Creek	This alternative is expected to result in a static condition trend for species composition however the current single-pasture deferred grazing strategy is not expected to provide for adequate plant development and reproduction on some upland and riparian areas. Shrub cover on riparian sites is not expected to change from current conditions which show an increase in willows in some areas of the allotment. This increase is not expected to continue under this alternative. This would likely have negative effects to lynx foraging habitat and travel corridor habitat over time. However this effect is expected to be small as lynx are not known to occupy the BDNF or the project area	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Effects to vegetation and therefore lynx foraging and travel corridor habitat are expected to be similar to the Current Grazing alternative, however slightly less due to design features in this alternative.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Effects to vegetation and therefore lynx foraging and travel corridor habitat are expected to be very similar to the Current Grazing alternative above; however this alternative would likely result in more rapid recovery of upland and riparian sites that are in less than desirable condition. This could potentially result in improved species composition and shrub cover on riparian sites which would have the greatest positive effect on lynx foraging and travel corridor habitat than the other action alternatives

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Pintlar Creek	This alternative is expected to result in a static condition trend for species composition however the current single-pasture deferred grazing strategy is not expected to provide for adequate plant development and reproduction on some upland and riparian areas. Shrub cover on riparian sites is not expected to change from current conditions. This would likely have negative effects to lynx foraging habitat and travel corridor habitat over time. This effect is expected to be small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Effects to vegetation and therefore lynx foraging and travel corridor habitat are expected to be slightly less negative due to design features in this alternative to the Current Grazing alternative.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. With the exception of Pintler Meadows, effects would be similar to the Proposed Action alternative. Pintler Meadows in this alternative would be closed to livestock grazing for a minimum of 10 years. This would potentially result in more rapid improvement of riparian shrubs than the other action alternatives. This would have greater positive effects to lynx travel corridor habitat over time than the other action alternatives.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Mussigbrod	Implementation of this alternative is expected to result in little improvement to current species composition and is likely to result in continued impacts to vegetation that maintains less than desirable species composition in some riparian areas. Shrub cover would continue to increase in the Mussigbrod fire area; however unburned sites would have little change. This would likely have negative effects to lynx foraging habitat and travel corridor habitat over time. This effect is expected to be small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. This alternative is expected to lead to a more rapid rate of vegetation recovery on upland and riparian sites when compared to current management. Incorporation of Allowable Use Levels, a reduction in season of use and incorporation of a rest year would result in improved species composition. Conversion of temporary exclosure fence into permanent fence is also expected to result in faster recovery through greater protection of riparian sites that are currently in less than desirable condition. This is likely to result in increased shrub cover on these sites which would have positive effects to lynx travel corridor habitat and foraging habitat over time. This effect is expected to be small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. This alternative would provide for a faster rate of recovery than the other action alternatives. Proposed rest of the Bender pasture combined with a single pasture modified rest rotation would substantially reduce the intensity and duration of livestock grazing and would allow for substantial improvement in species composition and willow cover. Improving the quality of this habitat over time would have positive effects to lynx foraging and travel corridor habitat when compared to the other action alternatives. This effect is expected to be unmeasurable as lynx are not known to occupy the BDNF or the project area.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Ruby Creek	This alternative is expected to result in a static condition trend for species composition however the current 2-pasture deferred grazing strategy is not expected to provide for adequate plant development and reproduction on some upland and riparian areas. Shrub cover on riparian sites is not expected to change. This would likely have negative effects to lynx foraging habitat and travel corridor habitat over time.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. This alternative is expected to result in little change to existing conditions. However complete rest of the Butler pasture one year out of three would be expected to improve species composition where needed. Maintaining and improving the quality of this habitat overtime would have positive effects to lynx foraging and travel corridor habitat when compared to the current management alternatives. This effect is expected to be small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. This alternative is expected to provide better grazing deferment to plants and improve plant vigor. This would result in an improvement in species composition in the long term in upland and riparian areas. Improving the quality of this lynx habitat overtime would have positive effects to lynx foraging and travel corridor habitat when compared to the other action alternatives. This effect is expected to be small as lynx are not known to occupy the BDNF or the project area.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Dry Creek	This alternative is expected to result in a slow improving trend in desirable species composition on upland sites and maintain existing conditions on riparian sites. This would have static effects to lynx travel corridor habitat as the current species composition for riparian sites was not meeting desired objectives. Shrub cover under this alternative is expected to maintain mostly static over time. This would have negative impacts on lynx foraging and travel corridor habitat as the current condition is well below desired amounts. This effect is expected to be small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. This alternative is expected to result in greater improvements to rangeland health on upland and riparian sites than the current management alternative. Incorporation of a rest year and AUL's would allow for improved plant vigor which would improve species composition over time. Isolated areas such as lower Big Lake Creek would see an increase in riparian shrub cover, however overall shrub cover would remain static. Improving species composition and cover under this alternative would improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Direct and indirect effects are similar as the Proposed Action alternative.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Twin Lakes	Implementation of this alternative is expected to result in little to no change to species composition and it is expected that a trend towards less desirable forage species would continue to occur within the Big Lake portion of the allotment. This may have negative impacts to lynx foraging habitat by reducing the quality of the habitat for prey. The Little Lake portion is expected to maintain existing conditions or possibly result in a slow improving trend in desirable species composition. Maintaining plant vigor, species composition and forb availability will have positive effects lynx foraging and travel corridor habitat. Species composition for riparian sites is largely unknown however little change in the Big Lake portion of the allotment and a possible improving trend on the Little Lake portion is expected over time. Forested plant communities continue to increase in riparian areas and this is expected to continue under this alternative. Natural succession of this habitat is not expected to have negative impacts to lynx. Negative and beneficial impacts to lynx habitat from change in species composition as mentioned above are expected to be small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. This alternative is expected to result in greater improvements to rangeland health on upland and riparian sites than the current management alternative. Incorporation of rest periods and AUL's would allow for improved plant vigor which would improve species composition over time. Shrub cover has the potential for a faster rate of improvement. Improving species composition under this alternative would improve available lynx foraging habitat in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Direct and indirect effects are similar as the Proposed Action alternative.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Monument	This alternative is expected to result in a static trend in desirable species composition on upland and on riparian sites. This would have positive effects to lynx travel corridor habitat as the current species composition for riparian sites was meeting desired objectives. Shrub cover under this alternative is expected to maintain mostly static over time. This would have negative impacts on lynx foraging and travel corridor habitat as the current condition is well below desired amounts. This effect is expected to be small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Direct and indirect effects are similar as the Current Grazing alternative.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. This alternative is expected to result in greater improvements to rangeland health on upland and riparian sites than the other action alternatives. Incorporation of a rest year and AUL's would allow for improved plant vigor which would improve species composition over time. Improving species composition under this alternative would improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area. Riparian shrub cover would remain static over time so there would be not increase in negative effects to this habitat.. Negative effects to lynx are expected to be small as lynx are not known to occupy the BDNF or the project area.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Pioneer	This alternative is expected to result in static species composition trend for upland and riparian sites and static riparian shrub cover. This alternative overall would have beneficial effects to upland and riparian vegetation, however less than the no action alternative, because habitat would be maintained over time. These effects to lynx foraging habitat are expected to be small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Direct and indirect effects are expected to be similar as the Current Grazing alternative.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. This alternative is expected to result in greater improvements to rangeland health on upland and riparian sites than the other action alternatives. Incorporation of a rest year and AUL's would allow for improved plant vigor which would improve species composition over time. Improving species composition under this alternative would improve available lynx foraging habitat and improve cover in valuable riparian travel corridors which would benifit transient lynx. This effect is expected to be beneficial however small as lynx are not known to occupy the BDNF or the project area. Riparian shrub cover would remain static which is currently below desired objectives. This however is likely a result of site characteristics and not livestock impacts so this alternative is not expected to change this variable. Beneficial effects to lynx from enhancing habitat in this alternative are expected to be small as lynx are not known to occupy the BDNF or the project area.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Saginaw	This alternative is expected to result in a static trend in desirable species composition on upland and on riparian sites. This would have positive effects to lynx travel corridor habitat as the current species composition for riparian and upland sites was meeting desired objectives. Shrub cover under this alternative is expected to maintain mostly static over time. Riparian shrub cover would remain static which is currently below desired objectives. This however is likely a result of site characteristics and not livestock impacts so this alternative is not expected to change this variable. Beneficial effects to lynx from maintaining habitat in this alternative are expected to be small as lynx are not known to occupy the BDNF or the project area.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. Direct and indirect effects are expected to be similar as the Current Grazing alternative.	There are multiple design features in this alternative that protect and enhance riparian areas and ensure that when allowable use levels are met, livestock would be moved. All of these design features also benifit transient lynx foraging and travel corridor habitat, which is valuable in lynx secondary/peripheral habitat found in the project area. A list of all project design features for this alternative can be found in Chapter 2 of this DEIS. This alternative is expected to result in some improvements to rangeland health conditions, which may have greater beneficial effects to lynx than the other action alternatives. Specifically, a reduction in the season of use would reduce the duration of livestock grazing effects to vegetation which could lead to improved plant vigor. Improving plant vigor, species composition and forb availability will have greater positive effects to lynx foraging and travel corridor than the other action alternatives. However, implementation of a grazing avoidance period from July 1 through August 25 in Unit 4 would likely result in less grazing deferment for the remaining pasture which could result in potential negative effects to foraging habitat by reducing plant vigor over the long term. Riparian shrub cover is not expected to change over time which would maintain shrub cover, however current cover is low. All effects to lynx in this alternative are expected to be small as lynx are not known to occupy the BDNF or the project area.

Table 14: Direct, Indirect, and cumulative Effects to Canada Lynx by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Cumulative Effects For All Allotments	The cumulative effects are the same for the Current Grazing Management, Proposed Action, and Alternative 4. There are multiple past, present and reasonably foreseeable actions in the analysis area that have the potential to impact Canada lynx, lynx secondary/peripheral habitat and snowshoe hare habitat. These are vegetation management projects, wildfire, insect and disease outbreak, livestock grazing, private land development, and human interactions associated with roads such as poaching, trapping or vehicle collisions. Of the 26 LAUs in the analysis area, a majority of the habitat lynx secondary/peripheral habitat and snowshoe hare habitat is found on Forest Service ownership, minimizing the impact of activities on private land on this habitat. Additionally, the lynx habitat present is classified as both unoccupied and secondary lynx habitat indicating it has minimal value of lynx, other than dispersing or transient individuals. As mentioned previously, livestock grazing as proposed in these action alternatives has the potential to change, reduce or eliminate snowshoe hare habitat in aspen, willows and riparian areas. Grazing may change plant composition where shrubs provide cover and connectivity between blocks of lynx habitat. These shrub-steppe habitats provide forage for lynx prey as well as cover for lynx movement. Project activities in these action alternatives are designed to maintain and enhance snowshoe hare habitats in riparian communities by improving species composition and riparian shrub cover. Under current management however some allotments that are below desired conditions and proposed would maintain these conditions. This could contribute to slight negative cumulative effects to snowshoe hare habitat and lynx movement in the analysis area. Proposed action and Alternative 4 improve composition of species and cover and overall create more available habitat for snowshoe hares. Additionally, project activities do not present movement barriers to transient lynx and all treatments are in compliance with the NRLMD and are not expected to preclude any future us of the area by transient lynx if they should choose to do so. Based on this, these alternatives, when compared to other past present and future actions, are not expected to add measureable negative cumulative effects to Canada lynx, lynx secondary/peripheral habitat or snowshoe hare habitat in the analysis area.		

Gray Wolf

Habitat and Use of Analysis Area

Spatial Bounds of the Analysis Area

The analysis area for grey wolf was selected by the approximate home ranges of the packs that are known to utilize the 11 allotments in this project. Not all home ranges of each pack were known at the time of this analysis, so the Hunting Districts and Game Management Units (Montana and Idaho) where the packs are known to reside were used. This analysis area is large enough to include the pack ranges of the wolves that use the allotments in the project area, but small enough to not obscure the effects of the proposed actions in each allotment.

No Action Alternative For the Gray Wolf

The direct, indirect, and cumulative effects for the gray wolf are the same for all allotmentst under the No Action Alternative.

Direct/Indirect Effects to the Gray Wolf

Under this alternative, grazing would not be authorized in 11 allotments. There would be no impacts to wolves from exposure to unnatural food sources, such as livestock. Eleven fewer allotments would be grazed in the analysis area. This would reduce the number of active allotments in the analysis area, reducing the potential that wolves would come in contact with an unnatural food source and potentially reducing the probability of future wolf/livestock conflicts. Reducing the potential for wolf/ livestock conflicts would have a beneficial impact on the species, and at the local population level, would be measureable. This effect would be a measureable beneficial effect because management removal due to livestock conflicts is one of the major causes of mortality of wolves in this area.

Cumulative Effects to the Gray Wolf

There are a multitude of past, present and future actions activities in the analysis area, in the absence of an action, that have the potential to or are currently negatively affecting the gray wolf and gray wolf habitat. A majority of these effects are from the use of the road network in the area, developed recreation sites and the presence of private inholdings and neighboring private property that have dispersed recreation, hunting and livestock grazing. The effects to the gray wolf and gray wolf habitat from these actions include potential disturbance or displacement due to human presence, motorized use and other mechanized equipment, presence of livestock (an unnatural food source), change in forested condition classes (depending on type of timber harvest) and hunting or management related mortality. All of these activities had or continue to have the potential to impact gray wolves in the analysis area. The presence of these activities may lead gray wolves to avoid otherwise suitable habitat and cause direct mortality. This alternative does not proposed any activities, so there would be no cumulative effects to the gray wolf. However this alternative, when compared to all past, present and reasonably foreseeable actions that impact gray wolves in the analysis area, could benefit this species by reducing potential management removal from livestock conflicts.

Determination for the Gray Wolf

This alternative may have minor ***beneficial impacts*** to grey wolves by removing livestock from the allotments in this analysis area. The wolf packs that utilize the project area have many human related threats to their survival, including livestock grazing throughout the Big Hole, Salmon and Bitterroot Valleys. Reducing the areas that are grazed could reduce the potential that these individuals would come in contact with livestock and may reduce the potential of removal from the population due to livestock depredation. Mortality risks are still high to this species; therefore this beneficial impact may not be measurable.

A summary of the effects to Gray Wolf by allotment, by alternative, by Resource Indicator and Unit of Measure are in tables 15 and 16.

The remaining analysis for gray wolf by allotment by alternative is in Table 17 below. The cumulative effects to the gray wolf are analyzed at a scale larger than the individual allotment. Beause of this, the cumulative effects are analyzed by alternative at the end of Table 17.

Table 15: Summary for Gray Wolf of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative Resource Indicator and Units of Measure**	**Current Grazing Management Alternative Resource Indicator and Units of Measure**
	Change in Secure Habitat as measured by Number of active Allotments and pastures	Change in Secure Habitat as measured by Number of active Allotments and pastures
Seymour	0 Allotment 0 Pastures	1 Allotment 9 Pasture Rest Rotation
Fishtrap	0 Allotment 0 Pastures	1 Allotment 2 Pastures, Deferred Rotation
Mudd Creek	0 Allotment 0 Pastures	1 Allotment 1 Pasture Deferred Rotation
Pintlar Creek	0 Allotment 0 Pastures	1 Allotment 1 Pasture Partly Deferred Rotation
Mussigbrod	0 Allotment 0 Pastures	1 Allotment 2 Pasture Deferred Rotation
Ruby Creek	0 Allotment 0 Pastures	1 Allotment 3 Pasture Partially Deferred Rotation
Dry Creek	0 Allotment 0 Pastures	1 Allotment 2 Pasture Deferred Rotation
Twin Lakes	0 Allotment 0 Pastures	1 Allotment 2 Pasture Deferred Rotation in Big Lake and 2 pasture Modified Rest with rest 2 years out of 6 in Little Lake areas
Monument	0 Allotment 0 Pastures	1 Allotment 2 Pastures, Deferred Rotation
Pioneer	0 Allotment 0 Pastures	1 Allotment 3 Pastures, Deferred Rotation
Saginaw	0 Allotment 0 Pastures	1 Allotment 4 Pastures, Rest Rotation

Table 16: Summary for Gray Wolf of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**	**Alternative 4 Resource Indicator and Units of Measure**
	Change in Secure Habitat as measured by Number of active Allotments and pastures	Change in Secure Habitat as measured by Number of active Allotments and pastures
Seymour	1 Allotment 9 Pasture Rest Rotation	1 Allotment 9 Pasture Rest Rotation with Tenmile pasture only grazed once every 3 years
Fishtrap	1 Allotment 2 Pastures, Deferred Rotation	1 Allotment rested 1 in 3 years 2 Pasture Deferred Rotation
Mudd Creek	1 Allotment 1 Pasture Deferred Rotation	1 Allotment rested 1 in 3 years 1 Pasture Deferred Rotation
Pintlar Creek	1 Allotment 1 Pasture Deferred Rotation every other year	1 Allotment 1 Pasture Deferred Rotation every other year, Entire Pintlar Meadows rested for 10 years
Mussigbrod	1 Allotment	1 Allotment

Table 16: Summary for Gray Wolf of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**	**Alternative 4 Resource Indicator and Units of Measure**
	Change in Secure Habitat as measured by Number of active Allotments and pastures	Change in Secure Habitat as measured by Number of active Allotments and pastures
	2 Pasture Deferred Rotation with complete rest of allotment 1 out of 3 years	1 Pasture Deferred Rotation every other year, Entire Bender Pasture rested for a minimum of 10 years
Ruby Creek	1 Allotment 3 Pasture Partially Deferred Rotation with Butler pasture rested 1 year out of 3	1 Allotment 3 Pasture Partially Deferred Rotation with Butler pasture rested 1 year out of 3
Dry Creek	1 Allotment 2 Pasture Deferred Rotation with entire allotment rested 1 year out of 3	1 Allotment 2 Pasture Deferred Rotation with entire allotment rested 1 year out of 3
Twin Lakes	1 Allotment 2 Pasture Modified Rest Rotation for Big and Little Lake	1 Allotment 2 Pasture Modified Rest Rotation for Big and Little Lake
Monument	1 Allotment 2 Pastures, Deferred Rotation	1 Allotment rested 1 in 4 years 2 Pasture Deferred Rotation
Pioneer	1 Allotment 3 Pastures, Deferred Rotation	1 Allotment rested 1 in 4 years 3 Pasture Deferred Rotation
Saginaw	1 Allotment 4 Pastures, Rest Rotation	1 Allotment 4 Pastures, Rest Rotation

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Seymour	Not all wolves that come in contact with cattle make kills; however, conflicts between livestock and wolves can and does occur, which can result in management actions. These actions typically include hazing and harassment or euthanization, a direct impact to the species. This allotment under this alternative proposes a grazing system that incorporates rest which may reduce the potential for future wolf/livestock conflicts in these allotments when compared to not including rest (a time when livestock is not in certain areas). Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	Impacts to wolves under this alternative are similar to Proposed Action. Reducing the area that is grazed by livestock in this allotment may reduce the potential for future wolf/livestock conflicts in these allotments when compared to not including rest (a time when livestock is not in certain areas). Direct impacts to wolves from management actions due to livestock depredation area are likely to continue.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf Impacts to wolves under this alternative are similar to the Current Management and the Proposed Action Alternatives above, as there is still a 9 pasture rest rotation system in place, however additional rest was added to the Tenmile pasture. This pasture will only be grazed once every three years which will reduce the area that is grazed by livestock in any given year more than the other action alternatives. However, direct impacts to wolves are likely if management actions need to be implemented against wolves as a result of this alternative.

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Fishtrap	Under this alternative this allotment has a grazing system that permits livestock in each pasture in each allotment every year. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	Impacts to gray wolf under this alternative are the same as the Current Grazing Alternative because this alternative proposes the same grazing system.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. Impacts to wolves under this alternative are less than the Current Grazing Management and Proposed Action alternatives, as there is still a 2 pasture deferred rotation system in place, however the entire allotment will be rested 1 year in 3. This would reduce the area with cattle present, reducing the potential that wolves would come in contact with an unnatural food source and potentially reducing the probability of future wolf/livestock conflicts. However, presence of livestock in these allotments would continue to expose wolves to an unnatural food source and modify the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Mudd Creek	This allotment under this alterative includes a grazing system that does not include rest of the allotment or a pasture as it is under a single pasture deferred rotation. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area	The effects under this allotment are the same as the Current Grazing Alternative.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. Impacts to wolves under this alternative are less than the Current Management and the Proposed Action alternatives above, as there is still a 1 pasture deferred rotation system in place; however the entire allotment will be rested 1 year in 3. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential that wolves would come in contact with an unnatural food source and potentially reducing the probability of future wolf/livestock conflicts. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Pintlar Creek	This allotment under this alterative includes a grazing system that does not include rest of the allotment or a pasture as it is under a single pasture deferred rotation. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area	The effects under this allotment are similar as the Current Grazing Alternative. However every other year the pasture will have a deferred entry. This change in the grazing system does not have any additional effect to the grey wolf as livestock would remain present in the allotment and pasture annually. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves may still occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. Impacts to wolves under this alternative are less than the Current Grazing Management and the Proposed Action Alternatives, as there is still a 1 pasture deferred rotation system in place; however the entire Pintlar Meadow portion of the allotment will be rested for a minimum of 10 years. Additionally there is a special area location that will be grazed 1 out of 3 years. This will reduce the area that is grazed by livestock annually which will further reduce the potential for future wolf/livestock conflicts in this allotment when compared to the other action alternatives. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves may still occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Mussigbrod	This allotment under this alterative includes a grazing system that does not include rest of the allotment or pasture as it is under a single pasture deferred rotation. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area	Impacts to wolves under this alternative are less than the Current Grazing Management Alternative, as there is still a 2 pasture deferred rotation system in place, however the entire allotment will be rested 1 year in 3. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future wolf/livestock conflicts in this allotment when compared to the other action alternatives. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves may still occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. Impacts to wolves under this alternative are less than the Current Grazing Management and Proposed Action Alternatives, as there is still a deferred rotation system in place; however the entire Bender Pasture portion of the allotment will be rested for a minimum of 10 years, resulting in a 1 pasture deferred rotation. Additionally the entire pasture will be rested 1 year out of 3. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future wolf/livestock conflicts in this allotment when compared to the other action alternatives. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves may still occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Ruby Creek	This allotment under this alterative includes a grazing system that does not include rest of the allotment or pasture as it is under a 3 pasture deferred rotation with Butler pasture grazed season long for horses. Presence of livestock in this entire allotment annually exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area	Impacts to wolves under this alternative are less than the Current Grazing Management Alternative, as there is still a 3 pasture deferred rotation system in place, however Butler pasture will be rested 1 year out of 3. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future wolf/livestock conflicts in this allotment when compared to the other action alternatives. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves may still occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. Impacts to wolves under this alternative are the same as the Proposed Action Alternative, as there is still a 3 pasture partially deferred rotation system in place with the Butler pasture rested 1 year out of 3. This alternative does not have any additional effect to the Gray Wolf than the Current Management Alternative as livestock would remain present in the allotment and each pasture annually. Under this alternative entry into Cow Creek pasture would be deferred to August 1 every year however the measure for this species is the number of active allotments and pastures, which will remain the same.

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Dry Creek	This allotment under this alterative includes a grazing system that does not include rest of the allotment or pasture as it is under a 2 pasture deferred rotation. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area	Impacts to grizzly bears under this alternative are less than the Current Grazing Management Alternative, as there is still a 2 pasture deferred rotation system in place, however the entire allotment will be rested 1 year out of 3. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future wolf/livestock conflicts in this allotment when compared to the other action alternatives. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves may still occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. Impacts to wolves under this alternative are the same as the Proposed Action Alternative.

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Twin Lakes	Both the Big Lake and Little Lake pastures in this alternative operate under a 2 pasture grazing system. The Big Lake pastures operate a 2 pasture deferred system while the Little Lake pastures utilize modified rest rotation with rest 2 years out of 6. Minimizing the area that is grazed by livestock in this allotment annually (utilizing rest) may reduce the potential for future wolf/livestock conflicts in this allotment when compared to not including rest (a time when livestock is not in certain areas). Presence of livestock in this allotment however still exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves may still occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	Both the Big Lake and Little Lake pastures in this alternative operate under a 2 pasture grazing system, however both areas will operate under a modified rest schedule with rest 2 years out of 6. This will reduce the area that is grazed by livestock in this allotment annually when compared to the Current Grazing Management Alternative; which may reduce the potential for future wolf/livestock conflicts in this allotment when compared to not including rest (a time when livestock is not in certain areas). Presence of livestock in this allotment however still exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves may still occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. This allotment under this alternative is the same as the Proposed Action Alternative; therefore the effects are the same.

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Monument	This allotment under this alterative includes a grazing system that does not include rest of the allotment or a pasture as it is under a 2 pasture deferred rotation. Presence of livestock in these allotments exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	Impacts to grizzly bears under this alternative are similar to the Current Grazing Management Alternative because this alternative proposed the same grazing system and therefore the same impact to changes in secure habitat for this species.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. Impacts to wolves under this alternative are less than the Current Grazing Management and Proposed Action Alternatives, as there is still a 2 pasture deferred rotation system in place but the entire allotment will be rested 1 year in 4. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future wolf/ livestock conflicts. Presence of livestock in these allotments however still exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Pioneer	This allotment under this alterative includes a grazing system that does not include rest of the allotment or a pasture as it is under a 3 pasture deferred rotation. Presence of livestock in this entire allotment annually exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area	Impacts to wolves under this alternative are similar to the Current Grazing Management Alternative because this alternative proposes the same grazing system.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. Impacts to wolves under this alternative are less than the Current Grazing Management and Proposed Action Alternatives, as there is still a 3 pasture deferred rotation system in place, however the entire allotment will be rested 1 year in 4. This will reduce the area that is grazed by livestock during the rest year which will further reduce the potential for future wolf/ livestock conflicts. Presence of livestock in these allotments however still exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Saginaw	This allotment in this alternative is grazed under a 4 pasture rest rotation, which incorporates a period of time where there are not cattle in each of the pastures. This will reduce the area that is grazed by livestock during the rest period which will further reduce the potential for future wolf/ livestock conflicts in those areas. Presence of livestock in these allotments however still exposes wolves to an unnatural food source and modifies the habitat that is available to them in the analysis area. Direct impacts to wolves could occur if management actions need to be implemented against nuisance or habituated wolves or entire packs. The likelihood of this is high due to the extensive history of cattle in these allotments with a history of wolf depredation in the analysis area.	This alternative has the same proposal of this allotment as the Current Grazing Management Alternative; therefore the effects are the same.	There are no mitigation/design features in this alternative that minimize impacts to the grey wolf or impact the grey wolf. This alternative has the same proposal of this allotment as the Current Grazing alternative; therefore the effects are the same.
Cumulative Effects For All Allotments	There are a multitude of past, present and future actions activities in the analysis area, when considered with this alternative, that have the potential to or are currently negatively affecting the grey wolf and wolf habitat (Table 7). A majority of these effects are from the use of the road network in the area, recreation at numerous developed recreation sites and the presence of private inholdings and neighboring private property that have dispersed recreation, livestock grazing and hunting. The effects to grey wolf and wolf habitat from these actions include potential disturbance or displacement due to	The cumulative effects to wolves from this alternative is similar to the Current Grazing Management Alternative however slightly less negative due to the increased rest which results in a smaller area grazed by livestock in 6 of the 11 allotments. All of the activities listed in the Current Grazing Management Alternative cumulative effects analysis have the potential to impact grizzly bears and/or grizzly bear habitat in the analysis area. The presence of these activities may lead wolves to avoid otherwise suitable habitat and may increase the potential for management removal or wolf mortality.	The cumulative effects to wolves from this alternative is similar to the Current Grazing Management and Proposed Action Alternative, however less negative due to the increased rest in all 11 allotments, which results in a smaller area grazed by livestock. All of the activities listed in the Current Grazing Management Alternative and the Proposed Action Alternative cumulative effects analysis have the potential to impact wolves and wolf habitat in the analysis area under this alternative. The presence of these activities may lead wolves to avoid otherwise suitable habitat and may increase the potential for management

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	human presence, motorized use and other mechanized equipment, presence of livestock (an unnatural food source) and hunting related mortality. All of these activities have the potential to impact grey wolf and wolf habitat in the analysis area. The presence of these activities may lead wolves to avoid otherwise suitable habitat and may increase the potential for management removal or direct hunting related mortality. Livestock grazing as proposed under this alternative, when compared to these past, present and future actions mentioned above, will add negative short term cumulative effects to wolves in the analysis area by increasing the potential for management removal from livestock depredation. The likelihood of this is high due to the extensive history of cattle in these allotments with wolf related conflicts. Because pack social structure is very adaptable and resilient, breeding members can be quickly replaced either from within or outside the pack and pups can be reared by another pack member should their parents die. Consequently, wolf populations can rapidly recover from severe disruptions, such as very high levels of human-caused mortality or disease. This has been shown true in the analysis area and throughout the three federal recovery areas for the Grey Wolf (NWMT, CID, and the GYA). Since reintroduction of wolves, numbers in both Idaho	Livestock grazing as proposed under this alternative, when compared to these past, present and future actions mentioned above, will add negative short term cumulative effects to wolves in the analysis area by increasing the potential for management removal from livestock depredation. The likelihood of this is high due to the extensive history of cattle in these allotments with wolf related conflicts. Because pack social structure is very adaptable and resilient, breeding members can be quickly replaced either from within or outside the pack and pups can be reared by another pack member should their parents die. Consequently, wolf populations can rapidly recover from severe disruptions, such as very high levels of human-caused mortality or disease. This has been shown true in the analysis area and throughout the three federal recovery areas for the Grey Wolf (NWMT, CID, and the GYA). Since reintroduction of wolves, numbers in both Idaho and Montana have increased substantially (600%+) and maintained current levels, even in light of management removal and hunting mortality (Figure 1 and Figure 2). ***Determination*** - This alternative ***may impact individuals or habitat but will not likely cause a trend towards federal listing or loss of viability to the population or species*** as evidenced by increasing population (Figure 1	removal. Livestock grazing as proposed under this alternative, when compared to these past, present and future actions mentioned above, will add negative short term cumulative effects to wolves in the analysis area by increasing the potential for management removal from livestock depredation. The likelihood of this is high due to the extensive history of cattle in these allotments with wolf related conflicts. Because pack social structure is very adaptable and resilient, breeding members can be quickly replaced either from within or outside the pack and pups can be reared by another pack member should their parents die. Consequently, wolf populations can rapidly recover from severe disruptions, such as very high levels of human-caused mortality or disease. This has been shown true in the analysis area and throughout the three federal recovery areas for the Grey Wolf (NWMT, CID, and the GYA). Since reintroduction of wolves, numbers in both Idaho and Montana have increased substantially (600%+) and maintained current levels, even in light of management removal and hunting mortality (Figure 1 and Figure 2). ***Determination*** - This alternative ***may impact individuals or habitat but will not likely cause a trend towards federal listing or loss of viability to the population or species*** as evidenced by increasing population (Figure 1 and Figure 2) in the face of current multiple use activities and

Table 17: Direct, Indirect, and cumulative Effects to Gray Wolf by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	and Montana have increased substantially (600%+) and maintained current levels, even in light of management removal and hunting mortality (Figure 1 and Figure 2). ***Determination -*** This alternative ***may impact individuals or habitat but will not likely cause a trend towards federal listing or loss of viability to the population or species*** as evidenced by increasing population (Figure 1 and Figure 2) in the face of current multiple use activities and infrastructure development across southwest Montana.	and Figure 2) in the face of current multiple use activities and infrastructure development across southwest Montana.	infrastructure development across southwest Montana.

Greater Sage Grouse

Habitat and Use of the Analysis Area

Spatial bounds of the Analysis Area

The analysis area for sage-grouse is defined as the preliminary sage-grouse habitat within 18km of any lek within 18km of the 11 allotments. Preliminary general habitat was developed under a multi-agency effort associated with the National Sage-Grouse Planning Strategy (www.blm.gov/sagegrouse/). This mapped habitat was recently developed as a way to display important sage-grouse habitats and develop recommendations for management of this habitat. These modeled habitats and mapped leks can be found in Appendix A7.

There are 14 sage-grouse leks within the analysis area and all but one lek (S. Fork Watson Creek) is within the Wisdom population. The S. Fork Watson Creek Lek is within the Bannack population. All of these Wisdom leks, expect on McVey site, are on private property. The McVey 32 site is on Forest Service lands and S, Fork Watson Creek is on BLM lands. Of these 14 leks, there are 3 locations of birds that have multiple leks, however are used by the same birds, depending on the year. These lek sites are the Spokane, Mud Lake and McVey areas. The Spokane Ranch has three mapped sage-grouse leks that are active, however only one of the lek sites is known to be active each year, documenting that these birds use multiple locations depending on the year. This same scenario is evident for the Mud Lake and McVey leks which have two lek sites at each location. When considering these multiple lek sites, there are 10 known lek sites within the analysis area. Of these 10 areas, 6 are confirmed active. These are Mud Lake, Spokane, McVey, Fox Gulch, Mussigbrod Road and South Fork Watson Creek.

Of the 14 sage-grouse leks in the analysis area, only one, Mussigbrod Road, is within 6km of an allotment in this project (Mussigbrod Allotment). The import is that this is the upper range of nest distance from leks as noted in Connelly (2000). Consequently the likelihood of sage-grouse nesting anywhere on the allotments is remote due to the distance from known leks and much of the habitat on the allotments is under snow during the sage grouse nesting season.

While Forest Service habitat ownership is overshadowed by private land and BLM habitat, National Forest lands do provide support for upslope dispersal from breeding and nesting areas. Sage grouse have been observed in summer/fall on the allotments being considered here. The allotments support springs, wet meadows, pothole areas, and stream bottoms that provide summer and late brood-rearing habitat. Additional habitat is found in irrigated hay meadows on adjacent land. As mentioned previously, 80% of sage-grouse in SW Montana nest within 2 miles of a lek and all allotments are greater than 3 miles from a lek so the value of this modeled nesting habitat to nesting sage-grouse is low.

There are 508,000 acres of modeled sage-grouse habitat in the analysis area, approximately 108,373 acres is modeled as brood rearing habitat and the other 400,000 acres are modeled as nesting habitat (Table 12). Of the total 508,000 acres, approximately 44% is State of Montana lands, 36% is Private, 10% is BLM lands and 2% is National Forest System Lands.

Table 18: Modeled Sage-grouse Habitat Acres in the Analysis Area by Ownership

	Ownership (Acres)							
Habitat Type	**B-D NF**	**BLM**	**MT FW&P**	**NPS**	**Other NF**	**Private**	**ST MT**	**Total**
Breeding, Nesting, Early Brood Rearing / Late Brood	25414.3	62861.8	534.5	72.6	13.8	145832.3	40730.9	275460.2
Late Brood Rearing	1876.1	1491.5	52.3	5.6	2.6	2037.7	2382	7847.8
Riparian	4846	671.3	72.3	146.1	8	29568.9	2211.6	37524.2
Total	32136.4	65024.6	659.1	224.3	24.4	177438.9	45324.5	**320832.2**
Percentage	**10.02%**	**20.27%**	**0.21%**	**0.07%**	**0.01%**	**55.31%**	**14.13%**	

Nine out of the 11 allotments contain this modeled habitat and acres by ownership can be found in Table 13 below. As mentioned previously, 80% of sage-grouse in SW Montana nest within 2 miles of a lek and all allotments are greater than 3 miles from a lek so the value of this modeled nesting habitat to nesting sage-grouse is low.

Table 19: Acres of Modeled Sage-grouse Habitat by Allotment and Ownership for the Nine Allotments

Allotment	BLM Acres	FS Acres	Private Acres	Total Acres
Dry Creek	**343.7**	**584.1**	**13.2**	**941**
Brood Rearing	3.4	221.5		224.9
Nesting	340.3	362.6	13.2	716.1
Monument	**59.1**	**1866.6**	**0.4**	**1926.1**
Brood Rearing	0.1	872.4	0.4	872.9
Nesting	59	994.2		1053.2
Mudd Creek		**1012.3**	**128.6**	**1140.9**
Brood Rearing		246.9	62.1	309
Nesting		765.4	66.5	831.9
Mussigbrod	**101.7**	**701.3**		**803**
Brood Rearing		130.1		130.1
Nesting	101.7	571.2		672.9
Pintlar Creek		**1338.2**		**1338.2**
Brood Rearing		349.8		349.8
Nesting		988.4		988.4
Pioneer		**1078.6**	**70.2**	**1148.8**
Brood Rearing		241.5	44.7	286.2
Nesting		837.1	25.5	862.6
Ruby Creek	**22.7**	**2142.6**	**235.5**	**2400.8**
Brood Rearing	7.6	815.2	40.9	863.7
Nesting	15.1	1327.4	194.6	1537.1
Saginaw		**2903.6**	**65.6**	**2969.2**
Brood Rearing		437.6		437.6
Nesting		2466	65.6	2531.6
Twin Lakes		**882.6**	**14.9**	**897.5**
Brood Rearing		317.2		317.2
Nesting		565.4	14.9	580.3
Grand Total	**527.2**	**12509.9**	**528.4**	**13565.5**

Sage-grouse preliminary general habitat was mapped by Montana Fish Wildlife and Parks in accordance with the National Sage-grouse Planning Strategy. According to this mapped polygon, there are approximately 262,422 acres of preliminary general habitat (PGH) and 170,634 acres of preliminary primary habitat (PPH) mapped within the analysis area (See Appendix A7 for map). This modeled habitat is mapped within five Forest Service allotments and is approximately 0.2% (687 acres) of the total modeled PGH in the sage-grouse analysis area (Table 14). Due to mapping generalities, 1/3 of these 687 acres is currently lodgepole pine or subalpine conifer, habitats not typically used by sage-grouse.

Table 20: Sage-grouse Modeled Preliminary General Habitat by Habitat Type for the Five Allotments

Allotments by Habitat Type	Acres
Mudd Creek Allotment	**8**
PGH	**8**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	7.6
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	0.4
Pintlar Creek Allotment	**98**
PGH	**98**

Table 20: Sage-grouse Modeled Preliminary General Habitat by Habitat Type for the Five Allotments

Allotments by Habitat Type	Acres
Aspen	1.2
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	2.3
Lodgepole Pine	11.8
Low / Moderate Cover Grasslands	1.6
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	18.9
Mesic Shrublands	1.3
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	2.1
Very Low Cover Grasslands	27.1
Very Low Cover Sagebrush / Xeric Shrubs (5-14% shrub, 25-100% grass)	31.7
Pioneer Allotment	**4.6**
PGH	**4.6**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	2.1
Lodgepole Pine	2.5
Ruby Creek Allotment	**14.1**
PGH	**14.1**
Lodgepole Pine	5.6
Mesic Shrublands	1.6
Moderate / High Cover Grasslands	3.6
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	3.3
Saginaw Allotment	**562.7**
PGH	**562.7**
Aspen	6.4
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	1.9
Lodgepole Pine	136.8
Low / Moderate Cover Grasslands	364.5
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	0.2
Mixed Lower Subalpine Conifer Forest	46
Moderate / High Cover Grasslands	6.9
Grand Total	**687.4**

Personal communication with MTFWP Biologist V. Boccadori and multiple years or lek count data suggests that the Wisdom sage-grouse use on the National Forest is not common, except in some edges where vast amounts of sagebrush from neighboring ownerships boarders National Forest sagebrush habitat (pers. com Boccadori 2/2013). Additionally, Boccadori suspects a potential lek site near the Fish Trap allotment; however this is unverified at this time (pers. com Boccadori 2/2013). Following March 2013 lek surveys, no lek was confirmed.

Personal communication with MTFWP Biologist C. Fager and lek data for the Hairpin suggests that in the 1970's or 80's there were some records of birds displaying in this area as well as some recent records. There is abundant sage grouse sign on the National Forest in the Fox Creek area, south of the Hairpin, however use in the Saginaw allotment is not documented. The South Fork of Watson Creek lek is still active and it is not believed that these birds would be affiliated with the Saginaw allotment (pers. com Fager 2/2013). See appendix A7 for maps of the modeled Sage grouse habitat and leks.

Livestock grazing in general *can* have direct and indirect effects on sage grouse. Potential effects include trampling of nests or disturbance of nesting birds and change in species composition and structure of vegetation. Sage-grouse are not known or suspected to nest in any of the allotments in the analysis area and livestock grazing as proposed in the action alternatives does not overlap the majority of nesting season. Therefore this indicator was not used to summarize potential effects to sage-grouse in this project. Additionally, this risk of impact is highest on the valley floors on non-Forest Service ownership near leks. As noted in the Connelly (2000) guidelines, there is little direct experimental evidence linking grazing practices to sage grouse population

levels. There will be no impact to this species for proposed hardened crossings or fence construction using dead trees under any alternative because this type of does not occur in sage-grouse habitat or have the potential to impact birds.

Table 21: Summary for Greater Sage-grouse of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative**				**Current Grazing Management**			
	Resource Indicator – Quality of Habitat				**Resource Indicator – Quality of Habitat**			
	Units of Measure				**Units of Measure**			
	Preferred forb availability	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**	**Preferred forb availability**	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**
Seymour	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse habitat
Fishtrap	Most rapid improvement	Most rapid improvement	Localized increases but static overall	0	Static to very slow improvement	Static to very slow improvement	Static	0
Mudd Creek	Most rapid improvement	Most rapid improvement	Localized increases but static overall	0	Static condition trend	Static condition trend	Static	0
Pintlar Creek	Most rapid improvement	Most rapid improvement	Static	0	Static to downward trend in condition	Static to downward trend in condition	Static	0
Mussigbrod	Most rapid improvement	Most rapid improvement	Increases in burned areas, Static in others	0	Static	Static	Increases in burned areas, Static in others	0
Ruby Creek	Most rapid improvement	Most rapid improvement	Static	0	Static	Static	Static	0
Dry Creek	Most rapid improvement	Most rapid improvement	Static	0	Slow Improvement	Slow Improvement	Static	0
Twin Lakes	Most rapid improvement	Most rapid improvement	Static	0	Slow Improvement	Slow Improvement	Static	0

Table 21: Summary for Greater Sage-grouse of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative**				**Current Grazing Management**			
	Resource Indicator – Quality of Habitat				**Resource Indicator – Quality of Habitat**			
	Units of Measure				**Units of Measure**			
	Preferred forb availability	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**	**Preferred forb availability**	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**
Monument	Most rapid improvement	Most rapid improvement	Static	0	Static	Static	Static	0
Pioneer	Most rapid improvement	Most rapid improvement	Overall static, some increase over time	0	Static	Static	Overall static, some increase over time	0
Saginaw	Most rapid improvement	Most rapid improvement	Overall static, some increase in burned sites over time	0	Static	Static	Overall static, some increase in burned sites over time	0

Table 22: Summary for Greater Sage-grouse of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**				**Alternative 4 Resource Indicator and Units of Measure**			
	Preferred forb availability	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**	**Preferred forb availability**	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**
Seymour	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse habitat	NA, not sage-grouse

Table 22: Summary for Greater Sage-grouse of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**				**Alternative 4 Resource Indicator and Units of Measure**			
	Preferred forb availability	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**	**Preferred forb availability**	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**
				habitat				habitat
Fishtrap	Slow improvement	Slow improvement	Static	0	Potential for more rapid improvement	Potential for more rapid improvement	Potential for localized increases over time	0
Mudd Creek	Slow Improvement	Slow Improvement	Static	0	Potential for more rapid improvement	Potential for more rapid improvement	Static	0.1
Pintlar Creek	Slow Improvement	Slow Improvement	Static	0	Slow Improvement	Slow Improvement	Static	0.3 Highly visible
Mussigbrod	Moderate improvement	Moderate improvement	Increases in burned areas and exclosure, Static in others	1	Rapid improvement in Bender pasture. Some improvement in Mussigbrod pasture	Rapid improvement in Bender pasture. Some improvement in Mussigbrod pasture	Increases in burned areas and exclosure, Static in others	1.1
Ruby Creek	Static	Static	Static	0	Some improvement	Some improvement	Static	.25
Dry Creek	Potential for faster rate of improvement	Potential for faster rate of improvement	Static	0	Potential for faster rate of improvement	Potential for faster rate of improvement	Static	0
Twin Lakes	Potential for faster rate of improvement	Potential for faster rate of improvement	Static	0	Potential for faster rate of improvement	Potential for faster rate of improvement	Static	0

Table 22: Summary for Greater Sage-grouse of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**				**Alternative 4 Resource Indicator and Units of Measure**			
	Preferred forb availability	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**	**Preferred forb availability**	**Perennial Grass and Forb Canopy Cover**	**Percent canopy cover of sagebrush**	**Miles of fencing constructed**
Monument	Static	Static	Static	0	Potential for faster rate of improvement	Potential for faster rate of improvement	Static	0
Pioneer	Static	Static	Overall static, some increases over time	0	Potential for faster rate of improvement	Potential for faster rate of improvement	Overall static, some increases over time	0
Saginaw	Static	Static	Overall static, some increase in burned sites over time	0	Potential for some improvement	Potential for some improvement	Overall static, some increase in burned sites over time	0

Table 23: No Action Alternative Direct/Indirect Effects for Greater Sage-grouse by Allotment

Allotments	Direct/Indirect Effects to Greater Sage-grouse
Seymour	The Seymour Allotment and associated Mt. Haggin Game Range is not sage-grouse habitat so there will be no direct or indirect effects to sage-grouse from any alternative.
Fishtrap	Connelly (2000) notes that there is little experimental evidence linking grazing to sage grouse population levels. Grazing can affect grass height and herbaceous cover, affecting nest selection and success. Connelly (2000) notes the upper range of nest distances from lek sites is 6.2km and this allotment is not within this radius. Consequently, the likelihood of this impact is most probable on non-BDNF lands and the effect of this no grazing alternative on nest selection and success is unlikely. Under this alternative, forage plants (including sage-grouse preferred forbs) would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term. Great plant species richness with abundant forbs and insects characterize sage-grouse brood areas. Grouse usually move to more mesic sites during June and July in a variety of habitats during summer, including sagebrush, small burned areas, wet meadows, farmland, and other irrigated areas adjacent to sagebrush habitats. Sites used by grouse broods have been shown to contain twice as much forb cover as independent sites. This alternative is likely to increase preferred forb availability and canopy cover which may have beneficial impacts to sage-grouse habitat and sage-grouse. With the removal of livestock, localized increases in sagebrush cover may occur in areas where sage-brush cover is currently low. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known or suspected to nest in this allotment. Increasing sagebrush canopy cover can have positive and negative effects to sage-grouse summer brood-rearing habitat as this habitat can vary drastically. Overall this variable is expected to remain static in the long term. Removal of livestock and the absence of new fence construction may reduce the potential for mortality losses from fences.
Mudd Creek	Same as Fishtrap Allotment
Pintlar Creek	Same as Fishtrap Allotment
Mussigbrod	Same as Fishtrap except in the Mussigbrod wildfire area as shrub cover is expected to continue to increase over time. It is unlikely that this would impact sage-grouse nesting as this habitat variable is strongly tied to suitable nesting sites and sage-grouse are not known or expected to nest in this allotment.
Ruby Creek	Under this alternative, forage plants (including sage-grouse preferred forbs) would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term. Great plant species richness with abundant forbs and insects characterize sage-grouse brood areas. Sites used by grouse broods have been shown to contain twice as much forb cover as independent sites. This alternative is likely to increase preferred forb availability and canopy cover which may have beneficial impacts to sage-grouse habitat and sage-grouse. With the removal of livestock, sagebrush cover is expected to remain static over time. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known or suspected to nest in this allotment.

Table 23: No Action Alternative Direct/Indirect Effects for Greater Sage-grouse by Allotment

Allotments	Direct/Indirect Effects to Greater Sage-grouse
Dry Creek	Under this alternative, forage plants (including sage-grouse preferred forbs) would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term. Great plant species richness with abundant forbs and insects characterize sage-grouse brood areas. Sites used by grouse broods have been shown to contain twice as much forb cover as independent sites. This alternative is likely to increase preferred forb availability and canopy cover which may have beneficial impacts to sage-grouse habitat and sage-grouse. With the removal of livestock, sagebrush cover is expected to remain static over time. Sagebrush cover was present in amounts expected for this habitat type (17%), which is in the suitable breeding habitat category and the suitable summer upland habitat category according to Stiver et al. 2010. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known to nest in this allotment.
Twin Lakes	Under this alternative, forage plants (including sage-grouse preferred forbs) would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term. Great plant species richness with abundant forbs and insects characterize sage-grouse brood areas. Sites used by grouse broods have been shown to contain twice as much forb cover as independent sites. This alternative is likely to increase preferred forb availability and canopy cover which may have beneficial impacts to sage-grouse habitat and sage-grouse. With the removal of livestock, sagebrush cover is expected to remain static over time however data suggests that there has been a trend towards increased sagebrush cover. Sagebrush cover was present in amounts expected for this habitat type (20%), which is in the Suitable breeding habitat category and the Suitable summer upland habitat category according to Stiver et al. 2010. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known to nest in this allotment.
Monument	Same as Twin Lakes
Pioneer	Under this alternative, forage plants (including sage-grouse preferred forbs) would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term. Great plant species richness with abundant forbs and insects characterize sage-grouse brood areas. Sites used by grouse broods have been shown to contain twice as much forb cover as independent sites. This alternative is likely to increase preferred forb availability and canopy cover which may have beneficial impacts to sage-grouse habitat and sage-grouse. With the removal of livestock, sagebrush cover is expected to remain static over time however data suggests that there has been a trend towards increased sagebrush cover. Sagebrush cover was present in amounts expected for this habitat type (27%), which is in the Marginal breeding habitat category and the Marginal summer upland habitat category according to Stiver et al. 2010. There may be some increases in sagebrush cover over time. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known or suspected to nest in this allotment.

Table 23: No Action Alternative Direct/Indirect Effects for Greater Sage-grouse by Allotment

Allotments	Direct/Indirect Effects to Greater Sage-grouse
Saginaw	Under this alternative, forage plants (including sage-grouse preferred forbs) would not be grazed by livestock which would result in improved vigor, seed production and increase trend in desirable species composition in the long term. Great plant species richness with abundant forbs and insects characterize sage-grouse brood areas. Sites used by grouse broods have been shown to contain twice as much forb cover as independent sites. This alternative is likely to increase preferred forb availability and canopy cover which may have beneficial impacts to sage-grouse habitat and sage-grouse. With the removal of livestock, sagebrush cover is expected to remain static over time. Sagebrush cover was present in below average but within the range expected for this habitat type (9%), which is in the Marginal breeding habitat category and the Marginal summer upland habitat category according to Stiver et al. 2010. There may be some increases in sagebrush cover over time in areas that were past prescribed burning reduced sagebrush cover. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known or suspected to nest in this allotment.

Table 23: No Action Alternative Direct/Indirect Effects for Greater Sage-grouse by Allotment

Allotments	Direct/Indirect Effects to Greater Sage-grouse
Cumulative Effects For All Allotments Except Seymour Allotment	The Seymour Allotment and the Mt. Haggin Game Range is not sage grouse habitat so there will be no cumulative effects to sage-grouse from this alternative. There are a multitude of past, present and reasonably foreseeable actions that have the potential to impact sage-grouse in the analysis area. These include but are not limited to different land uses, noxious weed management, sagebrush loss, livestock and wild ungulate grazing, range infrastructure and power lines and hunting. These are discussed in detail below. Land uses: Forest Service ownership of sage-grouse habitat at the allotment, analysis area, and forest-wide scales respectively are relatively small in southwest Montana. The dominant challenges to habitat management for sage grouse are found on the valley floors on non-Forest Service ownership. There are no active or inactive leks in the allotments in the analysis area (See Appendix A7 for the map). They analysis area lies within Beaverhead County, which is predominantly rural with a population density of 2 people per square mile. This is a partial reflection of the amount of public lands in the county. The county is the largest cattle and hay producer in the State. Acres of hay harvested ranged from 93, 500 acres in 2000 to 77,000 acres on 2012 with a high of 224, 000 acres in 2005 (National Agricultural Statistics Service 2013). More large rural parcels are being offered on the local real estate market. It is unknown if such parcels are being considered for subdivision development or a continuation of the ranching lifestyle. Subdivision development is not increasing in the Wisdom area and such development cannot occur on BDNF lands and any development is subject to permits processes under the control of local and county government. Land uses beyond the national forest have the greatest potential for affecting sage grouse populations in southwestern Montana. Noxious Weed Management: As noxious weeds spread and control efforts follow, there is the increased possibility of declining habitat quality in sage brush habitats. Both the spread of weeds themselves and the treatment of weeds could have a detrimental impact on sage grouse or their habitat. The spread of weeds can reduce the herbaceous understory desirable for sage grouse. Weed infestations and treatments on the BDNF encompass very little of the forest (Beaverhead-Deerlodge National Forest Weed Control FEIS 2002 Appendix B). Current weed infestations in the existing mapped sage grouse habitat on the Forest are relatively low. Infestations are primarily scattered point and roadside locations. The Forest Plan includes direction to prevent, reduce, or eliminate infestations of non-native or noxious weed species with emphasis on areas where there is a high likelihood of establishment and spread. Aerial spraying in particular could increase disturbance and possible displacement of sage grouse. Aerial spraying for weed control does occur on the forest and in the analysis area. Overall, noxious weed management throughout the analysis area should have beneficial effects to sage-grouse and sage-grouse habitat. Sagebrush Loss: Conversion of sagebrush habitat to grassland or agriculture typically has adverse effects on sage grouse (Connelly et al., 2000). Although sage grouse need a variety of habitats, including open areas, converted lands typically have less value to sage grouse. In the case of fire and herbicides, sagebrush typically re-grows over time; meanwhile multiple generations of sage grouse are affected. When areas are permanently converted by plowing and reseeding, effects are continuous. Sagebrush conversions to grasslands have occurred in the past on public and private lands to enhance grazing opportunities. We do not have acreage breakdowns by ownership. There have been no cropland conversions on national forest lands.

Table 23: No Action Alternative Direct/Indirect Effects for Greater Sage-grouse by Allotment

Allotments	Direct/Indirect Effects to Greater Sage-grouse
Cumulative Effects For All Allotments Except Seymour Allotment	Forest-wide estimated xeric shrublands cover is 58% of the lower range of modeled historic occurrence. Conifer encroachment is a likely cause of this difference. Current estimates show mountain shrublands occupy 84% of the lower range of modeled historic shrublands. Conifer encroachment into shrublands is also a likely cause of this difference. Lesica and Cooper(1997) note that "fire history studies indicate that forests were confined to rocky or mesic sites prior to European settlement, but there has been a substantial increase in conifers at the forest-grassland ecotone." None of the alternatives propose any treatments of sagebrush. Consequently all alternatives are neutral regarding potential sagebrush loss. Livestock/Wild Ungulate Grazing: Connelly et al. (2000) state: "There is little direct experimental evidence linking grazing practices to sage grouse population levels (Braun 1987, Connelly and Braun 1997). However, grass height and cover affect sage grouse nest site selection and success. Total cattle grazing in Beaverhead county has declined from 157,000 head in 2000 to 116,000 head in 2009 (National Agricultural Statistics Service). Sheep grazing is a much smaller component with 17,500 head in 2000 and 14,000 head in 2009 (National Agricultural Statistics Service). Livestock have been grazed in the allotments in the analysis area since the mid 1800's. Since then, the Forest Service has been reducing livestock numbers. Consequently, the conditions and trends of the upland vegetation has generally been in "fair to good" with "stable to upward trends. To the extent that future grazing use mimics the declines noted from 2000 – 2009 in Beaverhead County, potential grazing conflicts with sage grouse could also decline. Range Infrastructure and Power lines: Range infrastructure, particularly fences, can provide perches for potential predators. However, there is little information suggesting that nest predation is a widespread problem. Connelly (2004) notes: "Although there is little published information supporting the notion that predation is a major limiting factor on sage-grouse, arguments continue to be made supporting predator control as an important management action. More recently, numerous investigators have documented sage-grouse survival and nest success. Only two of these studies indicated that predation was limiting sage-grouse populations by decreasing nest success, but both of these indicated that low nest success due to predation was ultimately related to poor nesting habitat. Most reported nest success rates are >40%, suggesting that nest predation is not a widespread problem. Additionally, relatively high survival of adult birds and recent results demonstrating that coyote control in an area of Wyoming failed to produce an effect on nesting success, further reinforce the idea that predation is not a widespread factor acting to depress sage-grouse populations." Corvids (crows, ravens, jays, magpies) are known egg predators of many species, including sage grouse. They routinely use fence posts and powerline poles for perches with ravens and magpies quite visible in the analysis area. Connelly (2000) notes: Structures such as powerlines and fences pose hazards to sage grouse because they provide additional perch sites for raptors and because sage grouse may be injured or killed when they fly into these structures.

Table 23: No Action Alternative Direct/Indirect Effects for Greater Sage-grouse by Allotment

Allotments	Direct/Indirect Effects to Greater Sage-grouse
Cumulative Effects For All Allotments Except Seymout Alltoment	There are hundreds of miles of fences and power lines in the analysis area although not all in sage grouse habitat. Fences on Forest Service allotments are generally four-wire construction (top wire 42 inches high) with posts every 16.5 feet and either wood or wire stays between posts, making them relatively visible. Additioanlly, a majority of fences throughout the Big Hole valley are even more visible as they are wooden worm fences or wooden jackleg fences. We know of no chronic hazard areas for grouse on these allotments. There are un-quantified lengths of fence on adjacent Bureau of Land Management, state, and private lands. Spring/Water Developments & Irrigation: Spring/water developments for livestock and irrigation of pastures have resulted in some tradeoffs for sage grouse. On one hand, developments distribute water on the landscape in such a way as to create more brood rearing and late summer habitat than existed historically. On the other hand, conversion of native sagebrush areas to irrigated fields has resulted in less cover and increased mortality risks. Irrigated hayfields are not found anywhere on the Forest Service allotments. Such conversions are located on non-Forest Service ownership in the analysis area. Poorly designed spring developments can result in the drying-up of wet meadow habitat. All Forest Service water developments on the allotments are designed to maintain free water and wet meadow habitat and are compatible with the guidelines. The tradeoff is that some areas around water developments can become over-used by livestock if not excluded by fencing or carefully monitored. Mining/Energy Development: The short and long-term effects of mining and energy development on sage grouse are variable and poorly understood (Connelly et al. 2000). Since there are no active mining developments and old mines are either reclaimed or naturally re-vegetated, mining is not considered an issue with sage grouse habitat at this time. However, the BLM leasing program has sold oil leases in southwestern Montana. There is neither full scale development nor applications for drilling permits. If southwestern Montana is deemed profitable for energy development, adverse effects to sage grouse, particularly lek sites could occur. Such development is not quantifiable at this time in the absence of development interest. Hunting: Hunting is a legitimate recreational and cultural use of wildlife resources. However, the effect of hunting on sage grouse is controversial from a public perspective. Some people believe hunting is detrimental to general sage grouse populations. Others focus their concern on the effects to small, isolated populations. And although some concede that harvest may have some effects on local populations, they believe hunting impacts are small when compared with other causes of mortality. Hunting is one of many forms of mortality to which sage grouse are subjected. Part of the hunting controversy is that hunting is a very "visible" form of mortality. Annual survival rates for sage grouse after all forms of mortality are roughly 50% (Connelly et al. 2000). Many natural resources are in need of sustainable management, and sage grouse populations are also sustainable if managed carefully. Sage grouse tend to have relatively long lives with low annual turnover in the population and a low reproductive rate (Connelly et al. 2000). These and other factors make it important to manage sage grouse harvest differently than that of other small game species.

Table 23: No Action Alternative Direct/Indirect Effects for Greater Sage-grouse by Allotment

Allotments	Direct/Indirect Effects to Greater Sage-grouse
Cumulative Effects For All Allotments Except Seymout Allotment	Sage grouse are managed as an upland game bird under state legislative authority including the statutory mandate of the Fish, Wildlife and Parks Commission to regulate harvest (MTFWP 2005). "Sage grouse generally have the lowest average productivity rate of any upland bird in Montana but also are one of the longest lived. Although some believe that hunting is detrimental, the direct effects of hunting on sage grouse are still small when compared to other forms of mortality" (MTFWP 2005). All aspects of hunting management are the exclusive responsibility of Montana Fish, Wildlife, and Parks. ***Summary and Determination*** This alternative will not add measurable cumulative effects to this species because reducing livestock grazing on these 11 allotments will not contribute to any of the known threats to the species. It may over time benefit the species by removing fence lines currently on FS lands in the allotments considered in this project. Removal of these fences may reduce potential collision related mortality; however, this effect is unmeasurable because Beaverhead-Deerlodge NF ownership of potential sage grouse habitat is minor when compared to Private and Bureau of Land Management ownership. The clear challenges for sage grouse management in southwest Montana are found on the valley floors. All breeding occurs at lek sites which are key activity areas where congregating birds are potentially more vulnerable to a variety of threats, which is not associated with the allotments in this analysis. Additionally, both the Centennial and Big Hole valleys are focus areas for native habitat conservation for grayling, sage-grouse and other wildlife, resulting in considerable acreage enrolled in long-term and perpetual conservation agreements with private landowners. Given this population's size, limited habitat threats, and ties to Idaho's birds, the Southwest Montana population is characterized as being at a low level of risk (USDI FWS 2013). As noted at Table 13 above, Beaverhead-Deerlodge NF ownership of potential sage grouse habitat is minor when compared to Private and Bureau of Land Management ownership. The clear challenges for sage grouse management in southwest Montana are found on the valley floors. All breeding occurs at lek sites which are key activity areas where congregating birds are potentially more vulnerable to a variety of threats, which is not associated with the allotments in this analysis. This alternative minimizes impacts to sage-grouse by removing potential effects from cattle and precluding the addition of additional fences or water developments that could pose a risk to sage grouse. These risks are not quantifiable and are potentially contradicted by the lek upward trend data for the nearest populations. Given the upward trend data in concert with the range of multiple uses for these birds, ***no impact*** to sage-grouse is expected.

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Fishtrap	This alternative is expected to result in a very slow improving trend in desirable grass and forb composition including mapped sage-grouse habitat. This alternative is expected to continue to provide for adequate plant development and reproduction that will maintain plant vigor which is expected to maintain forb availability and grass a forb cover. Shrub cover is expected to not change in the long term under this alternative. Cover in this allotment (8%) is in the Marginal category for breeding and summer upland sage-grouse habitat (Stiver et al. 2010). Maintaining forb and grass cover and forb availability may benefit sage-grouse as they rely on these species for foraging. According to the Range Report, species composition is within the parameters expected for these plant communities in this allotment and shrub cover is also within the range of total shrub cover expected. Overall, this alternative proposes livestock grazing which does have more of an impact on sage-grouse habitat (grass and forb height specifically) than the No Action alternative but there is little experimental evidence linking grazing to sage grouse population levels so direct impacts to sage-grouse populations are expected to be unlikely. The absence of new fence construction will not increase the potential for additional mortality losses from fences; however this impact may still occur.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. Direct and indirect effects to sage-grouse and sage-grouse habitat are expected to be similar to the Current Grazing Alternative because a different level of impact is not expected to be detectable within the timeframe of this analysis.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. Direct and indirect effects to sage-grouse and sage-grouse habitat are expected to be similar to the Current Grazing Alternative and the Proposed Action above however the additional rest period would potentially result in a more rapid recovery of upland and riparian sites that are currently in less than desirable condition. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. The absence of new fence construction will not increase the potential for additional mortality losses from fences; however this impact may still occur. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and is not mapped as sage-grouse habitat according to the MTFWP habitat layer.

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Mudd Creek	This alternative is expected to result in a static trend of species composition and is not likely to provide for adequate plant development and reproduction in some areas of the allotment. This may have negative impacts to sage-grouse that may use this habitat because the current species composition of the allotment is in a range of what is expected but not providing for adequate plant development in some areas may reduce the quality of the habitat for sage-grouse in the future. This impact is expected to be small, as this allotment is not known to be used by sage-grouse however approximately 8 acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time. The average cover on this allotment (19%) is within the range categorized as suitable for breeding and summer upland habitat (Stiver et al 2010). Overall, the sites monitored in this allotment show the sagebrush-grassland sites meeting desired rangeland health objectives.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. Direct and indirect effects to sage-grouse and sage-grouse habitat are expected to be similar to the Current Grazing Alternative above because a different level of impact is not expected to be detectable within the timeframe of this analysis.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. Direct and indirect effects to sage-grouse and sage-grouse habitat are expected to be similar to the Current Grazing Alternative and the Proposed Action above however the additional rest period would potentially result in a more rapid recovery of upland and riparian sites that are currently in less than desirable condition. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. This impact is expected to be small, as this allotment is not known to be used by sage-grouse however approximately 8 acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. The construction of 0.1 miles of fencing for the proposed water development is expected to have no impact to sage-grouse or sage-grouse habitat as it is not located in sage-grouse mapped habitat or in an area where grouse are expected.
Pintlar Creek	This alternative is expected to result in a static trend of species composition and is not likely to provide for adequate plant development and reproduction in some areas of the allotment. This may have negative impacts to sage-grouse that may use this habitat because the current species composition of the allotment is below the amounts expected and not providing for adequate plant development in some areas may reduce the quality	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. Direct and indirect effects to sage-grouse and sage-grouse habitat are expected to be similar to the Current Grazing Alternative. However, deferred entry of livestock every other year would potentially allow for additional plant development and reproduction and increased plant vigor. This could lead to improved species	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. With the exception of Pintlar Meadows, direct and indirect effects to sage-grouse would be similar to those described under the Proposed Action alternative. In Pintlar Meadows, this part of the allotment would be closed to livestock grazing for a minimum of 10 years to allow for resource recovery following rehabilitation. This would potentially result

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	of the habitat for sage-grouse in the future. This impact is expected to be small, as this allotment is not known to be used by sage-grouse however approximately 55 acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time. The average cover on this allotment (18%) is within the range categorized as suitable for breeding and summer upland habitat (Stiver et al 2010). Overall, the sites monitored in this allotment show the sagebrush-grassland sites are below desired rangeland health objectives and this would remain static under this alternative.	composition which would increase the quality of sage-grouse habitat in the allotment. This rate of recovery may not be detectable in the timeframe of this analysis so beneficial impacts to sage-grouse habitat may be marginal.	in more rapid improvement of species composition; however this is not sage-grouse habitat therefore additional beneficial effects to sage-grouse are not expected. The additional 0.3 miles of worm fence constructed in this allotment will have no impact on sage-grouse as this fence is not in sage-grouse habitat or in an area sage-grouse are expected. Additionally, worm fence is highly visible which minimized potential collisions with sage-grouse.
Mussigbrod	This alternative is expected to result in little improvement to current species composition on the allotment. Currently on upland sites there is an apparent trend away from desirable species composition. This may have negative impacts to sage-grouse that may use this habitat because the current species composition of the allotment is below the amounts expected and not providing for adequate plant development in some areas may reduce the quality of the habitat for sage-grouse in the future. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and no acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time except in the Mussigbrod fire perimeter. Sagebrush cover was present in	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. Implementation of this alternative is expected to lead to a more rapid rate of vegetation recovery on upland sites when compared to current management. Incorporation of a rest year into the grazing system would result in improved species composition over time. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. This beneficial impact is expected to be small, as this allotment is not known to be used by sage-grouse and is not mapped as sage-grouse habitat according to the MTFWP habitat layer. Conversion of the temporary fences to a permanent fence is also expected to result in faster	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. This alternative is expected to provide for a faster rate of vegetation recovery than the Proposed Action because the Bender Pasture would be rested for a minimum of 10 years and the single pasture modified rest rotation strategy would reduce the intensity and duration of livestock grazing use on the allotment. These actions would result in improved species composition and cover. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. This beneficial impact is expected to be small, as this allotment is not known to be used by sage-grouse and is not mapped as sage-grouse habitat according to the MTFWP habitat layer. Conversion of the temporary

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	amounts expected for this habitat type (14%), which is in the Marginal breeding habitat category and the Suitable summer upland habitat category according to Stiver et al. 2010. There was a major decrease noted on two transects that were burned in the 2000 Mussigbrod fire and these shrubs are still recovering.	recovery through greater protection of the sites that are in less than desirable condition, creating positive effects to sage-grouse habitat. Shrub cover, including sagebrush is not expected to change over time except in the Mussigbrod fire perimeter. Sagebrush cover was present in amounts expected for this habitat type (14%), which is in the Marginal breeding habitat category and the Suitable summer upland habitat category according to Stiver et al. 2010.	fences to a permanent fence is also expected to result in faster recovery through greater protection of the sites that are in less than desirable condition, creating positive effects to sage-grouse habitat. Shrub cover, including sagebrush is not expected to change over time except in the Mussigbrod fire perimeter. Sagebrush cover was present in amounts expected for this habitat type (14%), which is in the Marginal breeding habitat category and the Suitable summer upland habitat category according to Stiver et al. 2010.
Ruby Creek	On sampled sites in this allotment there was a trend away from desirable species composition and an increase in nonnative plants. This alternative is expected to result in little improvement to current species composition and is not expected to provide for sufficient grazing deferment. Season long use is likely to maintain less than desirable species composition in the Butler pasture. This may have negative impacts to sage-grouse that may use this habitat because the current species composition of the allotment is below the amounts expected and not providing for adequate plant development in some areas may reduce the quality of the habitat for sage-grouse in the future. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and no acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. Additionally, sagebrush cover was not present in the sampled grasslands,	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. This alternative is expected to result in little change to existing rangeland health conditions, the measures used to evaluate the quality of sage-grouse habitat in the allotment. The complete rest of Bender pasture one year out of three would be expected to improve plant species composition and cover within the pasture. On sampled sites in this allotment there was a trend away from desirable species composition and an increase in nonnative plants. This alternative is expected to result in little improvement to current species composition. This may have negative impacts to sage-grouse that may use this habitat because the current species composition of the allotment is below the amounts expected and not providing for adequate plant development in some areas may reduce the quality	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. This alternative is expected to provide better deferment to forage plants which is expected to improve plant vigor and increased species composition and cover in all pastures. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and only 3.3 acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. The construction of 0.25 miles of fencing for the Cow Creek pasture is expected to have no impact to sage-grouse or sage-grouse habitat as it is not located in sage-grouse mapped habitat or in an area where grouse are expected.

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	which can be expected for this habitat type as a majority of this allotment is not sage-grouse habitat and only 3.3 acres of habitat in this allotment is mapped as sage-grouse habitat according to the MTFWP habitat layer.	of the habitat for sage-grouse in the future. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and only 3.3 acres of the allotment are mapped as sage-grouse habitat according to the MTFWP habitat layer. Additionally, sagebrush cover was not present in the sampled grasslands, which can be expected for this habitat type as a majority of this allotment is not sage-grouse habitat.	
Dry Creek	On sampled sites in this allotment there was an upward trend towards desirable species composition. This alternative is expected to result in continued slow upward trend in improved species composition and is expected to provide for sufficient grazing deferment. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and no acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time. Sagebrush cover was present in amounts expected for this habitat type (17%), which is in the Suitable breeding habitat category and the Suitable summer upland habitat category according to Stiver et al. 2010.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. This alternative is expected to result in greater improvements to rangeland health than the current grazing alternative. Incorporating a rest year into the grazing system will allow for improved slow upward trend in improved species composition. Improving plant vigor, species composition reproduction and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the Current Grazing alternative. This beneficial impact is expected to be small, as this allotment is not known to be used by sage-grouse and is not mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time. Sagebrush cover was present in amounts expected for this habitat type (17%), which is in the Suitable breeding habitat category and the Suitable summer upland habitat category according to Stiver et al. 2010.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. This alternative would have the same effects to sage-grouse as described under the Proposed Action alternative.

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Twin Lakes	Implementation of this alternative is expected to result in little to no change to species composition and it is expected that a trend towards less desirable forage species would continue to occur within the Big Lake portion of the allotment. This may have negative impacts to sage-grouse by reducing the quality of the habitat for sage-grouse in the future. The Little Lake portion is expected to maintain existing conditions or possibly result in a slow improving trend in desirable species composition. Maintaining plant vigor, species composition and forb availability will have positive effects to sage-grouse habitat and sage-grouse. This beneficial impact is expected to be small, as this allotment is not known to be used by sage-grouse and is not mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time. Sagebrush cover was present in amounts expected for this habitat type (20%), which is in the Suitable breeding habitat category and the Suitable summer upland habitat category according to Stiver et al. 2010.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. Implementation of this alternative is expected to potentially result in greater improvements to rangeland health in the allotment when compared to the current grazing alternative. This is expected to result in improved species composition over the long term. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and no acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time. Sagebrush cover was present in amounts expected for this habitat type (20%), which is in the Suitable breeding habitat category and the Suitable summer upland habitat category according to Stiver et al. 2010.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. This alternative would have the same effects to sage-grouse as described under the Proposed Action alternative.
Monument	Implementation of this alternative is expected to result in a static trend in species composition over time. Currently the long-term monitoring data for sagebrush-grassland sites have shown the species composition is present in desirable amounts and quantities as would be expected. Improving plant vigor, species composition and forb availability	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. The impacts to sage-grouse under this alternative are similar as the Current Grazing alternative.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. Implementation of this alternative is expected to potentially result in greater improvements to rangeland health in the allotment when compared to the current grazing alternative. This is expected to result in improved species composition over the long

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	will have greater positive effects to sage-grouse habitat and sage-grouse. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and is not mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time. Sagebrush cover was present in amounts expected for this habitat type (20%), which is in the suitable breeding habitat category and the suitable summer upland habitat category according to Stiver et al. 2010.		term. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and is not mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time. Sagebrush cover was present in amounts expected for this habitat type (20%), which is in the Suitable breeding habitat category and the Suitable summer upland habitat category according to Stiver et al. 2010.
Pioneer	Implementation of this alternative is expected to result in a static trend in species composition over time. Currently the long-term monitoring data for sagebrush-grassland sites have shown the species composition is present in desirable amounts and quantities as would be expected. Maintaining plant vigor, species composition and forb availability will have positive effects to sage-grouse habitat and sage-grouse. This beneficial impact is expected to be small, as this allotment is not known to be used by sage-grouse and only 2.1 acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time however there may be some increases in sagebrush cover over time. Sagebrush cover was present in amounts expected for this habitat type	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. Implementation of this alternative is expected to have similar effects to sage-grouse as the Current Grazing alternative.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. Implementation of this alternative is expected to potentially result in greater improvements to rangeland health in the allotment when compared to the current grazing alternative. This is expected to result in improved species composition over the long term. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. This impact is expected to be small, as this allotment is not known to be used by sage-grouse and only 2.1 acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including sagebrush is not expected to change over time however there may be some increases in sagebrush cover over time. Sagebrush

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	(27%), which is in the Marginal breeding habitat category and the Marginal summer upland habitat category according to Stiver et al. 2010. There may be some increases in sagebrush cover over time. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known or suspected to nest in this allotment.		cover was present in amounts expected for this habitat type (27%), which is in the Marginal breeding habitat category and the Marginal summer upland habitat category according to Stiver et al. 2010. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known or suspected to nest in this allotment.
Saginaw	Implementation of this alternative is expected to result in a static trend in species composition over time. Currently the long-term monitoring data for sagebrush-grassland sites have shown the species composition is present in desirable amounts and quantities as would be expected. Maintaining plant vigor, species composition and forb availability will have positive effects to sage-grouse habitat and sage-grouse. Sagebrush cover is expected to remain static over time. Sagebrush cover was present in below average amounts but within the range expected for this habitat type (9%), which is in the Marginal breeding habitat category and the Marginal summer upland habitat category according to Stiver et al. 2010. There may be some increases in sagebrush cover over time in areas that were past prescribed burning reduced sagebrush cover. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known or suspected to nest in this allotment.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 25-26) that are applicable to Sage-grouse. Implementation of this alternative is expected to have similar effects to sage-grouse as the Current Grazing alternative.	There are two mitigation/design features, number 9 and 10 (Ch.2 pgs. 28-29) that are applicable to Sage-grouse. This alternative is expected to result in some improvements to rangeland health conditions, which may have greater beneficial effects to sage-grouse than the other action alternatives. Specifically, a reduction in the season of use would reduce the duration of livestock grazing effects to vegetation which could lead to improved plant vigor. Improving plant vigor, species composition and forb availability will have greater positive effects to sage-grouse habitat and sage-grouse than the other action alternatives. However, implementation of a grazing avoidance period from July 1 through August 25 in Unit 4 would likely result in less grazing deferment for the remaining pasture which could result in potential negative effects to sage-grouse by reducing plant vigor over the long term. This negative impact is expected to be small, as this allotment is not known to be used by sage-grouse and only 2.1 acres are mapped as sage-grouse habitat according to the MTFWP habitat layer. Shrub cover, including

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
			sagebrush is not expected to change over time. Sagebrush cover was present in amounts expected for this habitat type (9%), which is in the Marginal breeding habitat category and the Marginal summer upland habitat category according to Stiver et al. 2010. There may be some increases in sagebrush cover over time in areas that were past prescribed burning reduced sagebrush cover. It is unlikely that this would impact sage-grouse nesting as this variable is strongly tied to suitable nesting sites and sage-grouse are not known or suspected to nest in this allotment.
Cumulative Effects for All Allotments Except Saginaw Allotment	There are a multitude or past, present and reasonably foreseeable actions that have the potential to impact sage-grouse in the analysis area. These include but are not limited to different land uses, noxious weed management, sagebrush loss, livestock and wild ungulate grazing, range infrastructure and power lines and hunting. These were discussed in detail above in the No Grazing Alternative. This alternative, when considering these actions, has the potential to add minor negative cumulative effects to this species. This is a result of continued livestock grazing which can alter grass and forb height and overtime, species composition. These effects are minor because the likelihood of this impact to nesting birds is most probable on non BDNF lands, not on the allotments in this analysis and, the trend data for these sage-grouse population shows an upward	There are a multitude or past, present and reasonably foreseeable actions that have the potential to impact sage-grouse in the analysis area. These include but are not limited to different land uses, noxious weed management, sagebrush loss, livestock and wild ungulate grazing, range infrastructure and power lines and hunting. These were discussed in detail above in No Grazing Alternative. This alternative, when considering these actions, has the potential to add minor negative cumulative effects to this species. This is a result of continued livestock grazing which can alter grass and forb height and overtime, and species composition. This effect is unmeasurable at a population level because Beaverhead-Deerlodge NF ownership of potential sage-grouse habitat is minor when compared to Private and Bureau of Land Management ownership. These	There are a multitude or past, present and reasonably foreseeable actions that have the potential to impact sage-grouse in the analysis area. These include but are not limited to different land uses, noxious weed management, sagebrush loss, livestock and wild ungulate grazing, range infrastructure and power lines and hunting. These were discussed in detail above in Alternative 1. This alternative, when considering these actions, has the potential to add minor negative cumulative effects to this species. This is a result of continued livestock grazing which can alter grass and forb height and overtime, and species composition. This effect is unmeasurable at a population level because Beaverhead-Deerlodge NF ownership of potential sage-grouse habitat is minor when compared to Private and Bureau of Land Management ownership. These effects from this alternative are minor because the likelihood of this impact to nesting

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	trajectory in concert with the multiple uses that are currently in place in the project/analysis area (Figure 6 and Figure 7). This alternative will not add measurable cumulative effects to this species because livestock grazing on these 10 allotments will not measurably contribute to any of the known threats to the species. This effect is unmeasurable because Beaverhead-Deerlodge NF ownership of potential sage grouse habitat is minor when compared to Private and Bureau of Land Management ownership. The clear challenges for sage grouse management in southwest Montana are found on the valley floors. All breeding occurs at lek sites which are key activity areas where congregating birds are potentially more vulnerable to a variety of threats, which is not associated with the allotments in this analysis. Additionally, both the Centennial and Big Hole valleys are focus areas for native habitat conservation for grayling, sage-grouse and other wildlife, resulting in considerable acreage enrolled in long-term and perpetual conservation agreements with private landowners. Given this population's size, limited habitat threats, and ties to Idaho's birds, the Southwest Montana population is characterized as being at a low level of risk (USDI FWS 2013). ***Summary and Determination*** This alternative ***may impact individuals or habitat but will not likely cause a trend towards federal listing or loss of viability to the population or species***. As noted at	effects from this alternative are minor because the likelihood of this impact to nesting birds is most probable on non BDNF lands, not on the allotments in this analysis and, the trend data for these sage-grouse population shows an upward trajectory in concert with the multiple uses that are currently in place in the project/analysis area (Figure 6 and Figure 7). Additionally, the grazing system and allowable use levels proposed in this alternative are designed to maintain vegetative cover and species composition in the allotments, benefiting this species. The clear challenges for sage grouse management in southwest Montana are found on the valley floors. All breeding occurs at lek sites which are key activity areas where congregating birds are potentially more vulnerable to a variety of threats, which is not associated with the allotments in this analysis. Additionally, both the Centennial and Big Hole valleys are focus areas for native habitat conservation for grayling, sage-grouse and other wildlife, resulting in considerable acreage enrolled in long-term and perpetual conservation agreements with private landowners. Given this population's size, limited habitat threats, and ties to Idaho's birds, the Southwest Montana population is characterized as being at a low level of risk (USDI FWS 2013). ***Summary and Determination*** This alternative ***may impact individuals or habitat***	birds is most probable on non BDNF lands, not on the allotments in this analysis and, the trend data for these sage-grouse population shows an upward trajectory in concert with the multiple uses that are currently in place in the project/analysis area (Figure 6 and Figure 7). Additionally, the grazing system and allowable use levels proposed in this alternative are designed to maintain vegetative cover and species composition in the allotments, benefiting this species. The clear challenges for sage grouse management in southwest Montana are found on the valley floors. All breeding occurs at lek sites which are key activity areas where congregating birds are potentially more vulnerable to a variety of threats, which is not associated with the allotments in this analysis. Additionally, both the Centennial and Big Hole valleys are focus areas for native habitat conservation for grayling, sage-grouse and other wildlife, resulting in considerable acreage enrolled in long-term and perpetual conservation agreements with private landowners. Given this population's size, limited habitat threats, and ties to Idaho's birds, the Southwest Montana population is characterized as being at a low level of risk (USDI FWS 2013). ***Summary and Determination*** This alternative ***may impact individuals or habitat but will not likely cause a trend towards federal listing or loss of viability to the population or species***. As noted at Table 13, Beaverhead-Deerlodge NF ownership of sage-grouse general habitat is minor

Table 24: Direct, Indirect, and Cumulative Effects to Greater Sage grouse by Allotment (Except Seymour Allotment) by all Alternatives except the No Action

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	Table 13, Beaverhead-Deerlodge NF ownership of potential sage grouse habitat is minor when compared to Private and Bureau of Land Management ownership. The clear challenges for sage grouse management in southwest Montana are found on the valley floors. All breeding occurs at lek sites which are key activity areas where congregating birds are potentially more vulnerable to a variety of threats, which is not associated with the allotments in this analysis. These risks are not quantifiable and are potentially contradicted by the lek upward trend data for the nearest populations.This alternative minimizes impacts to sage-grouse from livestock grazing with the incorporated design features.	***but will not likely cause a trend towards federal listing or loss of viability to the population or species***. As noted at Table 13, Beaverhead-Deerlodge NF ownership of sage-grouse general habitat is minor when compared to Private and Bureau of Land Management ownership. The clear challenges for sage grouse management in southwest Montana are found on the valley floors. All breeding occurs at lek sites which are key activity areas where congregating birds are potentially more vulnerable to a variety of threats, which is not associated with the allotments in this analysis. These risks are not quantifiable and are potentially contradicted by the lek upward trend data for the nearest populations. Overall, this alternative is designed to restore and enhance sage-grouse habitat by maintaining species composition and diversity and sagebrush canopy cover and structure.	when compared to Private and Bureau of Land Management ownership. The clear challenges for sage grouse management in southwest Montana are found on the valley floors. All breeding occurs at lek sites which are key activity areas where congregating birds are potentially more vulnerable to a variety of threats, which is not associated with the allotments in this analysis. These risks are not quantifiable and are potentially contradicted by the lek upward trend data for the nearest populations. Overall, this alternative is designed to restore and enhance sage-grouse habitat by maintaining species composition and diversity and sagebrush canopy cover and structure.

Northern Bog Lemming

Habitat and Use of the Analysis Area

Spatial and Temporial bounds

The allotments in this project will be used as the N. bog lemming analysis area. This is due to the small homerange size of the species and dispersal distances are not known. Additionally, the impacts from the action alternatives relating to this species habitat would be limited to the allotment where cows are present.

Northern bog lemmings are not known within the allotments in this project. The only known bog lemming location on the BDNF is within Maybee Meadows, approximately 3 miles to the southwest of the Mussigbrod Allotment and 6 miles to the northwest of the Ruby Allotment. This individual was found in 1992 with confirmed evidence of reproduction. This wetland/bog complex is the most southern documented location of the Northern Bog Lemming in Montana. Based on field surveys of the allotments, Hamby Swamp in the Monument allotment contains thick moss mats, a preferred habitat for this species. Hamby swamp is approximately 460 acres and roughly 30% of this contains sphagnum bog mats (pers. com K. Greenwood, District Range Specialist), the best habitat predictor for this species. No other allotments are known or suspected to have this type of habitat. Therefore, effects to this species by alternative would be limited to the changes in management of the Monument Allotment.As previously mentioned, Hamby Swamp in the Monument allotment contains thick moss mats, a preferred habitat for this species. Hamby swamp is approximately 460 acres and roughly 30% of this contains sphagnum bog mats (pers. com K. Greenwood, District Range Specialist), the best habitat predictor for this species. No other allotments are known or suspected to have this type of habitat. Therefore, effects to this species by alternative would be limited to the changes in management of the Monument Allotment.

Direct, Indirect, and Cumulative Effects to Northern Bog Lemming

As identified above, the only allotment that the habitat for the Northern Bog Lemming has the potential to occur in is the Monument Allotment. Therefore, there will be no impacts to the Northern Bog Lemming habitat, or any cumulative effects under any of the alternatives for any of the allotments other than the Monument Allotment.

Below in table 25, is a summary of the effects to the Northern Bog Lemming by allotment, by alternative, by Resource Indicator and Unit of Measure.

Table 25: Summary for Northern Bog Lemming of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative Resource Indicator and Units of Measure**	**Current Grazing Management Alternative Resource Indicator and Units of Measure**	**Proposed Action Alternative Resource Indicator and Units of Measure**	**Alternative 4 Resource Indicator and Units of Measure**
	Acres of bog habitat that overlaps with grazed acres	Acres of bog habitat that overlaps with grazed acres	Acres of bog habitat that overlaps with grazed acres	Acres of bog habitat that overlaps with grazed acres
Seymour	0	0	0	0
Fishtrap	0	0	0	0
Mudd Creek	0	0	0	0
Pintlar Creek	0	0	0	0
Mussigbrod	0	0	0	0
Ruby Creek	0	0	0	0
Dry Creek	0	0	0	0
Twin Lakes	0	0	0	0

Table 25: Summary for Northern Bog Lemming of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative Resource Indicator and Units of Measure**	**Current Grazing Management Alternative Resource Indicator and Units of Measure**	**Proposed Action Alternative Resource Indicator and Units of Measure**	**Alternative 4 Resource Indicator and Units of Measure**
	Acres of bog habitat that overlaps with grazed acres	Acres of bog habitat that overlaps with grazed acres	Acres of bog habitat that overlaps with grazed acres	Acres of bog habitat that overlaps with grazed acres
Monument	0	100% of Hamby Swamp bog habitat is accessible to cattle	100% of Hamby Swamp bog habitat is accessible to cattle	100% of Hamby Swamp however the Monument allotment would be only be grazed 3 out of 4 years, increasing the rest on this allotment and reducing the time livestock are impacting Hamby Swamp.
Pioneer	0	0	0	0
Saginaw	0	0	0	0

Below is a detailed discussion of the direct, indirect, and cumulative effects and determination to the Northern Bog Lemming for the Monument Allotment by alternative.

Monument Allotment

No Action Alternative

Direct/Indirect Effects to the Northern Bog Lemming
Under this alternative, no grazing would be authorized. This would have potential beneficial effects to this species if it is present within Hamby Swamp buy reducing potential for trampling effects. There would be no potential for alteration of the sphagnum bog mats that are important to this species.

Cumulative Effects to the Northern Bog Lemming
Because this species relies on a very specific habitat type, destruction of this habitat or alteration of the site characteristics that create and maintain sphagnum moss would impact this species. There are multiple activities that are present in the analysis area (allotments in the project); however none have the potential to impact this sensitive habitat type other than grazing, wild ungulate use and recreation. All vegetation management actions avoid this sensitive habitat. Because this alternative could have potential beneficial effects to this species, no negative cumulative effects are expected.

Determination to the Northern Bog Lemming
This alternative will have ***no impact*** to the Northern Bog Lemming or Bog Lemming habitat. Livestock would not be authorized which would have potential beneficial effects to this species if it is present within Hamby Swamp buy reducing potential for trampling effects. However, this species is not known to occur in the allotment so beneficial impacts to this species are unmeasurable.

Current Grazing Management

Direct/Indirect Effects to the Northern Bog Lemming
Under this alternative, grazing would be authorized under a deferred rotation. Grazing has the potential to impact this species by trampling the species habitat (modifying its burrows) and a slight potential for direct trampling effects. The likelihood of this is low because even though livestock is known to use the swamp, only a small portion of the swamp is impacted by cattle and only 30% of the swamp contains bog mats. Typically, livestock avoids these bog mats, reducing the potential for impacts to this species. This would reduce the potential direct and indirect impacts to this species from this alternative.

Cumulative Effects to the Northern Bog Lemming
Because this species relies on a very specific habitat type, destruction of this habitat or alteration of the site characteristics that create and maintain sphagnum moss would impact this species. There are multiple activities that are present in the analysis area (allotments in the project), however none that have the potential to impact this sensitive habitat type other than grazing, wild ungulate use and recreation. All vegetation management actions avoid this sensitive habitat. The action alternatives add potential direct and indirect impacts to the sphagnum moss habitat this species prefers, however since this species is not known to occur this far south in Montana and has not been documented in this area, negative cumulative effects to this species are unlikely.

Determination to the Northern Bog Lemming
This alternative ***may impact individuals or habitat but will not likely cause a trend towards federal listing or loss of viability to the population or species***. Grazing has the potential to impact this species by trampling the species habitat (modifying its burrows) and a slight potential for direct trampling effects. The likelihood of this is low because even though livestock is known to use the swamp, only a small portion of the swamp is impacted by cattle and only 30% of the swamp contains bog mats.

Proposed Action

Direct/Indirect Effects to the Northern Bog Lemming
Under this alternative effects are similar to the Current Grazing Management above.

Cumulative Effects to the Northern Bog Lemming
Under this alternative effects are similar to the Current Grazing Management above.

Determination to the Northern Bog Lemming
This alternative ***may impact individuals or habitat but will not likely cause a trend towards federal listing or loss of viability to the population or species***. Grazing has the potential to impact this species by trampling the species habitat (modifying its burrows) and a slight potential for direct trampling effects. The likelihood of this is low because even though livestock is known to use the swamp, only a small portion of the swamp is impacted by cattle and only 30% of the swamp contains bog mats

Alternative 4

Direct/Indirect Effects to the Northern Bog Lemming
Under this alternative, grazing would be authorized under a deferred rotation and the allotment would be rested 1 year in 4. Grazing has the potential to impact this species by trampling the species habitat (modifying its burrows) and a slight potential for direct trampling effects. The likelihood of this is low because even though livestock is known to use the swamp, only a small portion of the swamp is impacted by cattle and only 30% of the swamp contains bog mats. Typically, livestock avoids these bog mats, reducing the potential for impacts to this species. Alternative 4 incorporates a full year of rest for this allotment for 1 year in every 4 years. This would reduce the potential direct and indirect impacts to this species from this alternative.

Cumulative Effects to the Northern Bog Lemming

Because this species relies on a very specific habitat type, destruction of this habitat or alteration of the site characteristics that create and maintain sphagnum moss would impact this species. There are multiple activities that are present in the analysis area (allotments in the project), however none that have the potential to impact this sensitive habitat type other than grazing, wild ungulate use and recreation. All vegetation management actions avoid this sensitive habitat. The action alternatives add potential direct and indirect impacts to the sphagnum moss habitat this species prefers, however since this species is not known to occur this far south in Montana and has not been documented in this area, negative cumulative effects to this species are unlikely.

Determination to the Northern Bog Lemming

This alternative ***may impact individuals or habitat but will not likely cause a trend towards federal listing or loss of viability to the population or species***. Grazing has the potential to impact this species by trampling the species habitat (modifying its burrows) and a slight potential for direct trampling effects. The likelihood of this is low because even though livestock is known to use the swamp, only a small portion of the swamp is impacted by cattle and only 30% of the swamp contains bog mats. Additionally this alternative reduces the potential direct and indirect impacts to this species by adding additional rest to the allotment which minimizes the time livestock would be present in Hamby Swamp.

Pygmy Rabbit

Spatial Boundsof the Analysis Area

For the purpose of this analysis, pygmy rabbit habitat was modeled according to the following parameters from the Montana Natural Heritage Programs Montana Field Guide (MTNHP 2009): 1) documented species range in Montana, 2) >20% sage brush cover, 3) elevation up to 7600 ft. and 4) 3 miles from project allotments (from a documented dispersal distance of 3.0 miles).

Following this model, there are approximately 34,515 acres of modeled pygmy rabbit habitat within the analysis area (Table 26). See Appendix A7 for map. Of this modeled habitat, approximately 20% is Forest Service ownership with the majority of the habitat modeled is private property. Of the 34,515 acres of habitat in the analysis area, are approximately 5,361 acres (16%) is within the allotments in this project (see table 27 below).

Table 26: Modled Pygmy Rabbit Habitat in the Analysis Area

Sagebrush Type	B-D NF Acres	BLM Acres	MTFWP Acres	NPS Acres	Private Acres	State Acres	Water*	Total
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	3168.6	240.4	721.5	39.3	5561.2	505.8	0.8	10237.6
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	2931.4	667.4	1080.5	31.4	12368.2	682.5	1.5	17762.9
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	1085.7	340.2	811.6		4118.2	157	2.6	6515.3
Grand Total	**7185.7**	**1248**	**2613.6**	**70.7**	**22047.6**	**1345.3**	**4.9**	**34515.8**

Note: Water mapped in error

Table 27: Pygmy Rabbit Modeled Habitat by Allotment by Ownership

Allotments	B-D NF Acres	BLM Acres	Private Acres	Total Acres
Dry Creek	**299.1**	**302.1**	**8.4**	**609.6**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	15.2			15.2
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	283.9	292.5	8.4	584.8
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)		9.6		9.6
Fishtrap	**145**			**145**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	99.1			99.1
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	8.9			8.9

Table 27: Pygmy Rabbit Modeled Habitat by Allotment by Ownership

Allotments	B-D NF Acres	BLM Acres	Private Acres	Total Acres
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	37			37
Monument	**725.2**	**26.7**		**751.9**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	422.3	14.1		436.4
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	245.8	1.7		247.5
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	57.1	10.9		68
Mudd Creek	**300.4**		**24.1**	**324.5**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	116.7		7.6	124.3
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	132.5		6.3	138.8
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	51.2		10.2	61.4
Mussigbrod	**121.2**	**39**		**160.2**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	82.2	23.4		105.6
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	29.3	4.1		33.4
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	9.7	11.5		21.2
Pintlar Creek	**382.4**			**382.4**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	201			201
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	81.5			81.5
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	99.9			99.9
Pioneer	**632.9**		**1.1**	**634**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	394.8		1.1	395.9
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	133.2		0	133.2
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	104.9			104.9
Ruby Creek	**284.6**	**9.1**	**13.2**	**306.9**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	107.8		3.3	111.1
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	137.8		9.9	147.7
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	39	9.1		48.1
Saginaw	**586**			**586**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	277			277
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	297.8			297.8
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	11.2			11.2
Seymour	**902.6**		**132.8**	**1035.4**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	326.5		3.3	329.8
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	351.3		59.6	410.9
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	224.8		69.9	294.7
Twin Lakes	**415.1**		**10.6**	**425.7**
High Cover Sagebrush / Xeric Shrubs (35-100% shrub)	141		1.7	142.7
Low Cover Sagebrush / Xeric Shrubs (15-24% shrub)	220.1		8.9	229
Moderate Cover Sagebrush / Xeric Shrubs (25-34% shrub)	54			54
Grand Total	**4794.5**	**376.9**	**190.2**	**5361.6**

Pygmy rabbit surveys were conducted within all the allotments in the project area in 2006 and in 2009. Three pygmy rabbit burrow systems were found in the Mudd Creek allotment during 2006 surveys. No pygmy rabbit sign was found in the other 10 allotments (See Appendix A7 for map).

Tables 28 and 29 below are a summary of the effects for the Pyfmy Rabbit by allotment, by alternative, by Resource Indicator and Unit of Measure. Table 30 displays and discusses the direct, indirect, and cumulative effects to Pygmy Rabbit for the No Action Alternative. Table 31 displays and discusses the direct, indirect, and cumulative effects to Pygmy Rabbit for all the other alternatives.

Table 28: Summary for Pygmy Rabbit of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**No Action Alternative Resource Indicator and Units of Measure**		**Current Grazing Management Resource Indicator and Units of Measure**	
	Grass and Forb Availability	**Percent canopy cover of sagebrush**	**Grass and Forb Availability**	**Percent canopy cover of sagebrush**
Seymour	Most rapid improvement	Static	Slow improving trend	Static
Fishtrap	Most rapid improvement	Localized increases but static overall	Static to very slow improvement	Static
Mudd Creek	Most rapid improvement	Localized increases but static overall	Static condition trend	Static
Pintlar Creek	Most rapid improvement	Static	Static to downward trend in condition	Static
Mussigbrod	Most rapid improvement	Increases in burned areas, Static in others	Static	Increases in burned areas, Static in others
Ruby Creek	Most rapid improvement	Static	Static	Static
Dry Creek	Most rapid improvement	Static	Slow improvement	Static
Twin Lakes	Most rapid improvement	Static	Slow improvement	Static
Monument	Most rapid improvement	Static	Static	Static
Pioneer	Most rapid improvement	Overall static, some increase over time	Static	Overall static, some increase over time
Saginaw	Most rapid improvement	Overall static, some increase in burned sites over time	Static	Overall static, some increase in burned sites over time

Table 29: Summary for Pygmy Rabbit of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**		**Alternative 4 Resource Indicator and Units of Measure**	
	Grass and Forb Availability	**Percent canopy cover of sagebrush**	**Grass and Forb Availability**	**Percent canopy cover of sagebrush**
Seymour	Slow but potentially more rapid improving trend	Static	Slow but potentially more rapid improving trend	Static
Fishtrap	Slow improvement	Static	Potential for more rapid improvement	Potential for localized increases over time
Mudd Creek	Slow improvement	Static	Potential for more rapid improvement	Static
Pintlar Creek	Slow improvement	Static	Slow improvement	Static
Mussigbrod	Moderate improvement	Increases in burned areas and exclosure, Static in others	Rapid improvement in Bender pasture. Some improvement in Mussigbrod pasture	Increases in burned areas and exclosure, Static in others
Ruby Creek	Static	Static	Some improvement	Static

Table 29: Summary for Pygmy Rabbit of Effects by Allotment by Alternative By Resource Indicator and Unit of Measure

Allotment	**Proposed Action Alternative Resource Indicator and Units of Measure**		**Alternative 4 Resource Indicator and Units of Measure**	
	Grass and Forb Availability	**Percent canopy cover of sagebrush**	**Grass and Forb Availability**	**Percent canopy cover of sagebrush**
Dry Creek	Potential for faster rate of improvement	Static	Potential for faster rate of improvement	Static
Twin Lakes	Potential for faster rate of improvement	Static	Potential for faster rate of improvement	Static
Monument	Static	Static	Potential for faster rate of improvement	Static
Pioneer	Static	Overall static, some increase over time	Potential for faster rate of improvement	Overall static, some increase over time
Saginaw	Static	Overall static, some increase in burned sites over time	Potential for some improvement	Overall static, some increase in burned sites over time

Table 30: No Action Alternative Direct/Indirect and Cumulative Effects for Pygmy Rabbit by Allotment

Allotments	Direct/Indirect and Cumulative Effects to Pygmy Rabbit
Seymour	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. Under this alternative, sagebrush cover is expected to remain static over time and was not recorded in the upland grasslands in this allotment. This can be expected for these types of sites. Given that information, the likelihood of impacting this species is most probable on non BDNF lands (where 84% of the habitat is modeled) and the beneficial effects of this alternative are likely low if not discountable.
Fishtrap	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. Under this alternative, sagebrush cover is expected to remain static over time and averaged 8%, well under the average used by this species. This can be expected for these types of sites. Given that information, the likelihood of impacting this species is most probable on non BDNF lands (where 84% of the habitat is modeled) and the beneficial effects of this alternative are likely low if not discountable.
Mudd Creek	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. Sagebrush cover in this allotment averaged 19%, which is just below the 20% used to predict available habitat. Pygmy rabbits were found in this allotment during surveys in higher density stands of sagebrush. There are approximately 300 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term, maintaining this habitat.

Table 30: No Action Alternative Direct/Indirect and Cumulative Effects for Pygmy Rabbit by Allotment

Allotments	Direct/Indirect and Cumulative Effects to Pygmy Rabbit
Pintlar Creek	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. Sagebrush cover in this allotment averaged 18%, which is just below the 20% used to predict available habitat. There are approximately 380 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term, maintaining this habitat. Pygmy rabbits were not found in this allotment during surveys. Under this alternative, sagebrush cover is expected to remain static over time which would maintain available habitat overtime.
Mussigbrod	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. Sagebrush cover in this allotment averaged 14%, which is just below the 20% used to predict available habitat. There are approximately 160 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term, maintaining this habitat. Pygmy rabbits were not found in this allotment during surveys. Under this alternative, sagebrush cover is expected to remain static over time which would maintain available habitat overtime.
Ruby Creek	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands and sagebrush was not present in the upland transects that were surveyed. This can be expected for this habitat type as a majority of this allotment is not sagebrush. There are approximately 284 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term. Pygmy rabbits were not found in this allotment during surveys and are not known to be present. Under this alternative, sagebrush cover is expected to remain static over time which would maintain available pygmy rabbit habitat.

Table 30: No Action Alternative Direct/Indirect and Cumulative Effects for Pygmy Rabbit by Allotment

Allotments	Direct/Indirect and Cumulative Effects to Pygmy Rabbit
Dry Creek	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. There are approximately 600 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover). Sagebrush cover was present in amounts expected for this habitat type (17%), which is just below the 20% cover preferred by this species. Shrub cover, including sagebrush is not expected to change over time which would maintain this habitat. This alternative would maintain available pygmy rabbit habitat.
Twin Lakes	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. There are approximately 425 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term. Sagebrush cover was present in amounts expected for this habitat type (20%), which is the percent cover preferred by this species. Shrub cover, including sagebrush is not expected to change over time which would maintain this habitat for pygmy rabbits.
Monument	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. There are approximately 751 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term. Sagebrush cover was present in amounts expected for this habitat type (20%), which is the percent cover preferred by this species. Shrub cover, including sagebrush is not expected to change over time which would maintain this habitat for pygmy rabbits.

Table 30: No Action Alternative Direct/Indirect and Cumulative Effects for Pygmy Rabbit by Allotment

Allotments	Direct/Indirect and Cumulative Effects to Pygmy Rabbit
Pioneer	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. There are approximately 634 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term. Sagebrush cover was present in amounts expected for this habitat type (27%), which is within the percent cover preferred by this species. Shrub cover, including sagebrush is not expected to change over time which would maintain this habitat for pygmy rabbits.
Saginaw	This alternative presents the least amount of direct and indirect effects to pygmy rabbits because livestock grazing would not be authorized. Removal of livestock may reduce the potential for impacts from trampling and reduction in available forage for pygmy rabbits. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. Therefore the benefit to pygmy rabbits from this alternative is likely low. Additionally, pygmy rabbits have been shown to prefer dense sagebrush stands. There are approximately 586 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term. Sagebrush cover was present in amounts expected for this habitat type (9%), which is below the percent cover preferred by this species. Shrub cover, including sagebrush is not expected to change over time which would not reduce future habitat available to pygmy rabbits.
Cumulative Effects For All Allotments	There are a multitude or past, present and reasonably foreseeable actions that have the potential to impact pygmy rabbits in the analysis area. These include but are not limited to different land uses, noxious weed management, sagebrush loss, and livestock grazing (US DI Fish and Wildlife Service 2010) as discussed above in the sage-grouse section. This alternative will not add measurable cumulative effects to this species because reducing livestock grazing on these 11 allotments will not contribute to any of the known threats to the species. The clear challenges for pygmy rabbit management in southwest Montana are found on the valley floors, where the majority of the habitat is for the species. Additionally, no National Forest sagebrush habitat conversion is proposed under this alternative and Rauscher (1997) reports that pygmy rabbits are surviving and even thriving at current grazing levels in certain areas of southwest Montana. ***Determination -*** As noted in Table 27 above, Beaverhead-Deerlodge NF ownership of potential sage grouse habitat is minor when compared to Private and Bureau of Land Management ownership. The challenges for pygmy rabbit management in southwest Montana are found mostly on the valley floors, not on Forest Service ownership. A majority of the known pygmy rabbit locations are known throughout this lower elevation habitat where rabbits are potentially more vulnerable to a variety of threats, which is not associated with the allotments in this analysis. This alternative minimizes impacts to pygmy rabbits by removing potential effects from cattle. However, these risks are not quantifiable. Given the upward to stable trend data in habitat in the allotments and in concert with the range of multiple uses for this species, ***no impact*** to the pygmy rabbit is expected.

Table 31: Direct, Indirect, and Cumulative Effects to Pygmy Rabbit by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Seymour	Grazing, can affect grass height and herbaceous cover and the presence of livestock in the allotment can contribute to trampling effects to this species. Trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates. This alternative proposes a grazing strategy that would maintain the sagebrush habitat in these allotments and potentially increase ground cover and result in a slow improving trend in desirable species composition. Pygmy rabbits have been shown to prefer dense sagebrush stands. Under this alternative, sagebrush cover is expected to remain static over time and was not recorded in the upland grasslands in this allotment. This can be expected for these types of sites. The average bare ground in pygmy rabbit sites from Rauscher (1997) indicates a high level of bare ground, which is much higher than found in this allotment and under this alternative would potentially increase. Because this species is known to occur in drier and less productive sites and feeds mostly on sagebrush in the winter, this alternative would seem to have beneficial impacts to this species over time by increasing potential summer forage. This effect is expected to be small as a majority of this allotment is not mapped as pygmy rabbit habitat and pygmy rabbits are not known or suspected to occur in this	The effects to pygmy rabbit under this alternative are similar under the Current Grazing alternative.	The effects to pygmy rabbit under this alternative are similar under the Current Grazing alternative above. The actions proposed in this alternative would likely result in less livestock use within the Forest Service's Tenmile pasture which would result in improved species composition and ground cover. This effect is expected to be small as a majority of this allotment is not mapped as pygmy rabbit habitat and pygmy rabbits are not known or suspected to occur in this allotment. Overall, this alternative would maintain range conditions over time and therefore maintain available pygmy rabbit habitat.

Table 31: Direct, Indirect, and Cumulative Effects to Pygmy Rabbit by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	allotment. Overall, this alternative would maintain range conditions over time and therefore maintain available pygmy rabbit habitat.		
Fishtrap	This alternative is expected to result in a very slow improving trend in desirable grasses and forbs and is expected to continue to provide for adequate plant development and reproduction that will maintain forb and grass availability. This will maintain and slowly improve pygmy rabbit foraging habitat in the allotment. Shrub cover is expected to not change in the long term under this alternative and current cover in this allotment averages (8%), well below the level documented as preferred habitat. There are approximately 150 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term, maintaining this habitat. This allotment was surveyed for this species and none were detected; therefore direct effects to this species are unlikely. Additionally, trampling effects are thought to be unlikely because burrows are typically found at the base of sagebrush plants, minimizing the potential of being stepped on by wild and domestic ungulates.	Direct and indirect effects to sage-grouse and sage-grouse habitat are expected to be similar to the Current Grazing Alternative because a different level of impact is not expected to be detectable within the timeframe of this analysis	Direct and indirect effects to sage-grouse and sage-grouse habitat are expected to be similar to the Current Grazing Alternative and the Proposed Action however the additional rest period would potentially result in a more rapid recovery of upland and riparian sites that are currently in less than desirable condition. Improving plant vigor, species composition and forb availability will have greater positive effects to pygmy rabbit habitat than the other action alternatives.

Table 31: Direct, Indirect, and Cumulative Effects to Pygmy Rabbit by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Mudd Creek	This alternative is expected to result in a static trend of species composition and is not likely to provide for adequate plant development and reproduction in some areas of the allotment. This may have negative impacts to pygmy rabbits that may use this habitat because the current species composition of the allotment is in a range of what is expected but not providing for adequate plant development in some areas may reduce the quality of the habitat in the future. Shrub cover, including sagebrush is not expected to change over time. The average cover on this allotment (19%) is within the range categorized as suitable for pygmy rabbits and they are known in this allotment. There are approximately 150 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term, maintaining this habitat. Overall, the sites monitored in this allotment show the sagebrush-grassland sites meeting desired rangeland health objectives.	Direct and indirect effects to sage-grouse and sage-grouse habitat are expected to be similar to the Current Grazing Alternative because a different level of impact is not expected to be detectable within the timeframe of this analysis	Direct and indirect effects to pygmy rabbits are expected to be similar to the Current Grazing Alternative and the Proposed Action above however the additional rest period would potentially result in a more rapid recovery of upland sites that are currently in less than desirable condition. Improving plant vigor, species composition and therefore grass and forb availability will have greater positive effects to pygmy rabbit habitat and pygmy rabbits than the other action alternatives.
Pintlar Creek	This alternative is expected to result in a static trend of species composition and is not likely to provide for adequate plant development and reproduction in some areas of the allotment. This may have negative impacts to sage-grouse that may use this habitat because the current species composition of the allotment is below the amounts expected and not providing for adequate plant development in some areas may reduce the quality of the habitat for	Direct and indirect effects to pygmy rabbits are expected to be similar to the Current Grazing Alternative. However, deferred entry of livestock every other year would potentially allow for additional plant development and reproduction and increased plant vigor. This could lead to improved species composition which would	With the exception of Pintlar Meadows, direct and indirect effects to pygmy rabbits would be similar to those described under the Proposed Action alternative. In Pintlar Meadows, this part of the allotment would be closed to livestock grazing for a minimum of 10 years to allow for resource recovery following rehabilitation. This would potentially result in more rapid improvement of species composition; however this is not pygmy rabbit habitat therefore additional beneficial effects to pygmy rabbits are not expected.

Table 31: Direct, Indirect, and Cumulative Effects to Pygmy Rabbit by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	sage-grouse in the future. This impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time. The average cover on this allotment (18%) is just below the percentage suitable for pygmy rabbits. There are approximately 150 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term, maintaining this habitat. Overall, the sites monitored in this allotment show the sagebrush-grassland sites are below desired rangeland health objectives and this would remain static under this alternative.	increase the quality of habitat in the allotment. This rate of recovery may not be detectable in the timeframe of this analysis so increased beneficial effects to pygmy rabbits are marginal.	
Mussigbrod	This alternative is expected to result in little improvement to current species composition on the allotment. Currently on upland sites there is an apparent trend away from desirable species composition. This may have negative impacts to pygmy rabbits because the current species composition of the allotment is below the amounts expected and not providing for adequate plant development in some areas may reduce the quality of the habitat for pygmy rabbits in the future. This impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time except in the Mussigbrod fire perimeter. Sagebrush cover in this allotment	Implementation of this alternative is expected to lead to a more rapid rate of vegetation recovery on upland sites when compared to current management. Incorporation of a rest year into the grazing system would result in improved species composition over time. Improving plant vigor, species composition and forb availability will have greater positive effects to pygmy rabbit habitat than the proposed action alternative. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy	This alternative is expected to provide for a faster rate of vegetation recovery than the Proposed Action because the Bender Pasture would be rested for a minimum of 10 years and the single pasture modified rest rotation strategy would reduce the intensity and duration of livestock grazing use on the allotment. These actions would result in improved species composition and cover. Improving plant vigor, species composition and forb availability will have greater positive effects to pygmy rabbit habitat and pygmy rabbits than the other action alternatives. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time except in the Mussigbrod fire perimeter. Sagebrush cover was present in amounts expected for this habitat type (14%), which is which is below the percent

Table 31: Direct, Indirect, and Cumulative Effects to Pygmy Rabbit by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	averaged 14%, which is just below the 20% used to predict available habitat. There are approximately 160 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to not change in the long term. Overall, sagebrush cover is expected to remain static over time which would maintain available habitat overtime. Pygmy rabbits were not found in this allotment during surveys. There was a major decrease noted on two transects that were burned in the 2000 Mussigbrod fire and these shrubs are still recovering.	rabbits. Shrub cover, including sagebrush is not expected to change over time except in the Mussigbrod fire perimeter. Sagebrush cover was present in amounts expected for this habitat type (14%), which is below the percent preferred by this species. There are approximately 160 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to remain static over time which would maintain available habitat.	preferred by this species. There are approximately 160 acres of pygmy rabbit habitat mapped within the allotment (high sagebrush cover) and under this alternative; shrub cover is expected to remain static over time which would maintain available habitat.
Ruby Creek	On sampled sites in this allotment there was a trend away from desirable species composition and an increase in nonnative plants. This alternative is expected to result in little improvement to current species composition and is not expected to provide for sufficient grazing deferment. Season long use is likely to maintain less than desirable species composition in the Butler pasture. This may have negative impacts to pygmy rabbits because the current species composition of the allotment is below the amounts expected and not providing for adequate plant development in some areas may reduce the quality of the habitat for pygmy rabbits in the future. This impact is expected to be small, as this allotment is not known to be used by rabbits and sagebrush cover is expected to remain static	This alternative is expected to result in little change to existing rangeland health conditions, the measures used to evaluate the quality of pygmy rabbit habitat in the allotment. The complete rest of Bender pasture one year out of three would be expected to improve plant species composition and cover within the pasture. On sampled sites in this allotment there was a trend away from desirable species composition and an increase in nonnative plants. This alternative is expected to result in little improvement to current species composition. This may have negative impacts to rabbits that may use this	This alternative is expected to provide better deferment to forage plants which is expected to improve plant vigor and increased species composition and cover in all pastures. Improving plant vigor, species composition and forb availability will have greater positive effects to pygmy rabbit habitat and pygmy rabbits than the other action alternatives. This impact is expected to be small, as this allotment is not known to be used by pygmy rabbits and a majority of the allotment is not pygmy rabbit habitat.

Table 31: Direct, Indirect, and Cumulative Effects to Pygmy Rabbit by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	over time.	habitat because the current species composition of the allotment is below the amounts expected and not providing for adequate plant development in some areas may reduce the quality of the habitat for sage-grouse in the future. This impact is expected to be small, as this allotment is not known to be used by pygmy rabbits and sagebrush cover is expected to remain static over time.	
Dry Creek	On sampled sites in this allotment there was an upward trend towards desirable species composition. This alternative is expected to result in continued slow upward trend in improved species composition and is expected to provide for sufficient grazing deferment. Improving plant vigor, species composition and forb availability will have greater positive effects to pygmy rabbit habitat and pygmy rabbits than the other action alternatives. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Sagebrush cover was present in amounts expected for this habitat type (17%), which is just below the 20% cover preferred by this species. Shrub cover, including sagebrush is not expected to change over time which would maintain this habitat.	This alternative is expected to result in greater improvements to rangeland health than the current grazing alternative. Incorporating a rest year into the grazing system will allow for improved slow upward trend in improved species composition. Improving plant vigor, species composition reproduction and forb availability will have greater positive effects to pygmy rabbit habitat and pygmy rabbits than the Current Grazing alternative. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Sagebrush cover was present in amounts expected for this habitat type (17%), which is just below the 20% cover preferred by this	This alternative would have the same effects to sage-grouse as described under the Proposed Action alternative.

Table 31: Direct, Indirect, and Cumulative Effects to Pygmy Rabbit by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
		species. Shrub cover, including sagebrush is not expected to change over time which would maintain this habitat.	
Twin Lakes	Implementation of this alternative is expected to result in little to no change to species composition and it is expected that a trend towards less desirable forage species would continue to occur within the Big Lake portion of the allotment. This may have negative impacts to pygmy rabbits by reducing the quality of the habitat for pygmy rabbits in the future. The Little Lake portion is expected to maintain existing conditions or possibly result in a slow improving trend in desirable species composition. Maintaining plant vigor, species composition and forb availability will have positive effects to pygmy rabbit habitat. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time and was present in amounts expected for this habitat type (20%), which is the amount preferred by this species. The Little Lake portion is expected to maintain existing conditions or possibly result in a slow improving trend in desirable species composition. Overall this alternative would maintain sagebrush cover over time and maintain this pygmy rabbit habitat.	Implementation of this alternative is expected to potentially result in greater improvements to rangeland health in the allotment when compared to the current grazing alternative. This is expected to result in improved species composition over the long term. Improving plant vigor, species composition and forb availability will have greater positive effects to pygmy rabbit habitat than the other action alternatives. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Sagebrush cover was present in amounts expected for this habitat type (20%), which is the amount preferred by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time, which would maintain pygmy rabbit habitat.	This alternative would have the same effects to sage-grouse as described under the Proposed Action alternative.
Monument	Implementation of this alternative is expected to result in a static trend in species composition over	The impacts to pygmy rabbits under this alternative are similar as the	Implementation of this alternative is expected to potentially result in greater improvements to rangeland health in the

Table 31: Direct, Indirect, and Cumulative Effects to Pygmy Rabbit by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
	time. Currently the long-term monitoring data for sagebrush-grassland sites have shown the Maintaining plant vigor, species composition and forb availability will have positive effects to pygmy rabbit habitat and pygmy rabbits. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time and was present in amounts expected for this habitat type (20%), which is the amount preferred by this species. Overall this alternative would maintain sagebrush cover over time and maintain this pygmy rabbit habitat.	Current Grazing alternative.	allotment when compared to the current grazing alternative. This is expected to result in improved species composition over the long term. Improving plant vigor, species composition and forb availability will have greater positive effects to pygmy rabbit habitat and pygmy rabbits. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Sagebrush cover was present in amounts expected for this habitat type (20%), which is the amount preferred by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time, which would maintain pygmy rabbit habitat.
Pioneer	Implementation of this alternative is expected to result in a static trend in species composition over time. Currently the long-term monitoring data for sagebrush-grassland sites have shown the species composition is present in desirable amounts and quantities as would be expected. Maintaining plant vigor, species composition and forb availability will have positive effects to pygmy rabbit habitat and pygmy rabbits. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time and was present in amounts expected for this habitat type (27%), which is the amount preferred by this species. Overall this alternative would maintain sagebrush cover over time and maintain this pygmy rabbit habitat.	The impacts to pygmy rabbits under this alternative are similar as the Current Grazing alternative.	Implementation of this alternative is expected to potentially result in greater improvements to rangeland health in the allotment when compared to the current grazing alternative. This is expected to result in improved species composition over the long term. Improving plant vigor, species composition and forb availability will have greater positive effects to pygmy rabbit habitat and pygmy rabbits. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Sagebrush cover was present in amounts expected for this habitat type (27%), which is the amount preferred by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time, which would maintain pygmy rabbit habitat.

Table 31: Direct, Indirect, and Cumulative Effects to Pygmy Rabbit by Allotment by Alternative

Allotment	Current Grazing Management Alternative	Proposed Action Alternative	Alternative 4
Saginaw	Implementation of this alternative is expected to result in a static trend in species composition over time. Currently the long-term monitoring data for sagebrush-grassland sites have shown the species composition is present in desirable amounts and quantities as would be expected. Maintaining plant vigor, species composition and forb availability will have positive effects to pygmy rabbit habitat and pygmy rabbits. This beneficial impact is expected to be small, as this allotment is not known to be used by pygmy rabbits. Shrub cover, including sagebrush is not expected to change over time and was present in amounts expected for this habitat type (9%), which is the amount preferred by this species. Overall this alternative would not reduce available sagebrush cover over time and maintain this pygmy rabbit habitat.	The impacts to pygmy rabbits under this alternative are similar as the Current Grazing alternative	This alternative is expected to result in some improvements to rangeland health conditions, which may have greater beneficial effects to sage-grouse than the other action alternatives. Specifically, a reduction in the season of use would reduce the duration of livestock grazing effects to vegetation which could lead to improved plant vigor. Improving plant vigor, species composition and forb availability will have greater positive effects to pygmy rabbit habitat and pygmy rabbits than the other action alternatives. However, implementation of a grazing avoidance period from July 1 through August 25 in pasture 4 would likely result in less grazing deferment for the remaining pasture which could result in potential negative effects to rabbits by reducing plant vigor over the long term. Sagebrush cover was present in amounts expected for this habitat type (9%), which is below the amount preferred for this species. There may be some increases in sagebrush cover over time in areas that were past prescribed burning reduced sagebrush cover. This may benefit pygmy rabbit habitat in the future but it is unlikely because pygmy rabbits are not known in this allotment.
Cumulative Effects for All Allotments	The cumulative effects are the same for the Current Grazing Management, Proposed Action and Alternative 4 for Pygmy Rabbits. Loss of habitat through fire, grazing, invasion of exotic animals, and conversion to agriculture is probably the most significant factor contributing to pygmy rabbit declines (USDA 2009a – Appendix B and US DI Fish and Wildlife Service 2010). This alternative will not add measurable cumulative effects to this species because this alternative will not result in a loss of pygmy rabbit habitat. The clear challenges for pygmy rabbit management in southwest Montana are found on the valley floors, where the majority of the habitat is for the species. Additionally, no National Forest sagebrush habitat conversion is proposed under this alternative and Rauscher (1997) reports that pygmy rabbits are surviving and even thriving at current grazing levels in certain areas of southwest Montana. ***Determination -*** These alternatives ***may impact individuals or habitat but will not likely cause a trend towards federal listing or loss of viability to the population or species.*** As noted at Table 27, Beaverhead-Deerlodge NF ownership of potential pygmy rabbit habitat is minor when compared to Private and Bureau of Land Management ownership. The clear challenges for pygmy rabbit management in southwest Montana are found on the valley floors. Alternative 4 minimizes impacts to this species from livestock grazing with the incorporated design features and grazing strategy designed to maintain and improve habitat over time with increased rest.		

Effects to MIS Rocky Mountain Elk

References to habitat effectiveness and road density management suggest that elk are a useful management indicator species to monitor the effectiveness of motorized use management and secure habitat changes especially since elk occur in every habitat type and virtually every elevation across the Forest. Elk were also selected as an MIS because they are one of the most popular hunted species in Montana and were not selected as an MIS due to population viability concerns. Open, motorized roads and trails are managed at the Hunting District and Landscape Scale. None of the alternatives in the project will impact motorized use management or impact secure habitat as measured by OMRTD. Therefore, all alternatives are incompliance with Forest Plan Direction for this MIS

Effects to MIS North American Wolverine

The wolverine was analyzed in detail above in the threatened and endangered species section. Livestock grazing, as proposed in the action alternatives, does not impact modeled wolverine denning habitat or impact winter non-motorized areas. Additionally, the no action alternative would have to impact on modeled wolverine denning habitat or winter non-motorized areas. Therefore, all alternatives are incompliance with Forest Plan Direction for this MIS.

Effects to Migratory Birds

The project area lies in BCR 10. The birds of conservation concern for BCR 10 are shown in Appendix B8 table Birds of Conservation Concern BCR 10. Three of these species have already been addressed as sensitive species (bald eagle, peregrine falcon and flammulated owl) in the R1 Regional Foresters Sensitive Species List. Of the remaining species, they are either not found in the project area, the project area is outside of the range for the species in Montana, there is no habitat in the project area, or live stock grazing and range improvement has not been identified as a threat to the species according to the Montana Bird Conservation Plan. A few are not expected to be impacted by livestock grazing and range improvements even though there is habitat because none of the alternatives are proposing any habitat conversion or there is no conflict from grazing and management of these species.

One species, the Willow flycatcher , with the implementation of the grazing mitigation/design featers and the accompanying Forest Plan aquatic standards is expected to maintain and improve the habitat for this species. For another specie, Brewer's sparrow, based on the Montana Bird Conservation Plan implementing recommendations for Greater Sage grouse should encompass all the needs of this species. For the Sage sparrow in Montana it is not considered a species of conservation concern.

The details of possible impacts to the individual species can be found in Appendix B8, the Birds of Conservation Concern BCR 10 table.

Comparison of Alternatives

Table 32: Summary of Effects to Resource Indicators for Grizzly Bear by Alternative

Alternative	Number of grazed Allotments and pastures in each BAU.	Level of Effect
No Action	0	Low
Current Grazing Management	11, however 2 incorporate a rest period	High
Proposed Action	11, however 6 incorporate a rest period	Moderate
Alternative 4	11, however all 11 incorporate a rest period and 2 allotments (Pintler and Ruby Creek) have entire pastures rested for 10 years	Moderate/Low

Table 33: Summary of Effects to Resource Indicators for Canada Lynx by Alternative

Alternatives	Species Composition of Upland Sties	Species Composition of Riparian Sites	Riparian Shrub Cover
No Action	Increase	Static to increase	Static to localized increases
Current Grazing Management	Static	Static	Static
Proposed Action	Static to increase	Static to increase	Static
Alternative 4	Static to increase	Static to increase	Static to localized increases

Table 34: Summary of Effects to Resource Indicators for Gray Wolf by Alternative

Alternative	Number of grazed Allotments and pastures in each BAU.	Level of Effect	Determination
No Action	0	Low	BI
Current Grazing Management	11, however 2 incorporate a rest period	High	MIIH
Proposed Action	11, however 6 incorporate a rest period	Moderate	MIIH
Alternative 4	11, however all 11 incorporate a rest period and 2 allotments (Pintler and Ruby Creek) have entire pastures rested for 10 years	Moderate /Low	MIIH

Table 35:Summary of Effects to Resource Indicators for Sage Grouse by Alternative

Alternative	Preferred Forbs	Sagebrush Cover	Grass and Forb Cover	Miles of fence	Level of Effect	Determination
No Action	Increase	Static	Increase	0	Low	NI
Current Grazing Management	Static	Static	Static	0	High	MIIH
Proposed Action	Static to increase	Static	Static to increase	1	Modera te/ Low	MIIH
Alternative 4	Static to increase	Static	Static to increase	1.35	Low	MIIH

Table 36:Summary of Effects to Resource Indicators for the Northern Bog Lemming

Alternative	Area of Bog Lemming Habitat Impacted	Level of Effect	Determination
No Action	0, None of the swamp would be impacted by cattle	Low	NI
Current Grazing Management	1, the Monument allotment would be grazed yearly	Moderate	MIIH
Proposed Action	1, the Monument allotment would be grazed yearly	Moderate	MIIH
Alternative 4	1, however the Monument allotment would be only be grazed 3 out of 4 years, increasing the rest on this allotment and reducing the time livestock are impacting Hamby Swamp	Moderate /Low	MIIH

Table 37: Summary of Effects to Indicators for the Pygmy Rabbit

Alternative	Availability of Forbs and Grasses	Sagebrush Cover	Level of Effect	Determination
No Action	Increase	Static	Low	NI
Current Grazing Management	Static	Static	High	MIIH
Proposed Action	Static to increase	Static	Moderate/ Low	MIIH
Alternative 4	Static to increase	Static	Low	MIIH