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Monroe Mountain Aspen Ecosystems Restoration Project

Richfield Ranger District, Fishlake National Forest
Sevier and Piute Counties, Utah

Legal Description: Multiple sections in Ranges 1, 2, 2 ½, and 3 West and in Townships 24, 25, 26, 27, 28, and 29 South

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For:

Richfield Ranger District
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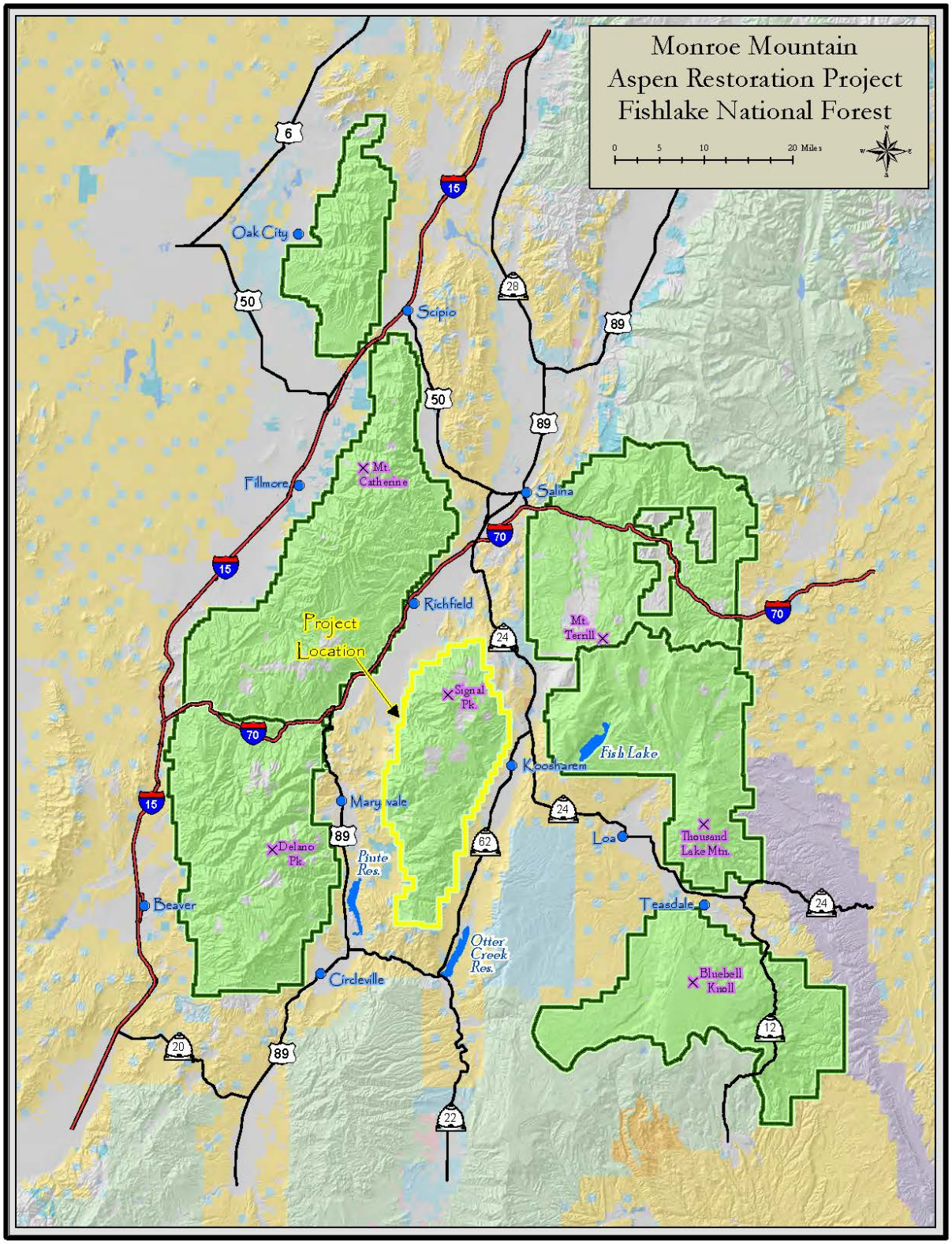
June 17, 2015


Monroe Mountain
Aspen Restoration Project
Fishlake National Forest
0 5 10 20 Miles
Oak City
Scipio
Fillmore
Mt. Catherine
Salina
Richfield
Project Location
Signal Pk.
Mt. Terrill
Fish Lake
Koosharem
Marysvale
Delano Pk.
Piute Res.
Loa
Thousand Lake Mtn.
Beaver
Teasdale
Otter Creek Res.
Circleville
Bluebell Knoll
6
15
50
28
89
70
24
62
20
22
12

Proposed Action

The action proposed by the District to meet the purpose and need is to conduct a combination of prescribed fire and/or mechanical thinning treatments in stable and seral aspen stands, and spruce/fir and mixed conifer stands to promote the regeneration and recruitment of aspen communities. Some stands currently dominated by spruce/fir and mixed conifer may have been dominated by aspen at some point in the past. Aspen occurs in varying percentages in spruce/fir, mixed conifer, and seral aspen dominated stands. Treating spruce/fir, mixed conifer, and aspen stands would reduce competition for resources, and encourage aspen to regenerate.

The proposed action is similar for all of the alternatives. What vary within the alternatives are the acreages of mechanical thinning verses the acreages of prescribed fire that would be treated depending on the issues (EIS Chapter 1), and the mileage of temporary roads proposed for each alternative. The treatment options proposed for the project area are: (1) areas would be mechanically thinned with the associated slash piled and burned, and (2) areas would receive prescribed fire treatments. Please see Chapter 2 for detailed descriptions of these treatment options and each alternative (EIS, Chapter 2).

Addressing the reduced occurrence of wildland fire primarily due to an increase in wildland fire suppression on Monroe Mountain is critical to the long-term restoration of aspen ecosystems. The average fire return intervals for each of the vegetation cover types occurring on Monroe Mountain can be found in Chapter 1 in the EIS This table also shows that the maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen, spruce/fir, and mixed conifer is 47,274 acres (Alternative 4). However, the management guidelines for Northern goshawk require leaving 40 percent interlocking crowns in foraging areas. To be compliant with the guidelines, prescribed burning would only occur when 60 percent of the prescribed fire area is expected to burn. This would leave 40 percent of the area with interlocking crowns intact. As for the areas proposed for mechanical treatments, by removing just conifer and/or removing conifer trees up to 8 inch at Diameter Breast Height (DBH), using group and singletree selection, desiring uneven-aged management, and proposing minimal mechanical treatments in the stable aspen stands, 40 percent of the area with interlocking crowns would also remain intact in the mechanical treatment areas. Therefore, the maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen, spruce/fir, and mixed conifer (assuming only 60 percent of the prescribed fire treatment areas are burned) is 36,300 acres (Alternative 4). The approximate duration of this project is 10 years; therefore, approximately 18,150 acres would be mechanically treated and/or prescribed burned every 5 years. This number is well within the recommended range of area to treat within a 5-year period of 5,000 to 24,000 acres (Chapter 1 of EIS).

Mechanical thinning and prescribed fire treatments are proposed within five Inventoried Roadless Areas (IRAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore) and within five draft Unroaded-Undeveloped Areas (UUAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore). No roads would be constructed within IRAs. Temporary roads would be constructed in treatment areas located outside of the IRAs (for all alternatives) including within draft UUAs (see Alternatives 4 and 5). The mileage for these temporary roads varies depending on the Alternative (see Chapter 2 for specific road locations, mileage, and

specifications). In addition, temporary fencing would be installed around Manning Meadows Reservoir and Barney Lake (see Chapter 2 for fencing locations, mileage, and specifications)

No active treatments are proposed within the sagebrush cover-type where scattered aspen trees and stands occur in portions of the sagebrush communities. These areas are expected to improve through passive restoration (i.e., by trying to allow naturally ignited fires to burn, and changing grazing and browsing management). See Chapter 2 for a detailed description of the District's proposal to address overbrowsing of aspen.

Fire Severity Definitions

Low soil burn severity: Surface organic layers are not completely consumed and are still recognizable. Structural aggregate stability is not changed from its unburned condition, and roots are generally unchanged because the heat pulse below the soil surface was not great enough to consume or char any underlying organics. The ground surface, including any exposed mineral soil, may appear brown or black (lightly charred), and the canopy and understory vegetation will likely appear "green."

Moderate soil burn severity: Up to 80 percent of the pre-fire ground cover (litter and ground fuels) may be consumed but generally not all of it. Fine roots (approximately 0.1 inch in diameter) may be scorched but are rarely completely consumed over much of the area. The color of the ash on the surface is generally blackened with possible gray patches. There may be potential for recruitment of effective ground cover from scorched needles or leaves remaining in the canopy that will soon fall to the ground. The prevailing color of the site is often "brown" due to canopy needle and other vegetation scorch. Soil structure is generally unchanged.

High soil burn severity: all or nearly all of the pre-fire ground cover and surface organic matter (litter, duff, and fine roots) is generally consumed, and charring may be visible on larger roots. The prevailing color or the site is often "black" due to extensive charring. Bare soil or ash is exposed and susceptible to erosion, and aggregate structure may be less stable. White or gray ash (up to several inches in depth) indicates that considerable ground cover or fuels were consumed. Sometimes very large tree roots (greater than 3 inches in diameter) are entirely burned extending from a charred stump hold. Soil is often gray, orange, or reddish at the ground surface where large fuels were concentrated and consumed.

Proposed Action and alternatives

Introduction

This section describes the proposed action and alternatives, and compares the alternatives considered for the Monroe Mountain Aspen Ecosystems Restoration project. It includes a description of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative and some

of the information is based upon the environmental, social, and economic effects of implementing each alternative.

Proposed Action

Proposed Mechanical Treatments

Seral and Stable Aspen Stands

There are two mechanical treatment options being considered in this analysis for seral and stable aspen dominated stands:

1. Conifers would be removed and the existing aspen would be retained regardless of the size of the conifer or if it is located within an IRA or draft UUA. To access the conifer, some incidental cutting of aspen may occur. This option would occur throughout the project area.
2. Within IRAs and draft UUAs, conifer would be thinned from below up to 8 inch DBH and the existing aspen would be retained. In all areas outside the IRAs and draft UUAs, conifers would be removed and the existing aspen would be retained regardless of the size of the conifer.

Spruce/Fir and Mixed Conifer Stands – Proposed Mechanical Treatment Methods

There are also two mechanical treatments options being considered in this analysis for spruce/fir and mixed dominated conifer stands:

1. This option would occur throughout the project area.
   a) If present, beetle killed conifer trees would be removed while ensuring consistency with the LRMP for snags and down woody debris (salvage harvest[1]).
   b) If conifer trees are currently infected by beetles and are in the process of dying, the infected trees would be removed while ensuring consistency with the LRMP for snags and down woody debris (sanitation harvest[2]).
   c) In areas of spruce/fir or mixed conifer where LRMP stocking levels are below plan guidance due to bark beetle impacts, replanting of spruce or mixed conifer may occur. If the remaining live trees were greater than a BA of 90[3], the remaining live trees

[1] Salvage harvest – The removal of dead trees, damaged trees, or dying trees resulting from injurious agents other than competition (Helms 1998).
[2] Sanitation harvest – The removal of trees to improve stand health by stopping or reducing the actual or anticipated spread of insects and disease (Helms 1998).
[3] A BA of 90 helps reduce fuel loads to facilitate prescribed burning. Disturbance from lowering the BA to 90 is expected to help stimulate new aspen growth while maintaining a spruce and conifer presence. A BA of 90 is also expected to reduce the probability of continued Spruce beetle infestation (Hebertson 2013) and is expected to allow for trees to grow bigger.

would be thinned using uneven- aged management[4] to a BA of 90 with single and group tree selection.

d) If no beetle killed or infested trees are present initially, trees would be thinned using uneven aged management to a BA of 90 with single and group tree selection.

2. Within IRAs and draft UUAs, conifer would be thinned from below up to 8 inch DBH. In all areas outside the IRAs and draft UUAs, treatments would occur as in Option 1 for spruce/fir and mixed conifer dominated stands.

Table 1. Option 1--Mechanical treatments with associated slash burning for seral and stable aspen, spruce/fir, and mixed conifer dominated

	Existing Vegetation	Mechanical and Associated Slash Burning
Alternative 2	Seral Aspen	3,146
	Stable Aspen	4,025
	Spruce/Fir	918
	Mixed Conifer	97
	Total	8,186
Alternative 3	Seral Aspen	6,422
	Stable Aspen	4,780
	Spruce/Fir	2,355
	Mixed Conifer	91
	Total	13,648
Alternative 4	Seral Aspen	9,492
	Stable Aspen	6,130
	Spruce/Fir	4,113
	Mixed Conifer	102
	Total	19,837
Alternative 5	Seral Aspen	6,736
	Stable Aspen	5,340
	Spruce/Fir	2,905
	Mixed Conifer	92
	Total	15,073

[4] Uneven-aged management – a planning sequence of treatments designed to maintain and regenerate a stand with three or more age classes (Helms 1998). This is opposed to even-aged management that describes a stand as trees composed of a single age class.

Table 2. Option 2--Mechanical treatments with associated slash burning for seral and stable aspen, spruce/fir, and mixed conifer dominated stands

	Existing Vegetation	Mechanical and Associated Slash Burning (Acres Outside IRAs and UUAs)	Mechanical and Associated Slash Burning (Acres Inside IRAs and UUAs)	Project Total
Alternative 2	Seral Aspen	2,349	797	3,146
	Stable Aspen	3,643	382	4,025
	Spruce/Fir	472	446	918
	Mixed Conifer	89	8	97
	Total	6,553	1,633	8,186
Alternative 3	Seral Aspen	3,111	3,311	6,422
	Stable Aspen	3,965	815	4,780
	Spruce/Fir	835	1,520	2,355
	Mixed Conifer	90	1	91
	Total	8,001	5,647	13,648
Alternative 4	Seral Aspen	3,991	5,501	9,492
	Stable Aspen	4,196	1,934	6,130
	Spruce/Fir	1,186	2,927	4,113
	Mixed Conifer	91	11	102
	Total	9,464	10,373	19,837
Alternative 5	Seral Aspen	2,547	4,189	6,736
	Stable Aspen	3,830	1,510	5,340
	Spruce/Fir	984	1,921	2,905
	Mixed Conifer	91	1	92
	Total	7,452	7,621	15,073

Proposed Prescribed Fire Treatments

Prescribed fire would be implemented utilizing aerial and/or hand ignition techniques targeting spruce/fir, mixed conifer, and seral aspen with mosaic burn patterns and mixed burn severities as an objective. To maintain LRMP compliance, prescribed fire would occur when 60 percent of the area would be expected to burn (Table 3).

Table 3. Proposed prescribed fire treatments.

	Existing Vegetation	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire - Mixed Burn Severities Factoring 60% of the Acres Get Burned
Alternative 2	Seral Aspen	15,159	9,095
	Stable Aspen	7,991	4,795
	Spruce-Fir	5,658	3,395
	Mixed Conifer	4,183	2,510
	Total	32,991	19,795
Alternative 3	Seral Aspen	14,318	8,591
	Stable Aspen	7,861	4,716
	Spruce-Fir	4,988	2,993
	Mixed Conifer	4,190	2,514
	Total	31,357	18,814
Alternative 4	Seral Aspen	12,763	7,658
	Stable Aspen	6,693	4,016
	Spruce-Fir	3,802	2,281
	Mixed Conifer	4,178	2,507
	Total	27,436	16,462
Alternative 5	Seral Aspen	11,676	7,006
	Stable Aspen	6,777	4,066
	Spruce-Fir	3,810	2,286
	Mixed Conifer	4,190	2,514
	Total	26,453	15,872

Design Criteria and Mitigation Measures –See Chapter 2 of the EIS for the list of design Criteria and mitigation measures

Mechanical Thinning Treatments and Associated Slash Pile Burning, and Prescribed Fire Treatments

- All applicable LRMP standards and guidelines would be applied and incorporated into all the action alternatives.
- Treated areas would be rested from livestock grazing for at least two growing seasons post implementation, and possibly three to reduce livestock browse pressure on new aspen sprouts.
- Invasive and noxious weeds are not known to occur in the proposed treatment areas; however, treatment areas would be monitored post-implementation. If noxious and/or invasive weeds were detected, the District would take the appropriate actions to control spread and eliminate the noxious and/or invasive weeds from the treatment areas.
- Equipment would be washed and inspected, prior to entering National Forest System lands, to remove any soil and debris that may contribute to the spread of noxious weeds.
- Equipment would be cleaned and dried before moving from one water source to another to prevent the spread of aquatic invasive species (AIS). If equipment cannot be completely dried, equipment would be decontaminated following the 2014 Region 4 Fire AIS guidelines (USFS 2014a).
- Treatments would target upland, non-riparian areas first. No more than 15 percent of the upland areas within a hydrologic unit code (HUC) 6 would be treated in any one year. After the upland areas have been treated (15 percent) and have recovered [comparable] watershed function, additional upland areas (15 percent) in the same HUC 6 could occur.
- After the upland areas have been treated and have recovered [comparable] watershed function and aspen restocking (1,000 aspen saplings per acre) are being achieved, then the aspen or conifer in riparian areas could be treated.
- No more than 5 to 10 percent of the riparian areas within a HUC 6 would be treated in any one year. After the riparian areas have been treated (5 to 10 percent) and have recovered [comparable] watershed function, additional riparian areas (5 to 10 percent) in the same HUC 6 could occur.
- Following treatments, if determined necessary by the Forest's fish biologist, hydrologist, or soil scientist, wood chips, slash, mulch, straw, and/or silt fences could be installed to help minimize impacts from soil erosion.
- A Spill Prevention Control and Containment Plan would be compiled and in place prior to project implementation.
- Areas for fuel storage, refueling, servicing, and parking of equipment would occur outside riparian areas in designated locations.
- Significant historical and cultural sites identified by the Forest archaeologist would be protected from prescribed fire treatments by the construction of a control line observing a 100-foot buffer from the site. These sites would also be protected from mechanical treatments by observing the same 100-foot buffer from the site.
- To provide for firefighter and public safety, some roads and dispersed camping areas may be temporarily closed during prescribed fire and/or mechanical treatment implementation.

Temporary closures would be determined by implementation personnel and would be based on the hazards present at the time of implementation.

- Within Northern goshawk areas, all applicable Fishlake LRMP Amendment Northern Goshawk Guidelines (USFS 2000) would be followed. For example:
    - Forest vegetative manipulation (timber harvest, prescribed burning, fuelwood, thinnings, weedings, etc.) would not occur within active nest areas (NAs) (approximately 30 acres; i.e. guideline O.) during the active nesting period. The active nesting period would normally occur between March 1 and September 30.
    - Vegetative treatments are designed to maintain or promote VSS; the percent of the group acreage covered by clumps of trees with interlocking crowns should typically range from 40 to 70 percent in PFAs areas (PFAs) and foraging areas, and 50 to 70 percent in NAs. To manage outside this range, it would either be shown that the range is not within PFC for the site and the biological evaluation process determines that managing outside the range would be consistent with the landscape needs of the Northern goshawk and its prey. The best and most reliable information would be used to make determinations. The District is not proposing to manage outside this range. Groups are made up of multiple clumps of trees. Groups would be of a size and distribution in a landscape that is consistent with disturbance patterns defined in regional or local PFC assessments. Clumps typically have two to nine trees with interlocking crowns.
- To help minimize impacts to migratory bird trust resources, coordination with the USFWS would occur as special circumstances arise.
- Within the spruce/fir dominated areas, to help minimize impacts from mechanical treatments on cavity nesting birds, thinning activities would usually commence after July 15.
- Within the aspen areas, a minimum of 200 snags per 100 acres: 8 inch DBH – 15 feet tall would be retained. Within the mixed conifer and spruce/fir areas, a minimum of 300 snags per 100 acres: 18 inch DBH – 30 feet tall would be retained.
- Within the aspen areas, a minimum of 50 down logs per 10 acres, 6-inch diameter at 8 feet long, and 30 tons per 10 acres would be retained. Within the mixed conifer and spruce/fir areas, a minimum of 50 down logs per 10 acres, 12-inch diameter at 8 feet long, and 100 tons per 10 acres would be retained.
- Livestock grazing permittees would be notified at least 1 year in advance of the treatments that would take place on their allotments. Discussions on to how to best rest the treated areas would occur directly with the permittees. The District would ensure the resting of treatment areas, herding, and electric fences are incorporated into Annual Operating Instructions. These actions would help ensure that permittees are in the communication loop and would give them enough time to plan for the resources they need to continue their operations.
- Impacts to permittees would be minimized by the use of herding and temporary electric fences so that treatment areas and/or stable aspen stands can be rested while non-treatment areas can continue to be grazed.
- If any prehistoric cultural features or deposits are encountered during project implementation, activities would be discontinued in the immediate area of the remains, and the State Historic Preservation Office (SHPO) would be consulted to evaluate their nature and significance. In addition, if any Native American human remains or funerary

objects were discovered during implementation they would be immediately reported as required by law.

- If project activities inadvertently discover habitation sites, plant gathering areas, human remains, and objects of cultural patrimony, the Historic Preservation Department – Traditional Culture Program would be notified respectively in accordance with the Native American Graves Protection and Repatriation Act.

Mechanical Thinning Treatments and Associated Slash Pile Burning

- Ground based mechanical treatments would only occur on slopes less than 40 percent.
- Within riparian areas, equipment operations would occur when soils are dry, frozen or snow levels are sufficient to prevent wheels or tracks from coming in contact with soil.
- Cutting methods would include, but are not limited to, feller bunchers, skid-steers attached with saws, and/or hand crews equipped with chainsaws, bow saws, or loppers.
- Merchantable wood and biomass removal methods to the nearest road would include, but are not limited to, skid-steers, skidders, horses, helicopters, and/or cables. The most likely areas for helicopter use would be near Manning Meadows Reservoir and Barney Lake.
- Within riparian areas, low ground pressure equipment (i.e. skid-steers) would be used where possible to help minimize soil impacts.
- Trees located on rocky ridges, or in other areas that are not as susceptible to fire would not be cut.
- A combination of skid trails, temporary roads, and existing roads would be used to facilitate the mechanical treatments that occur outside IRAs. Temporary roads would be reclaimed upon completion of the mechanical treatments.
- Inside the IRAs, skid trails and existing roads would be used to facilitate the mechanical treatments. No temporary roads would be constructed inside the IRAs. For areas that cannot be accessed via existing roads, cross-country travel would be allowed to facilitate access to specific stands.
- No temporary roads would be constructed in Northern goshawk PFAs or NAs.
- No skid trails or landings would be constructed inside riparian areas.
- Efforts would be made to cut trees as close to the ground as possible.
- Efforts would be made to have merchantable trees removed from Monroe Mountain.
- Non-merchantable trees and slash would be consolidated and either piled and burned, or hauled off-site. Non-merchantable trees could also be made available for firewood cutting.
- Inside IRAs, if existing roads and skid trails do not allow for the removal of biomass, trees and slash may be consolidated, piled, and burned on-site.
- No mechanical treatments using feller bunchers or skid-steers would occur in the stable aspen stands that have little to no conifer presence (less than 40 conifer stems per acre) in

the aspen understory. These areas may still be mechanically treated with hand crews equipped with chainsaws, bow saws, or loppers.

- Jack-strawing on a small scale, in site-specific areas to help impede ungulate access may occur.

Prescribed Fire Treatments

- Prescribed fire would be implemented utilizing aerial and/or hand ignition techniques targeting spruce/fir, mixed conifer, and seral aspen with mosaic burn patterns and mixed burn severities as an objective.
- No direct fire ignitions would occur in the stable aspen stands that have little to no conifer presence (less than 40 conifer stems per acre) in the aspen understory.
- No direct fire ignitions would occur in riparian areas on side slopes greater than 40 percent. On side slopes less than 40 percent in riparian areas, prescribed burning would occur when low to moderate fire severities would be expected. Riparian areas would be ignited on the outside edge so that the prescribed fire could back towards the interior of the riparian area.
- Pile burning would be limited in riparian areas. No pile burning would occur within a 100 feet of water. Pile burning that does occur within riparian areas would occur when fuel moisture levels are sufficient to limit creep.
- Within the spruce/fir and mixed conifer dominated stands that have little to no aspen presence (less than 15 aspen recruits per acre), prescribed burning would occur when low to moderate fire severities would be expected.
- For prescribed fire implementation, if water needs to be drafted, all water intakes would be equipped with a screen to prevent intake of fish and amphibian species. Drafting sites would be approved by the Forest's fish biologist prior to use.
- Prior to ignition, control lines may need to be constructed around the perimeter of the prescribed fire treatment areas.
- Control lines would be constructed with chainsaws, hand tools, and/or skid-steer equipment attached with a fecon head, Marshall saw and/or grapple hooks to primarily remove smaller diameter trees averaging less than 8 inch DBH, limb larger diameter trees, remove 1000 hour fuels, and dig handline. Trees larger than 8 inch DBH that may pose a threat to the effectiveness of the control lines would also be removed.
- Efforts would be made to cut trees as close to the ground as possible.
- Control lines would be feathered on the edges. Depending on slope, topography, and fuel loading, control lines may vary in width.
- Control lines would be reclaimed upon completion of the prescribed fire treatments.
- Prescribed fires would comply with the Utah State air quality standards. Prior to prescribed fire implementation, the District would obtain approval from Utah Smoke Management.

- Interested parties would be notified prior to implementing any prescribed burning.
- No broadcast prescribed burning would occur in Northern goshawk PFAs or NAs. Burning in PFAs or NAs would be limited to pile burning of slash material.
- No direct fire ignitions would occur during the nesting season (usually between May 15 and August 1) in areas where cavity nesting birds such as three-toed woodpeckers *(Picoides tridactylus)* are found.
- No fire ignitions that would likely result in moderate to high fire severities in Douglas fir dominated areas would occur to preserve Flammulated owl (*Otus flammeolus*) habitat and populations on Monroe Mountain. Low severity fire in the Douglas fir dominated stands during the non-nesting season (usually before May 15 and after August 1) would be allowed.

Boreal Toad Specific Design Features

Definition: Boreal toad mapped habitat is defined as the area within 328 feet from either side of streams, or from the high water lines of ponds, lakes, and wetlands, that are known to be occupied by boreal toad, have been occupied by boreal toad, or are adjacent to occupied habitat and suitable for use by boreal toad and the area within 984 feet of documented breeding sites.

- Utilize boreal toad Riparian Habitat Conservation Areas (RHCAs) of 328 feet from each side of streams, or from the high water lines of ponds, lakes, and wetlands, as buffers for vegetation treatments. Utilize RHCAs of 984 feet from known boreal toad breeding ponds.
- In order to protect boreal toads and hibernacula from being crushed, no ground-based mechanized harvesting equipment would be permitted within the RHCAs.
- Within the RHCAs, vegetation treatments would be limited to hand treatments, horse, or helicopter thinning up to 100 feet from streams, ponds, lakes, and wetlands or up to 328 feet from the known boreal toad breading ponds. No vegetation treatments (hand treatment, horse, or helicopter thinning) would be allowed within 100 feet of perennial streams or within 328 feet of breeding ponds, lakes, or other sites unless such treatments are coordinated with and approved by the Forest's fisheries biologist.
    - *Any exceptions to this design feature would be for the purpose of improving boreal toad habitat or reducing fire risk to boreal toad habitat, and would be approved by the Forest fisheries biologist. Design feature exceptions would be documented with a map of the area to be treated, any treatment requirements (i.e. timing, method to be used, etc.), and any needed implementation and/or post-treatment monitoring prior to treatment. A summary of monitoring results would be included on the documentation sheet post-treatment. See Appendix M in the Aquatics Specialist Report.
- Within the RHCAs it is allowable to leave some slash scattered and some slash piles unburned within riparian habitat to create micro habitat for boreal toads. No pile or slash burning would occur within 100 feet from streams, ponds, lakes, and wetlands or breeding sites edge. Within the remainder of the RHCAs, pile or slash burning would only occur on slopes and upland soils and habitats (i.e. outside of deep riparian soils

and/or true riparian vegetation) during the boreal toad dormant season (October 1 through April 15) unless coordinated with and approved by the Forest's fisheries biologist*.

- Within the RHCAs, snags (200 per 100 acres in aspen, 300 per 100 acres in mixed conifer spruce/fir, and large downed logs (50 per 10 acres; a minimum of 15 tons per acre) would be retained as cover for toads.
- Within the RHCAs, vegetation thinning treatments (hand treatment, horse, or helicopter thinning) would target less than 60 percent of the stands if treated for complete conifer removal (aspen cover type) or thinning to BA 90 (spruce/fir and mixed conifer cover types); or would target less than 80 percent of aspen, spruce/fir, or mixed conifer stands if treated by thinning conifer from below up to 8 inch DBH.
- If any unmapped perennial streams, seeps, or other water sources in boreal toad supporting habitat are encountered during project implementation, these areas would be protected by a 100-foot buffer. No vegetation treatments (hand treatment, horse, or helicopter thinning) would be allowed within this buffer unless these treatments are coordinated with and approved by the Forest's fisheries biologist*.
- If any boreal toad hibernacula are encountered during project implementation, these areas would be protected by a 328-foot buffer. No vegetation treatments (hand treatment, horse, or helicopter thinning) would be allowed within this buffer unless treatments are coordinated with and approved by the Forest's fisheries biologist.
- Temporary roads within the RHCAs would have toad passage friendly culverts installed where culverts are needed (buried culverts or bottomless arched structures) for the duration of the project.
- Dipping or drafting water for fire activities from smaller boreal toad breeding sites that may show a change in water levels from the use would be avoided, except for emergencies.
- Monitoring of boreal toad populations (in addition to current levels by the UDWR would be implemented to document project effects and to help plan future vegetation management projects in boreal toad habitat. This would include breeding site monitoring to document use and relative densities of populations. See Appendix J in the *Aquatic Specialist Report.*
- Within the RHCAs, prescribed burning would occur when generally low to moderate fire intensity and severities would be expected. Prescribed fire personnel would attempt to implement prescribed burning during the boreal toad dormant season (1 October through April 15).
- No direct fire ignitions would occur within 100 feet from streams, ponds, lakes, and wetlands, and 328 feet from boreal toad hibernacula or breeding ponds, lakes, and other breeding sites unless coordinated with and approved by the Forest's fisheries biologist. Fire ignitions could occur outside these buffers and allowed to back into these areas.
- Temporary roads within RHCAs would not be constructed or used for hauling logs until after October 1 of the calendar year, unless surveys and field inspection determine that toads are not likely to be impacted.
- For the 7th field HUCS (as delineated for the aquatics CEA): Manning Cr. – Manning Res., Manning Cr. – Barney Lake, Thompson Cr. - Anabella Res, and Water Cr. - Big Lake – vegetation treatments would be limited to 20 percent of the HUC area until watershed function is recovered [comparable] or would be limited to treatments that keep

a current Equivalent Roaded Area (ERA) modeling of the HUC at or under the recommended Threshold of Concern (TOC) of 10.

- Prior to beginning implementation within a HUC6 watershed, the Equivalent Roaded Area (ERA) modeling would be repeated for that HUC to incorporate the recovery period (i.e. years from this analysis to the implementation start date) for past projects, allow inclusion of new projects that were previously authorized but not yet carried out or completed during this planning process, and the proposed work. This would help incorporate effects from the currently authorized but not yet implemented or completed work in the Box Creek, Monument Peak, and Cove Mountain/North Clover projects. If the new ERA modeling shows the proposed work would push the HUC over the suggested TOC, multiple entries would occur to reduce cumulative effects to the subwatershed.
- The District would coordinate project treatments in watersheds containing Bonneville cutthroat trout or boreal toads with the Utah Division of Wildlife Resources southern region fisheries/toads personnel.

Temporary and Existing Roads and Skid Trails

Temporary roads would feature a finished road width of approximately 15 feet and may include turnouts at regular intervals. Road cut slopes would be constructed at a 1:1 vertical-to-horizontal ration and fill slopes at a 1:1.5 ratio. Road surfaces would be outsloped at a 3 to 5 percent slope. The primary road drainage feature would be drain drips, which shall be constructed at regular intervals. Culverts would be installed at any proposed stream crossings.

Upon project completion, temporary roads would be reclaimed. Reclaiming efforts would adhere to standard engineering best management practices and would be accomplished by ripping the roadbed and/or scarifying (scratching) the road surface with mechanical equipment. Litter and debris that is available in the area (primarily slash and large rocks) would be scattered over the ripped or scarified road surface and placed at or near the temporary road origins in order to deter traffic.

Criteria and Mitigation Measures Applicable to Existing Roads and Skid Trails within Inventoried Roadless Areas (IRAs) for All Action Alternatives

- Skid trails and existing roads would be used to facilitate the mechanical treatments. No temporary roads would be constructed inside the IRAs. For areas that cannot be accessed via existing roads, cross-country travel would be allowed to facilitate access to specific stands.
- If existing roads and skid trails do not allow for the removal of biomass, trees and slash may be consolidated, piled, and burned on-site.

Criteria and Mitigation Measures Applicable to Temporary and Existing Roads and Skid Trails outside Inventoried Roadless Areas for All Action Alternatives

- A combination of skid trails, temporary roads, and existing roads would be used to facilitate mechanical treatments. Temporary roads would be reclaimed upon completion of mechanical treatments.

Criteria and Mitigation Measures Applicable to Roads and Skid Trails Whether they are inside or outside of Inventoried Roadless Areas

- No temporary roads would be constructed in Northern goshawk NAs or PFAs.
- No skid trails or landings would be constructed inside riparian areas.
- To provide for firefighter and public safety, some roads and dispersed camping areas may be temporarily closed during prescribed fire and mechanical treatment implementation. Temporary closures would be determined by implementation personnel and would be based on the hazards present at the time of implementation.

Temporary Fencing around Manning Meadows Reservoir and Barney Lake (Figure 1)

Regardless of which alternative is selected, treatment areas adjacent to Manning Meadows Reservoir and Barney Lake would be fenced to exclude both wildlife and livestock browsing. With fencing, the amount of time needed to acquire a minimum of 1,000 aspen saplings per acre is expected to be quicker. Other vegetation and cover types are also expected to benefit from fencing.

The District is proposing to construct approximately 7.2 miles (633 acres) of temporary fence in the Manning Meadows Reservoir and Barney Lake areas. This fence would be approximately 8 feet tall and constructed with net wire, t-post, and wooden post. Maintenance of the temporary fence would occur for 4 to 6 years until the aspen shoots are greater than 6 feet tall, after which the fence would be removed.

AFFECTED ENVIRONMENT

The variety of vegetation on Monroe Mountain is reflective of the soils, climatic patterns, disturbance histories, and elevations. The lower and drier slopes are dominated by pinyon and juniper mixed with sagebrush and interspersed with an occasional meadow or riparian zone. Douglas-fir and white fir appear at mid elevations. Higher elevation areas are dominated by aspen mixed with Engelmann spruce and subalpine fir. Other vegetation types occur at different elevations and moisture regimes including mixed conifer and mountain shrubs. Mixed conifer ecosystems offer a variety of green textures and colors based on their species composition.

The current distribution of vegetation on the Mountain is constantly changing. Natural disturbances including fire and insects have affected vegetation composition. Today many of

these natural disturbance processes are not functioning as they have in the past. For example, spruce and subalpine fir is encroaching on, and in some cases replacing aspen stands; pinyon and juniper have invaded grass, forb, and sagebrush areas; and sagebrush areas have reduced grass and forb components.

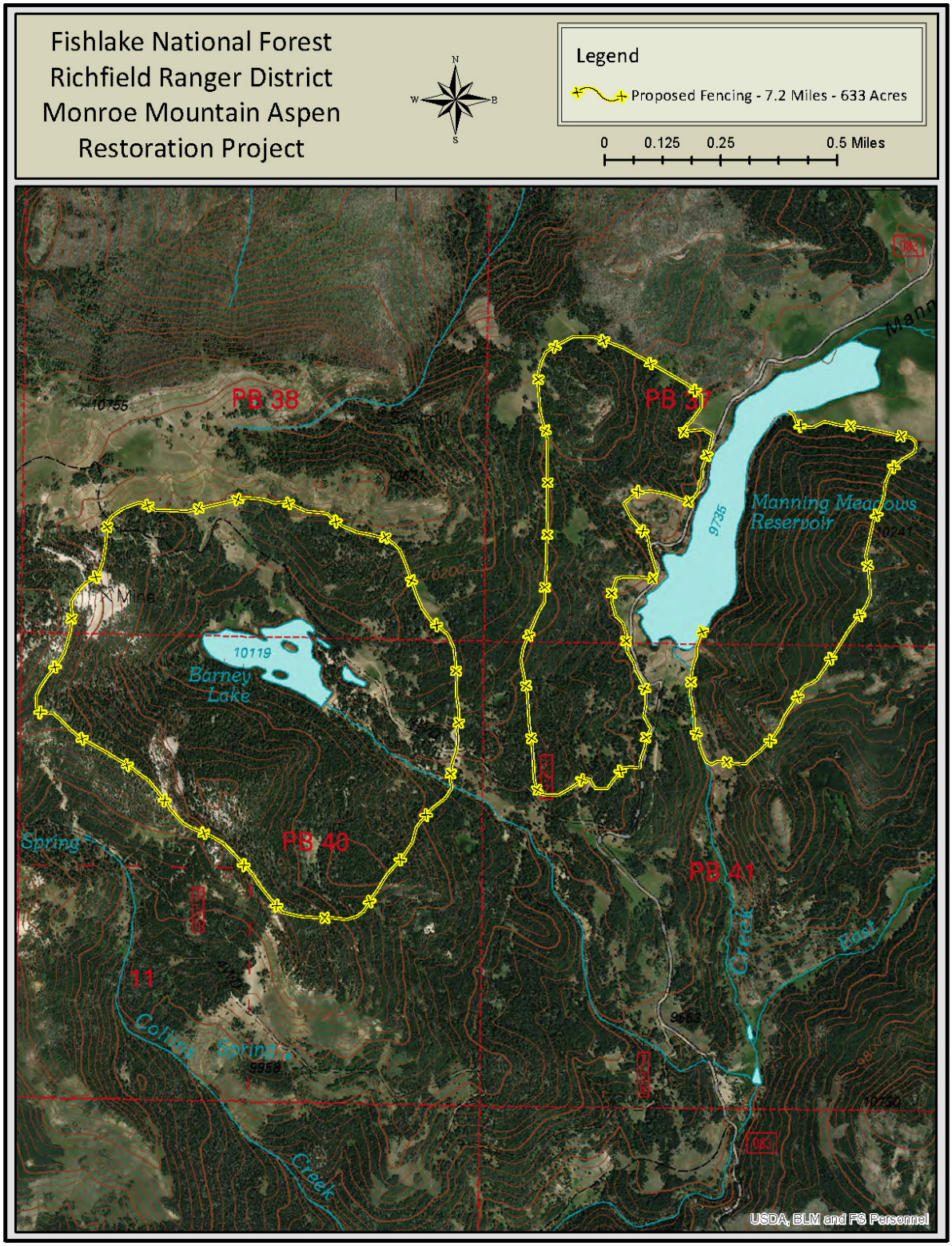


Figure 1: Proposed fencing near Manning Meadows Reservoir and Barney Lake

Water is especially important in the semi-arid climate of the region. The mountains and plateaus of the Forests are important for capturing, storing, and releasing water to the surrounding valleys. Ecological resources such as riparian and wetland areas, streams, aquatic species, wildlife, and vegetation are all dependent on these critical water resources. In addition, many local communities obtain culinary and agricultural water from sources located and developed within or near the Forests' boundaries. See Riparian Zones and Wetlands Areas containing hydric soils display near the end of this report.

Average annual precipitation ranges from 10 inches in the lower elevations to over 32 inches in the higher mountain ranges. The majority of this precipitation occurs in the winter and spring months primarily as snow. During this time, moisture is associated with frontal systems from the Pacific Ocean. In the mid to late summer month monsoonal air masses from the Gulf of California and the Gulf of Mexico can cause intense summer thunderstorms. These monsoonal storms can create hazardous flash floods in canyons, and can have impacts to various resources. Peak stream flows generally occur in the spring or early summer as a result of melting snowpack, but high flows can also be produced by localized summer thunderstorms.

Geographically, Monroe Mountain is part of the area that straddles the divide between the Great Basin and the Colorado Plateau. This transition zone is comprised of a mix of high mountain ranges and plateau lands of which Monroe Mountain is one, and is sometimes referred to as the Utah High Plateaus. The Sevier River watershed first trends north to south (Otter Creek on the Eastside of the Mountain) and then south to north on the Westside of Monroe Mountain, skirting and cutting a wide valley swath below the Forest. Elevations vary from approximately 5,400 feet near Monroe to 11,227 feet at Monroe Peak. Other Elevations of prominent Peaks going from North to South on Monroe Mountain include Signal Peak at 11,126, Monument Peak at 11,047, Marysvale Peak at 10,761, Bean Hill at 10,055, Langdan Mountain at 10,323, and Maelstrom Peak at 9,793 feet in elevation.

Monroe Mountain supports a variety of terrestrial and aquatic wildlife species that contribute to ecosystem function in a wide array of habitats and settings. The many lakes, reservoirs, and streams support an active sport fishery. The plateau and high elevation lakes of the Mountain characterize the Forest's unique geologic features. Many of the rivers and creeks throughout the Mountain provide habitat for trout populations, including Bonneville cutthroat trout are supported in restoring populations from Manning Meadow Reservoir. These waterways also provide excellent, diverse sport-fishing opportunities. In addition to supporting wildlife biodiversity, these water resources provide culinary water to adjacent communities. Monroe Mountain is part of the Sevier River Basin, a closed habitat system draining into the Great Basin.

Drinking Water Sources

Groundwater in the Forest serves as sources of drinking water for nearby towns and cities. Generally, natural spring sources that have collection systems and areas are used for communities in the communities surrounding the Forest, rather than wells or surface sources such as streams or lakes. The State of Utah has designated protection zones for these sources of drinking water (UDWQ, 2011b).

Groundwater Occurrence, Movement, Development and Use

Groundwater in the Project Area is recharged from local precipitation that averages 10 inches per year at low altitudes and up to about 32 inches per year in the mountains at the highest elevations. The precipitation is snow and rain from generally eastward-moving storms during the winter and from thunderstorms associated with northward air movements in late spring and summer (monsoons). Groundwater moves from recharge areas in the mountains and adjacent alluvial slopes toward the valleys. Groundwater is discharged at land surface as springs and creeks. It can also be utilized by plant roots and subsequently transpired to the atmosphere and pumped from wells and springs for water supply use. Groundwater can also migrate into deeper, permeable basin-fill deposits and bedrock through which it can flow into adjacent valleys.

There are numerous springs located throughout the project area. Discharges from these springs are probably associated with permeable bedrock, rock formations on the mountain slopes and in the basin-fill deposits. Most of the springs within and adjacent to the Project Area receive recharge from precipitation that falls within the Project Area and, therefore, have the potential to be impacted by land use activities.

Groundwater in the basin-fill deposits generally flows from the mountain highlands toward the adjacent valleys. Shallow groundwater that flows into a topographically closed basin does not leave the basin and eventually evaporates from the soil surface or is transpired through plants. Some valleys could also receive groundwater inflow from adjacent unclosed basins.

Groundwater within and adjacent to the Project Area is withdrawn for a number of beneficial uses, including drinking water, agriculture (irrigation and stock watering), industry (mining), and wildlife management. Well and spring discharges have a wide range of yields in the vicinity of the Project Area. The communities around the Forest use spring sources and groundwater wells for their drinking water (UDWQ, 2011b). These spring and well sites have Surface Water Protection Plans approved by the State to insure the quality of water needed to meet the required drinking water standards. Many of the spring sources and their associated Source Water Protection Zones are located within the Forest Boundaries. Drinking water yields likely range from a few hundred gallons per minute for smaller springs up to about 2,000 gallons per minute for the largest community well in the area.

In a nutshell, the State of Utah owns all of the water within the State, but does allow people/ communities to use water for approved Beneficial Uses and issues water right certificates to show they approve of the users putting that water to use appropriately by the State Engineer. Typical of high elevation lands, the Forest serve primarily as catchments for recharge zones. Unlike lower elevation valley bottoms, the Forest lands do not contain extensive unconsolidated deposits that support usable aquifers. However, there are consolidated bedrock aquifers at depth within the Forest that can provide usable groundwater. The majority of groundwater basins in the Forest are fully or almost fully appropriated, meaning that future development of groundwater is unlikely or limited.

Aquatic and Riparian Ecosystems

This region is characterized by an arid climate, where annual precipitation ranges from less than 10 inches in the valleys to about 32 inches in the highest peaks. In the project area much of this precipitation infiltrates through the soil profile and then into bedrock to become groundwater. Thus, surface water and associated aquatic and riparian ecosystems are extremely limited in extent. Aquatic and riparian ecosystems comprise approximately 1 percent of lands within the Project Area (see Riparian Zones and Wetlands Areas containing hydric soils display near the end of his soils Report). Yet these habitats are important in supporting biodiversity, and they perform critical ecosystem functions in maintaining dependent fish and wildlife populations, filtering and storing runoff and sediment produced by the watershed, and attenuating floods. These habitats are also important focus areas for human uses, such as recreation, livestock grazing, and water diversion/development for agricultural or domestic uses.

Aquatic ecosystems are defined as "environments characterized by the presence of standing or flowing water" (*Forest Service Manual 2605*). Within the Project Area, aquatic ecosystems are associated with lakes, streams, springs, seeps, and ponds.

Federal agencies are obligated to protect all wetlands and floodplains under EO 11990 (to minimize the destruction, loss, or degradation of wetlands; to preserve and enhance the natural beneficial values of wetlands; and to avoid adverse impacts to wetlands where practicable) and EO 11988 (to avoid adverse impacts associated with the occupancy and modification of floodplains; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural values served by floodplains).

The Fishlake National Forest maintains compliance with Executive Order 11988 in relationship of floodplain management. Most bankfull channels and floodplains on the Forest are only a few feet to up to about 20 feet wide or so. The Fishlake National Forest does not have large rivers like those found elsewhere. The widest the rivers are, including floodplains, is about 50-100 feet.

The Forest Plan states that special protection and management will be given to floodplains, wetlands and all land and vegetation for a minimum of 100 feet from the edges of all perennial streams, lakes and other waterbodies of water or to the outer margin of the riparian ecosystem if wider than 100 feet (FLRMP, P. IV-33).

Wetlands protected under Section 404 of the Clean Water Act (CWA) must meet the legal definition of a jurisdictional wetland, defined by the presence of three conditions: (1) permanent or seasonal water, (2) hydrophytic (water-loving) vegetation, and (3) soil characteristics influenced by saturated conditions (USACE 1987). Floodplains (lowland areas adjacent to streams or other inland waterways that may be submerged by floodwaters) as well as riparian areas frequently meet these criteria. Wetlands and floodplains occur on the Forest.

Wetlands are those areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Riparian areas are defined as a

vegetated ecosystem along a water body through which energy, materials, and water pass. Riparian areas characteristically have a high water table and are subject to periodic flooding and influence from the adjacent water body. These systems encompass wetlands, uplands, or some combination of these two landforms. They will not in all cases have all the characteristics necessary for them to be also classified as wetlands. These definitions may vary. See Riparian Zones and Wetlands Areas containing hydric soils display (Figure 2).

Riparian communities occur over a wide range of elevations along perennial and intermittent streams, in meadows, and along seeps and springs. Riparian ecosystems are extremely limited and valuable in the Project Area. In the arid West, the ecological role and importance of these riparian areas is greatly intensified. Riparian areas throughout the project area have been affected in the past. Some of these effects have been negative, including: lowering of water tables, erosion of stream channels, exotic plant encroachment, concentrated runoff and increased sediment from road construction, and changes in vegetation composition.

Level II Riparian Surveys (IRE) reports generally indicate that riparian and wetland ecosystems within the project area are in good and stable condition but have been impacted by current and past disturbance and use.

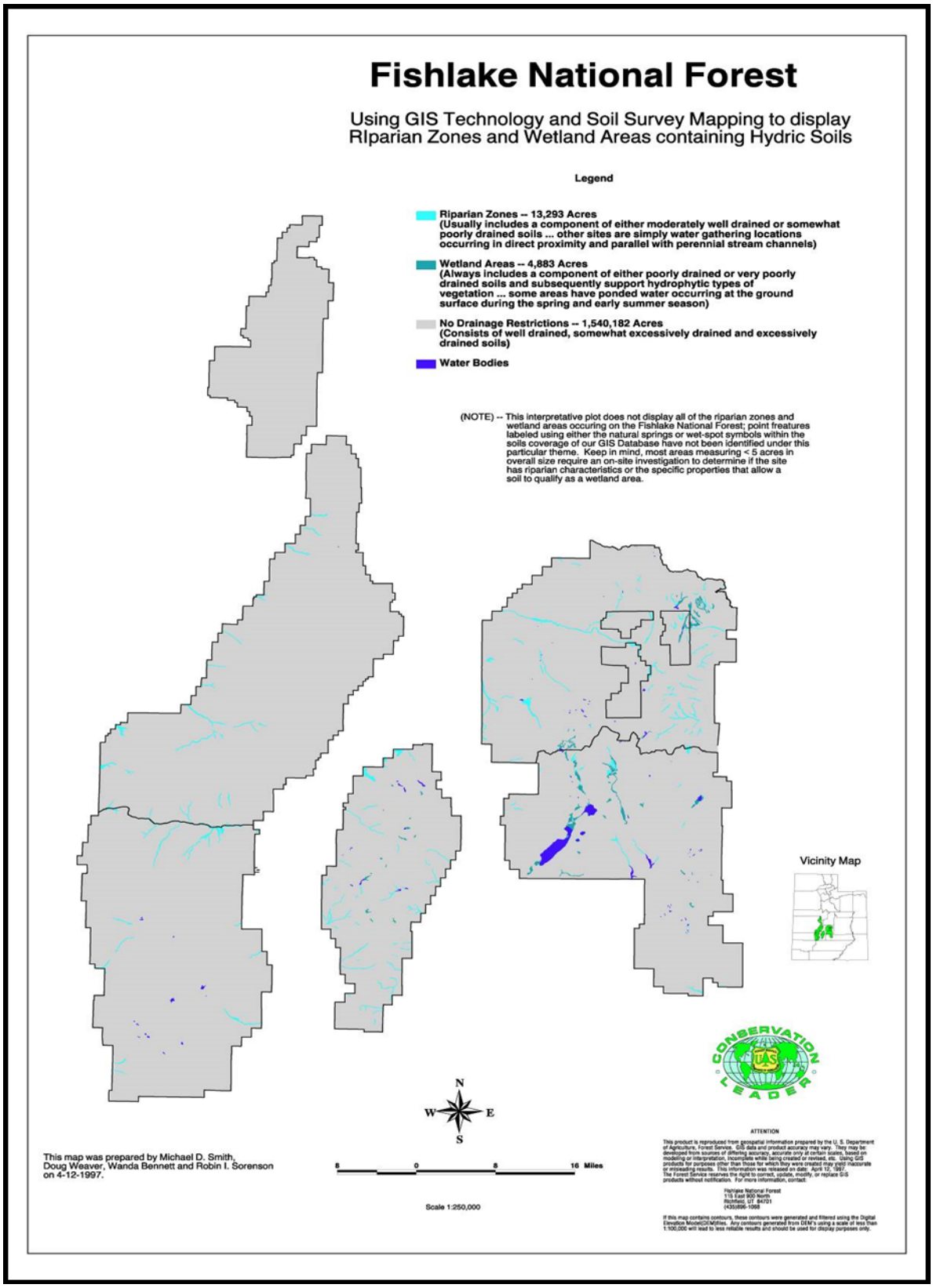


Figure 2: Riparian Zones and Wetland Areas containing Hydric Soils

The functions of wetlands and riparian areas include water quality improvement; stream shading; flood attenuation; shoreline stabilization; ground water exchange; and habitat for aquatic, semi-aquatic, terrestrial, migratory, and rare species. Wetlands and riparian areas typically occur as natural buffers between uplands and adjacent water bodies. Loss of these systems allows for a more direct contribution of nonpoint source (NPS) pollutants to receiving waters. The pollutant removal functions associated with wetlands and riparian area vegetation and soils combine the physical process of filtering and the biological processes of nutrient uptake. Riparian systems, particularly in western regions, have been shown to stabilize the recharge of shallow aquifers in a manner that supports streamflow of longer natural duration.

Wetlands and riparian areas can play a critical role in reducing NPS pollution by intercepting surface runoff, subsurface flow, and certain ground water flows. Their role in water quality improvement includes processing, removing, transforming, and storing such pollutants as sediment, nitrogen, phosphorus, and certain heavy metals. Research also shows that riparian areas function to control the release of herbicides into surface waters. Thus, wetlands and riparian areas buffer receiving waters from the effects of pollutants or they prevent the entry of pollutants into receiving waters. It is important to consider that degradation of wetlands and riparian areas can inhibit their ability to treat pollution.

Water Quality

Water quality in the Forest is influenced by several factors including geology, soils, vegetation, and human activities. Low dissolved oxygen, high phosphorous loads, and sedimentation are the prevailing water quality problems in the Forest. In general, water quality issues on Monroe Mountain are closely related to human activities on soils formed from the volcanic geology parent material that cause surface disturbance such as road use, grazing, and recreational use.

Water quality is assessed in terms of designated beneficial uses as defined by the State of Utah Division of Water Quality (UDWQ). The majority of streams and reservoirs on the Mountain provide water for domestic and agricultural uses, cold-water fisheries, recreation, and wildlife. Maintaining the quality of these waters is becoming increasingly important as the demand for water increases with the growing urban populations next to the Forest. Streams and lakes that the State considers impaired, and thus not able to meet their designated beneficial uses, are reported on the State's 303(d) list, which is updated every other year. Listed water bodies are then scheduled for TMDL development. The Forest streams and reservoirs shown on the approved 2006 State's 303(d) list (UDWQ 2006) are discussed below.

The majority of perennial streams and reservoirs on the Fishlake provide for cold water fisheries, recreation, wildlife, and agriculture uses. Maintaining the quality of these waters is becoming increasingly important as the demand for water increases with the growing population next to the Fishlake National Forest. Streams and lakes that the State considers impaired, and thus not able to meet their designated beneficial uses, are reported on the State's 303(d) lists, which are updated periodically. Listed waterbodies are then scheduled for TMDL development. Approved and other statuses of TMDLs are located on the State of Utah-DEQ website (UDWQ 2011).

Monroe Mountain waterbodies on the approved 2006 303(d) list.

Manning Meadow Reservoir-Dissolved Oxygen and Total Phosphorous for Cold Water Aquatic Use attributed to grazing (very likely recreation, roads and summer homes contributing too). Fishkill has occurred and reservoir is Mesotrophic. This drainage is near the top of the drainage so cumulative impacts occur from localized activities near the streams and the reservoir. Manning Meadow Reservoir, ironically even with fish kills, holds the brood stock population of Bonneville Cutthroat trout population for the State of Utah. It's a very important Statewide for native Bonneville Cutthroat trout reintroductions around the State.

Lower Box Creek Reservoir-pH for Cold Water Aquatic Use and is Mesotrophic. The Lower Reservoir is a low priority for a TMDL. The source of the pH impairment is listed as unknown but likely is just sediment from all activities within the watershed including recreation, roads and trails, grazing, and fuel treatments and the volcanic geology of the mountain. This drainage is flatter on top, and there is plenty of access across the drainage. There has been ongoing vegetation management within Box Creek reservoir drainage in the last 5 years and some wildfire too. The Box Creek Fuels Reduction Project Hydrology Specialist Report described treatment as: Notice all gross percent of treatment areas are less than or approximately equal to about 1.8% except for Box Creek at the Subwatershed (HUC6) scale that is 9.7% and the total treatment area that is 2.17%. These treatment percentages imply that at these multiple HUC scales that the proposed treatments would not likely lead to negative effects because of the small areas to be treated. There have not been reports of any effects from the treatments or fire within these drainages up to this point in time. The reservoirs likely aided in catching and trapping most fine (clays and silts) to nearly all coarse sediment (sands up to rocks).

Water Quality Monitoring
The Forest has been actively and cooperatively worked with the State of Utah in sampling water quality across the Forest. We have sampled Koosharem, Greenwich, and Box Creeks on the Eastside of Monroe Mountain, and on the Westside we sampled Monroe, and Manning Creeks. Sampling did overlap as initial Box Creek Project work was being implemented in the Box and Greenwich Creek drainages. One year we did year-long sampling of Manning Meadow Reservoir. Cooperative efforts of the Forest with the State Division of Water Quality includes additional sampling by the State including numerous lake and stream samples across the forest over that same period of time. The Forest additionally collects macro-invertebrate samples within fish bearing streams cooperatively with the Forest Fisheries Biologist. The Forest is actively engaged and is a leader in water quality monitoring and assessments on the Forest to maintain the high quality waters of the Forest and Clean Water Act compliance and will continue to do in regards to activities within the Forest.

The Forest has monitored and assessed water quality cooperatively with the State of Utah to maintain compliance with the Clean Water Act, and will continue to do so in regards to this project to maintain high quality waters of the Forest and compliance with the Clean Water Act. The Forest is actively engaged in improving and restoring watersheds on the Forest. A few Monroe Mountain areas include Manning Meadows, Barney Lake, Greenwich Creek and Lower Box Creek Reservoir.

Geology- Written by Andrew E. Godfrey, Geologist

The dark, somber hues of the rocks comprising Monroe Mountain, also known as the Sevier Plateau, stand in stark contrast to the vivid colors of the Colorado Plateau to the east. This does not mean, however, that the plateau has had a bland history. To the contrary, the mountain has been racked by violent eruptions, earthquakes, and giant landslides.

Beginning about 25 million years ago the area was a scene of intense, explosive volcanic activity. Within what is now called Monroe Mountain there were two main centers, one located around Signal Peak and the other around Langdon Mountain. Eruptions of these volcanoes were so violent that they created their own weather. Clouds of volcanic dust and gasses rose so high that they condensed, forming their own thunderstorms. The resulting torrential floods washed boulders and other debris down the newly formed sides of the volcanoes. Examples of these flood deposits can be seen along the walls of Pole Canyon.

As the eruptions proceeded a tremendous amount of material was removed from the pool of molten lava deep within the earth creating a large void. The overlying rocks subsided into this void much as a piston slides down a cylinder. The resulting depression is called a caldera. Monroe Peak Caldera is tremendous, measuring about 14 miles east-west and 11 miles north-south, from Poverty Flat on the west to Koosharem on the east, and from Tenderfoot Ridge on the north to Big Flat on the south.

This period of violent activity was followed by one of quiet. Erosion reduced the land to an area of low relief where streams slowly meandered. Between the low hills there were swamps and lakes. Gravels and sands were deposited along the stream courses while sands and muds were deposited in the swamps and lakes. This period lasted from about 14 to 7 million years ago and the sediments are known as the Sevier River Formation.

About five million years ago the period of quiescence ended. Forces within the earth lifted and bent large blocks. One such block is Monroe Mountain. On the east side, the rocks dip off to the east and are broken by several small faults that drop the east side downward. The west side, however, is bounded by a truly spectacular fault system. Stretching from about Gunnison to the Grand Canyon, this fault system has dropped the west side relative to the high standing east side. In places there is about two miles of displacement between the two sides. All this movement along the fault did not occur at one time. Only about 20 feet or less normally happens during one earthquake. Over several million years, with the earthquakes happening about once every 400 years, the distance built up.

As the relief between the mountain block and the surrounding valleys built up, the steep mountain slopes became more unstable. Repeated shakings by earthquakes loosened slope material and sent it crashing down as some of the larger landslides in the state of Utah. Thompson Creek Landslide near Monroe (this one is supposed to be the largest in Utah), Elbow Landslide near Marysvale, and The Brink near Burrville are the largest. There are numerous other landslides ringing Monroe Mountain. Thus, the gently rolling top of Monroe Mountain stands in stark contrast to the steep slopes surrounding it.

Landforms, Stream Channels and Soils

Geologic materials and soils form the foundation for ecosystems. They provide primary productivity in supporting plant growth. They also regulate hydrologic function of watersheds by storing and releasing water from precipitation or snowmelt.

Primary landform types in the project area include hills and mountains, hillslopes, floodplains and terraces, and the valley floors. Soils in the project area are closely associated with these primary landform types. The hillslopes borders the mountain areas and is comprised of alluvial deposits transported from the mountains over many thousands of years. Valley floor landforms lie at the lower portions of the main intermountain valleys and consist of stream, lake, and wind deposits.

Mass wasting is not a dominant process in the Project Area. However, rock fall, shallow landslides, deep-seated landslides, and debris flows may be potential hazards to roads and other facilities in the hill and mountain portions of the Project Area. In very steep terrain (greater than 30 - 40 percent slope) hill slopes could be vulnerable to slope failure and related surface erosion because of their excessive heights and slopes. Almost all of the forested land in the Project Area occurs in the hill and mountain areas. Water and wind erosion hazard is minimal for undisturbed soils. When disturbed, these soils are subject to erosion. Special methods and erosion control best management practices may be needed to prevent or limit soil loss in the hill and mountain areas.

The soils formed in alluvium and are generally on stable geomorphic surfaces, but they can be subject to flooding on active alluvial fans. In undisturbed sites, these soils have a low to slight erosion hazard due to protective cover from vegetation and surface gravel, but they have a high erosion hazard in disturbed areas.

Seeps, springs, and channels have narrow riparian vegetation zones where moisture is available for most of the growing season. These riparian zones are important in the Project Area because of their small extent in the region and their importance to plants and wildlife. They provide stability to streambanks and soils, and if damaged, erosion and water quality impacts can occur. The soils on floodplains and terraces are generally on zero to eight percent (0-8%) slopes. Most of the floodplain soils have a seasonal high water table, and some areas are subject to flooding for brief periods from March through June. These soils are formed in alluvium. Floodplain soils are relatively young and exhibit little, if any, profile development. Some of the terrace soils occur on older geomorphic surfaces and exhibit a moderate degree of soil development. Floodplain and terrace soils have fine to moderately coarse textured surface and subsurface layers. The soils are well to poorly drained, and runoff is slow for most floodplain and terrace soils. Erosion potential is minimal for undisturbed soils on terraces. Terrace soils subject to disturbance will have an increased erosion potential. Floodplain soils subject to disturbance may erode and result in sedimentation in the stream because of the nearness to channels.

Valley floor soils generally do not occur within the Project Area; however, existing and potential lease-related access roads to the Project Area may cross basin floor soil types. The valley floor slopes are zero to four percent. These soils were formed from lake sediments, alluvium over lake sediments, and windblown clay, silts and sands. Valley floor soils on more recent deposits are

poorly developed. Soils formed on slightly older geomorphic surfaces exhibit minimal soil development. Some of the basin floor soils have a seasonally high water table, and they are subject to occasional flooding. Valley floor soils are very deep and fine to moderately coarse textured throughout the profile. Runoff is very slow to slow for most valley soils. Water and wind erosion hazard is minimal for undisturbed soils and moderate to high for disturbed areas.

Sheetwash and rill erosion is common on sloping road surfaces in the Project Area following disturbance. Road surfaces and ditches concentrate storm runoff that can cause gully erosion if not properly dispersed. Ground disturbing activities in most areas of the Forest can occur with standard erosion, drainage, and restoration methods without resource impacts. However, soils will likely continue to erode as a result of grazing, vegetation conversion, fires, existing roads, recreation, and by natural conditions.

Streambanks, channels, channel migration zones, and floodplains have the potential for soil erosion, if disturbed. Vegetation plays an important part in protecting streambanks and preventing erosion along creeks. Streambanks can be steep and easily erode once disturbed. The most apparent areas of soil erosion in the Project Area are along road and creek channels, trails and camping areas where vegetation disturbance from people, grazing, and channel incision has occurred.

Within streams, quality of surface water and aquatic habitat is directly linked to channel stability and integrity of riparian habitat. Channel stability, including maintenance of stream dimension, pattern, and profile is dependent on a balance of sediment load, sediment size, and discharge within each watershed (Lane 1955). Also riparian vegetation plays an integral role in this stabilization of streams. Changes in discharge and size or quantity of sediment load will cause shifts within the channel through modification of the channel shape and gradient by deposition, channel incision, abandonment, or lateral migration. Watershed disturbances, which can alter discharge or sediment supply, may have adverse effects on stream stability, water quality, and aquatic habitat. These watershed disturbances include both natural events and human activities. Natural events include fire and floods. Land use activities include road building, water diversion or development, vegetation conversions (i.e., thinning or harrow application), grazing, oil and gas development, mining, etc.

Streams vary in their sensitivity to disturbance and changes in discharge or sediment produced by their watershed. Parameters relating to quality of water and riparian habitat have been quantitatively measured on numerous streams within watersheds throughout the Project Area. Only the 303(d) listed waters were discussed in depth. This information will serve as baseline data for analysis of proposals. Anecdotal observations suggest that many stream segments within the project area have been degraded to some extent by past land uses, watershed disturbance, and large flooding events.

Most soils within the project area that are dry when burned at low to moderate intensity and having a short residence time will not likely have limitations to being treated. But some smaller areas on steep slopes might have slight to severe limitations if burned at high severity. There are areas within the project area that likely will not burn easily due to insufficient ground cover and consequently will need to burn at moderate to high intensity or will likely have hydrophobic

conditions following fire that will likely lead to accelerated erosion loses following the burning treatments (6 files or soil displays located with hydrologist files).

There are not unstable lands or soils within the project area. However, there are large areas of slopes over 40 percent that would be considered very steep that when disturbed could lead to accelerated erosion and flooding. These slopes should not have wheeled or track equipment on them.

Most of the soil disturbance would result from removing groundcover and by hydrophobic soil formation. Best management practices (BMPs) can reduce soil disturbance effects to the areas surrounding the project operations. BMPs can reduce off-site effects more in the low to moderately steep areas, and with greater difficulty and less effectiveness in the steep areas.

Analysis area And Issues

Cumulative Effects Area (CEA) or Subwatershed Area is an area of land that could be only part of the HUC 6 area. CEAs are logical places to focus in on based on locations of treatments, in stream features such as reservoirs, lakes, or areas of different management activities that can be determined such as points in channel at the Forest Boundary or at confluences. These areas are typically much smaller in scope than the larger HUC 4 and 5 areas. Additional activities besides those being proposed within the CEAs or HUC 6 areas include the Box Creek and Twin Peaks projects, the Box Creek Fire area, Forest Travel Plan, grazing, Monument Peak Fuels Reduction Project, and work in the Cove Area, and recreation. These activities and the proposed project activities will be used to assess the cumulative effects within the CEAs. Prescribed fire will be used most likely following the vegetation treatment in the areas where mechanical treatments area proposed and these areas will therefore aid in the limiting the areas and the severity of which prescribed fire will be used.

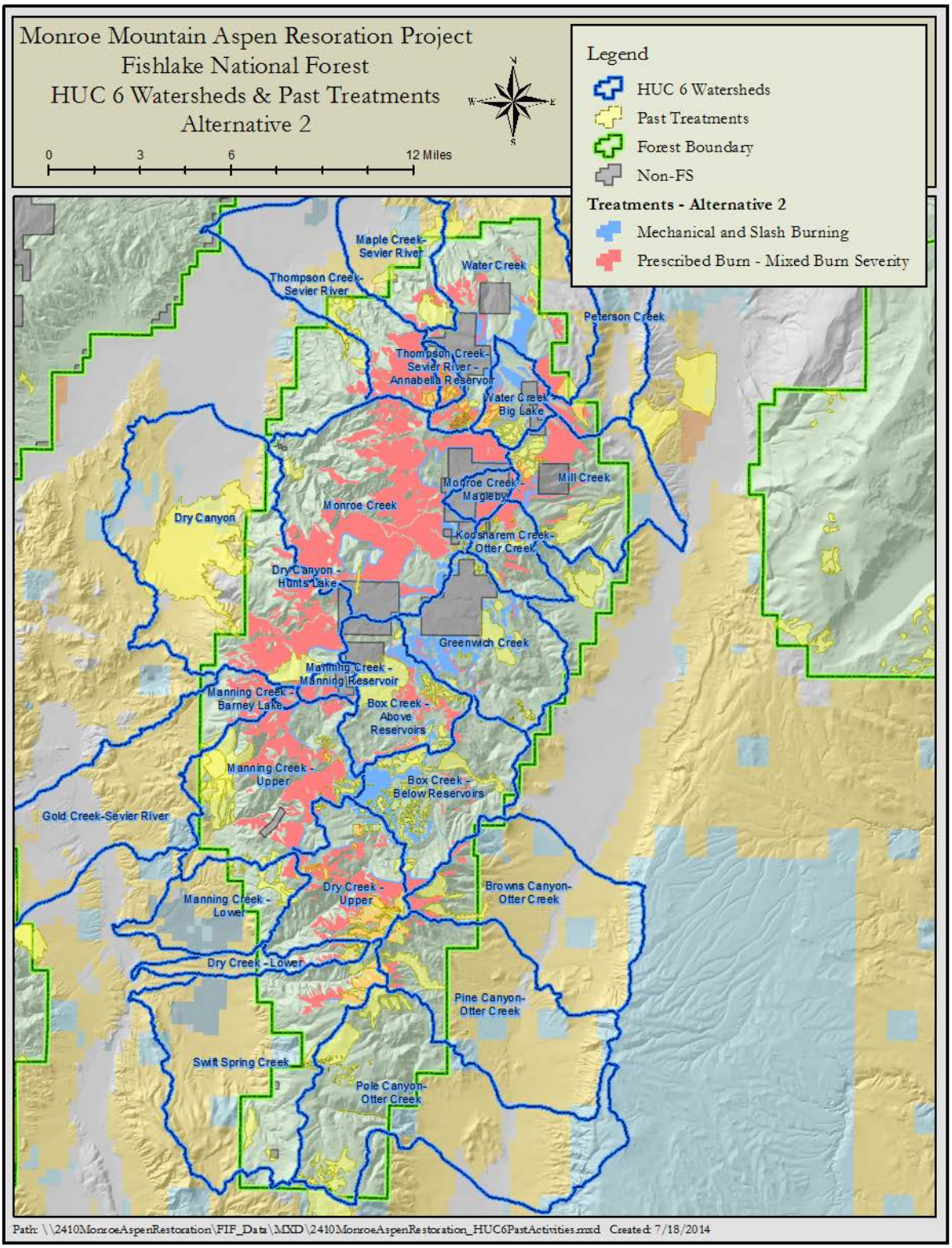
The analysis area includes not only the project area boundary, but also the area of possible influence, which in this case is the Cumulative Effects Areas (CEAs), subwatershed (HUC6) scale units (some CEAs are the same as the HUC6 subwatersheds (Tables 4 and 7, Maps 1-4). The resources addressed by this report include water quality, streams, reservoirs and lakes, floodplains, wetlands, soils, and municipal watersheds. The important issues to be addressed include soils, water quality (beneficial use support impairment), floodplains, and wetlands. Municipal watersheds will need to be addressed because there are four State Source Water Protection Zones (SWPZs) within or near the project area (Water Creek (Big and Deep Lake Area), Thompson Basin, Monroe and Koosharem Creeks. These Groundwater-SWPZs have a very small or no likelihood of being impacted from these hillslope or vegetation treatments though. The impacts would need to infiltrate down into the ground to become an issue and that is highly unlikely.

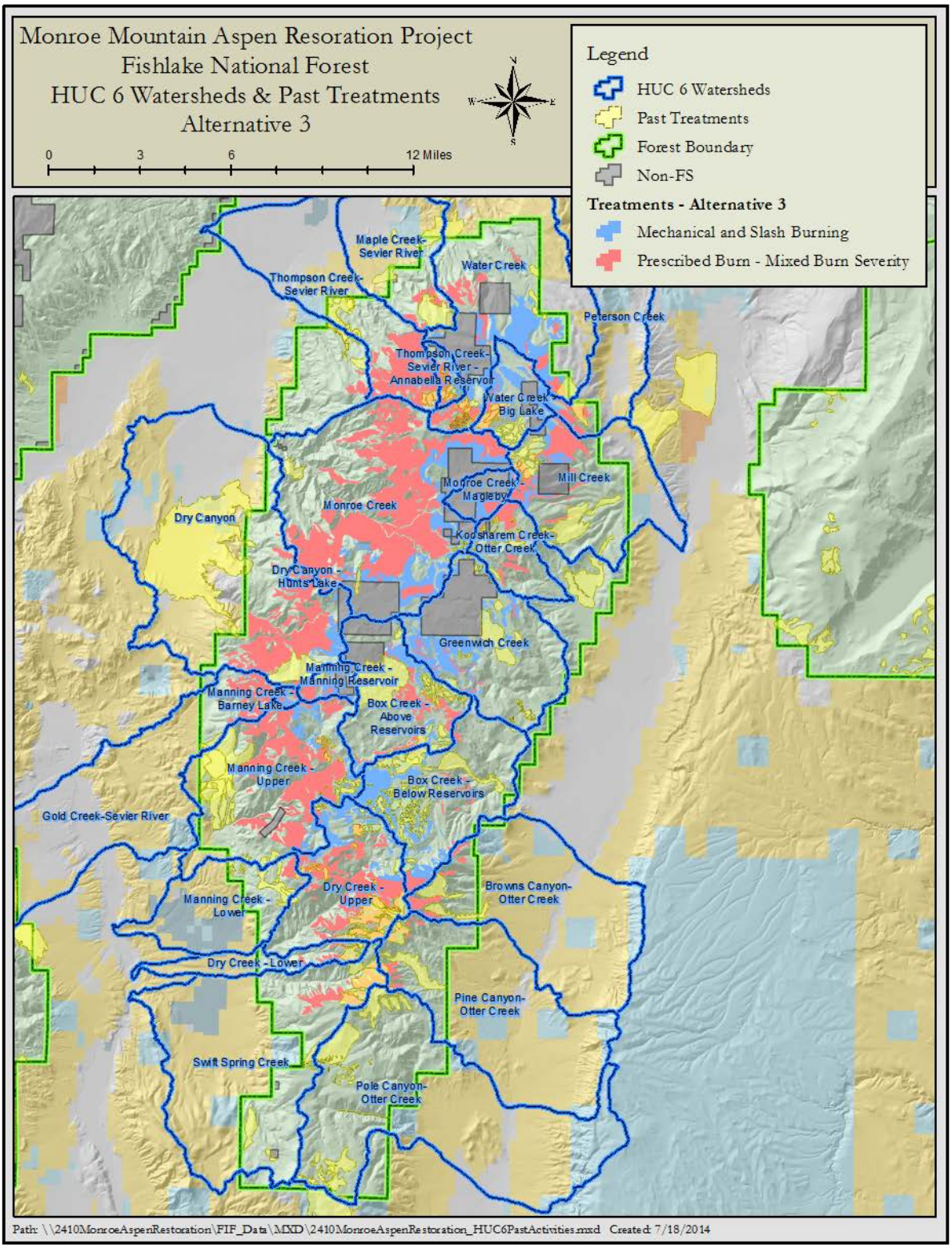
The existing condition includes information from the previous sections as part of the existing condition description within the analysis area of the project like water quality and forest plan information and uses as well as the analysis section. The more specific analysis areas that will be used to assess cumulative watershed effects includes the Huc6 or sometimes even smaller units or what I term Sub-HUC6

Table 4: Hydrological Units (HUC6 or Sub-Huc6) and Treatment Acres

		No Action	Alternative 2						Alternative 3						Alternative 4						Alternative 5					
HUC 6	HUC 6 Total Acres	Acres Being Treated	Mechanical & Slash Burning (Acres)	Mechanical & Slash Burning Percent of HUC 6 Being Treated	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire Mixed Burn Severities Factoring 60% of Acres Get Treated	Prescribed Fire Mixed Burn Severities Percent of HUC 6 Being Treated	All Treatments Combined Percent of HUC 6 Being Treated	Mechanical & Slash Burning (Acres)	Mechanical & Slash Burning Percent of HUC 6 Being Treated	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire Mixed Burn Severities Factoring 60% of Acres Get Treated	Prescribed Fire Mixed Burn Severities Percent of HUC 6 Being Treated	All Treatments Combined Percent of HUC 6 Being Treated	Mechanical & Slash Burning (Acres)	Mechanical & Slash Burning Percent of HUC 6 Being Treated	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire Mixed Burn Severities Factoring 60% of Acres Get Treated	Prescribed Fire Mixed Burn Severities Percent of HUC 6 Being Treated	All Treatments Combined Percent of HUC 6 Being Treated	Mechanical & Slash Burning (Acres)	Mechanical & Slash Burning Percent of HUC 6 Being Treated	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire Mixed Burn Severities Factoring 60% of Acres Get Treated	Prescribed Fire Mixed Burn Severities Percent of HUC 6 Being Treated	All Treatments Combined Percent of HUC 6 Being Treated
Box Creek - Above Reservoirs	8,470	0	686	8%	904	542	6%	15%	734	9%	896	538	6%	15%	737	9%	893	536	6%	15%	725	9%	796	478	6%	14%
Box Creek - Below Reservoirs	11,214	0	1,808	16%	445	267	2%	19%	2,098	19%	501		0%	19%	2,250	20%	501	301	3%	23%	1,974	18%	276	166	1%	19%
Browns Canyon-Otter Creek	17,857	0	2	0%	422	253	1%	1%	-	0%	424	254	1%	1%	-	0%	424	254	1%	1%	3	0%	420	252	1%	1%
Dry Canyon	59,521	0	72	0%	3,217	1,930	3%	3%	356	1%	3,031	1,819	3%	4%	754	1%	2,745	1,647	3%	4%	428	1%	2,959	1,775	3%	4%
Dry Canyon - Hunts Lake	241	0	-	0%	116	70	29%	29%	-	0%	116		0%	0%	-	0%	116	70	29%	29%	0	0%	116	70	29%	29%
Dry Creek - Lower	2,980	0	-	0%	209	125	4%	4%	-	0%	209	125	4%	4%	-	0%	209	125	4%	4%	0	0%	209	125	4%	4%
Dry Creek - Upper	9,510	0	417	4%	3,007	1,804	19%	23%	951	10%	3,153		0%	10%	1,254	13%	3,153	1,892	20%	33%	1,204	13%	2,213	1,328	14%	27%
Gold Creek-Sevier River	29,011	0	-	0%	830	498	2%	2%	-	0%	830	498	2%	2%	1	0%	829	497	2%	2%	0	0%	830	498	2%	2%
Greenwich Creek	11,922	0	1,721	14%	199	119	1%	15%	1,822	15%	195	117	1%	16%	1,864	16%	194	116	1%	17%	1,720	14%	195	117	1%	15%
Koosharem Creek-Otter Creek	3,715	0	43	1%	582	349	9%	11%	69	2%	585	351	9%	11%	238	6%	508	305	8%	15%	39	1%	585	351	9%	10%
Manning Creek - Barney Lake	283	0	-	0%	202	121	43%	43%	81	29%	121	73	26%	54%	130	46%	72	43	15%	61%	133	47%	70	42	15%	62%
Manning Creek - Lower	7,857	0	-	0%	191	115	1%	1%	-	0%	191	115	1%	1%	-	0%	191	115	1%	1%	4	0%	191	115	1%	2%
Manning Creek - Manning Reservoir	1,189	0	34	3%	367	220	19%	21%	190	16%	276	166	14%	30%	431	36%	41	25	2%	38%	281	24%	185	111	9%	33%
Manning Creek - Upper	14,855	0	364	2%	3,704	2,222	15%	17%	740	5%	3,795	2,277	15%	20%	1,298	9%	3,553	2,132	14%	23%	1,188	8%	2,878	1,727	12%	20%
Maple Creek-Sevier River	28,346	0	-	0%	316	190	1%	1%	-	0%	316	190	1%	1%	9	0%	308	185	1%	1%	0	0%	316	190	1%	1%
Mill Creek	11,800	0	225	2%	1,500	900	8%	10%	583	5%	1,255	753	6%	11%	869	7%	1,112	667	6%	13%	470	4%	1,255	753	6%	10%
Monroe Creek	23,532	0	997	4%	9,017	5,410	23%	27%	2,297	10%	8,680	5,208	22%	32%	4,363	19%	7,190	4,314	18%	37%	3,150	13%	7,041	4,225	18%	31%
Monroe Creek - Magleby	1,667	0	85	5%	413	248	15%	20%	330	20%	168	101	6%	26%	449	27%	49	29	2%	29%	330	20%	168	101	6%	26%
Peterson Creek	31,202	0	12	0%	499	299	1%	1%	118	0%	392	235	1%	1%	266	1%	244	146	0%	1%	118	0%	392	235	1%	1%
Pine Canyon-Otter Creek	18,464	0	-	0%	405	243	1%	1%	-	0%	405	243	1%	1%	-	0%	405	243	1%	1%	0	0%	405	243	1%	1%
Pole Canyon-Otter Creek	26,120	0	1	0%	18	11	0%	0%	16	0%	18	11	0%	0%	16	0%	18	11	0%	0%	2	0%	16	10	0%	0%
Swift Spring Creek	22,852	0	41	0%	738	443	2%	2%	40	0%	779	467	2%	2%	40	0%	779	467	2%	2%	113	0%	666	400	2%	2%
Thompson Creek-Sevier River	12,681	0	-	0%	2,276	1,366	11%	11%	8	0%	2,267	1,360	11%	11%	346	3%	1,930	1,158	9%	12%	8	0%	2,267	1,360	11%	11%
Thompson Creek-Sevier River - Annabella Reservoir	940	0	48	5%	626	376	40%	45%	217	23%	457	274	29%	52%	507	54%	167	100	11%	65%	223	24%	450	270	29%	52%
Water Creek	29,962	0	1,106	4%	1,903	1,142	4%	8%	2,250	8%	1,573	944	3%	11%	3,168	11%	1,175	705	2%	13%	1,802	6%	1,201	721	2%	8%
Water Creek - Big Lake	3,409	0	525	15%	726	436	13%	28%	743	22%	562	337	10%	32%	845	25%	470	282	8%	33%	1,159	34%	91	55	2%	36%
Grand Total	389,600		8,187		32,832	19,699			13,643		31,195	16,455			19,835		27,276	16,366			15,074		26,191	15,715		

Maps 1-4: (maps that should be referenced to Tables 4 and 7). Theses maps shows that the project area-Alternatives 2 to 5 in relationship to the Forest and previous activities and with the other alternatives.




Monroe Mountain Aspen Resoration Project
Fishlake National Forest
HUC 6 Watersheds & Past Treatments
Alternative 3
0
3
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12 Miles
Legend
HUC 6 Watersheds
Past Treatments
Forest Boundary
Non-FS
Treatments - Alternative 3
Mechanical and Slash Burning
Prescribed Burn - Mixed Burn Severity
Maple Creek-Sevier River
Water Creek
Thompson Creek-Sevier River
Peterson Creek
Thompson Creek-Sevier River - Annabella Reservoir
Water Creek - Big Lake
Monroe Creek - Magleby
Mill Creek
Monroe Creek
Dry Canyon
Koosharem Creek-Otter Creek
Dry Canyon - Hunts Lake
Greenwich Creek
Manning Creek - Manning Reservoir
Manning Creek - Barney Lake
Box Creek - Above Reservoirs
Manning Creek - Upper
Box Creek - Below Reservoirs
Gold Creek-Sevier River
Dry Creek - Upper
Browns Canyon-Otter Creek
Manning Creek - Lower
Dry Creek - Lower
Pine Canyon-Otter Creek
Swift Spring Creek
Pole Canyon-Otter Creek
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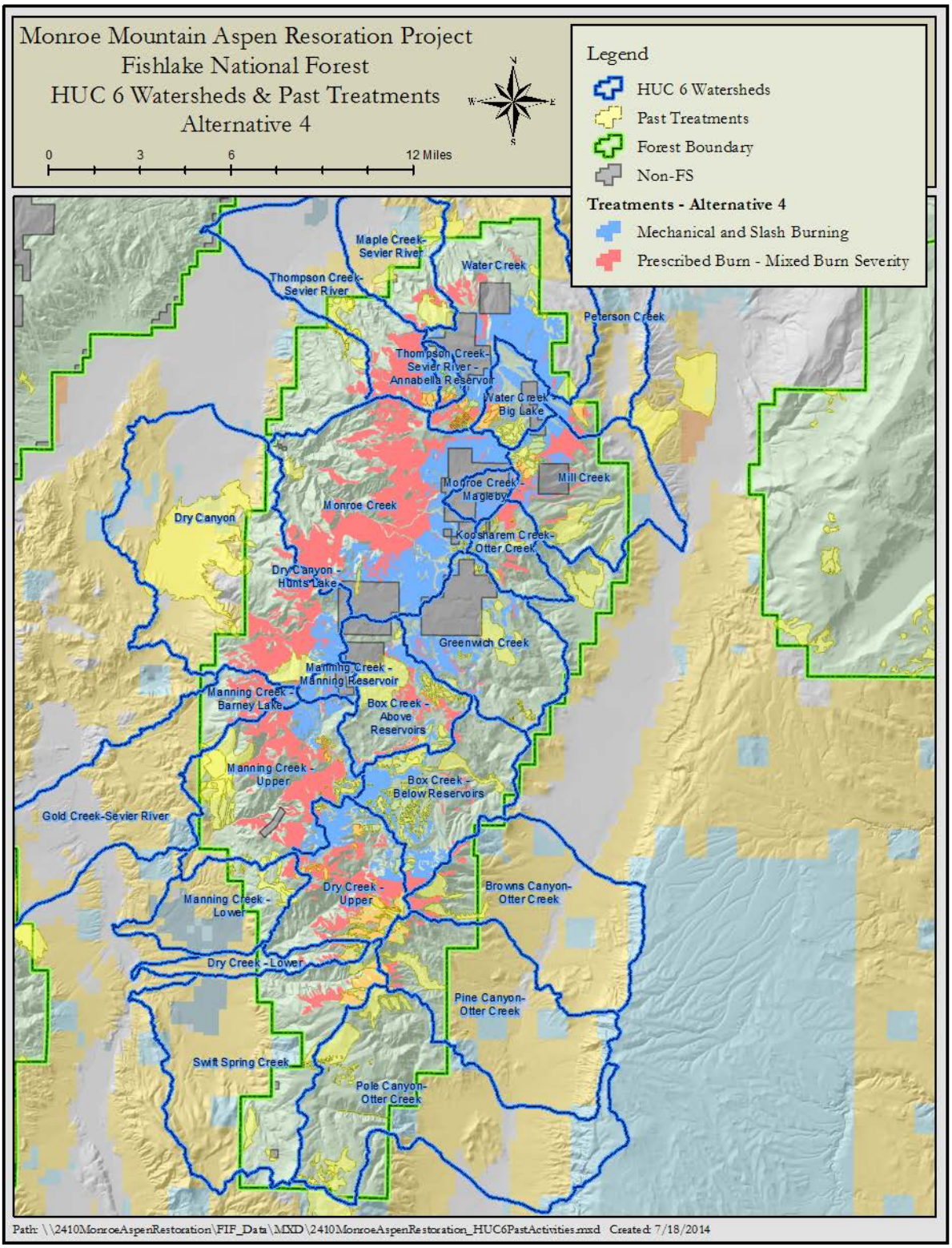
Monroe Mountain Aspen Resoration Project
Fishlake National Forest
HUC 6 Watersheds & Past Treatments
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HUC 6 Watersheds
Past Treatments
Forest Boundary
Non-FS
Treatments - Alternative 4
Mechanical and Slash Burning
Prescribed Burn - Mixed Burn Severity
Maple Creek-Sevier River
Water Creek
Thompson Creek-Sevier River
Peterson Creek
Thompson Creek-Sevier River - Annabella Reservoir
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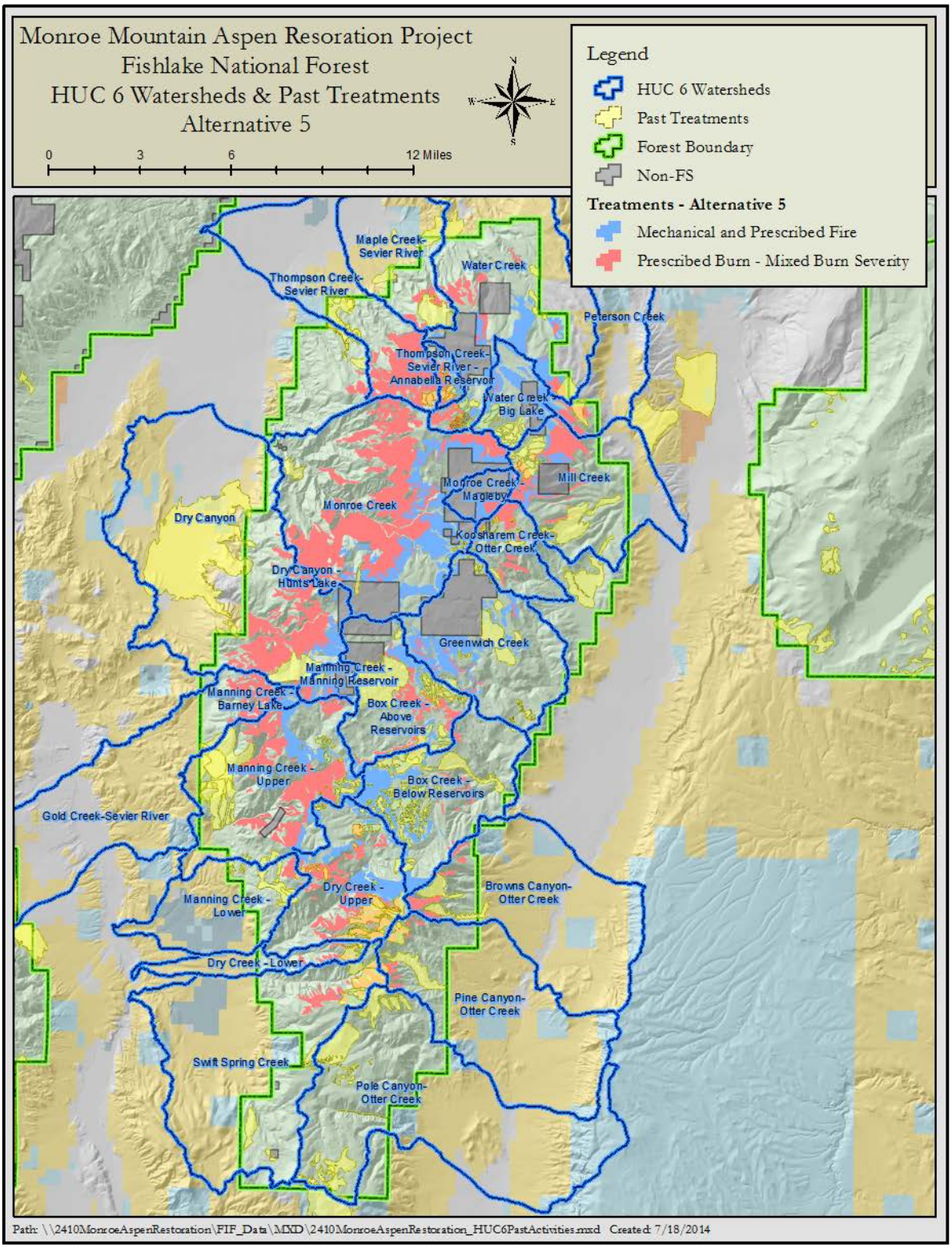
Monroe Mountain Aspen Resoration Project
Fishlake National Forest
HUC 6 Watersheds & Past Treatments
Alternative 5
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12 Miles
Legend
HUC 6 Watersheds
Past Treatments
Forest Boundary
Non-FS
Treatments - Alternative 5
Mechanical and Prescribed Fire
Prescribed Burn - Mixed Burn Severity
Maple Creek-Sevier River
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Thompson Creek-Sevier River - Annabella Reservoir
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Gold Creek-Sevier River
Dry Creek - Upper
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Manning Creek - Lower
Dry Creek - Lower
Pine Canyon-Otter Creek
Swift Spring Creek
Pole Canyon-Otter Creek
Path: \\2410MonroeAspenRestoration\FIF_Data\MXD\2410MonroeAspenRestoration_HUC6PastActivities.mxd Created: 7/18/2014

watersheds or delineated analysis cumulative effects areas (CEAs) in which the various proposed project units are located (see Tables 4 and 7and Maps 1-4). These areas were selected because they encompasses the geographic area that could have contributions from direct and indirect effects on watershed resources, as well as cumulative effects from the proposed actions and past, ongoing and proposed management activities (including Aquatic and Boreal Toad areas of concern).

Information and Best Available Science used to support Analysis, findings and conclusions.

Water Quality data:

Final_NF_Box_Creek_Oldroyd_Fire_Mon_Report (2003) is a monitoring report of water quality data, stream conditions, macroinvertebrates, fish, Boreal toads, and Burned Area Emergency Rehabilitation (BAER) treatment effectiveness that compares both pre and post Oldroyd wildfire conditions for North Fork of Box Creek written by Jim Whelan (Joint State and Forest Fisheries Biologist).

Oldroyd_2003observations.doc is an Oldroyd wildfire BAER treatment effectiveness monitoring report written by Dale Deiter (Forest Hydrologist) years ago.

From work the Forest specialists completed for the Box Creek Fire BAER Report states that no traditional hillslope treatments such as seeding or straw mulching were needed following the fire to protect values within and below the fire. Since the fire there have been very few issues with flooding or sediment delivery from the fire into the stream and reservoirs.

Jeff Petty/ Shell Valley Consulting Level II Riparian surveys for Koosharem, Box, Greenwich, and Manning Creeks.

Overall the riparian conditions are stable on Monroe Mountain. But there are reaches that are being impacted from uses such as grazing. Some historic incising of channels occurred on some reaches and there is some localized channel adjusting occurring within and around some of these reaches.

Monroe and Manning Creeks, all of the North Fork Box Creek tributary channels, and the Greenwich Creek tributaries are in good conditions with no or low entrenchment within and just below the project boundary. Both wildlife and cattle grazing occur throughout the area and some areas show evidence of bank trampling from both groups. South Fork Box Creek has a few areas where evidence of bare banks and trampling has occurred from cattle. Box Creeks have numerous areas that contain beaver dams, and large willowed wetland complexes, that aid in flood routing, and limiting flooding effects on Box Creeks and aid in these creeks functioning properly. In the non-wetland stream channel areas (beaver dam-willow complexes), the streams are typically only slightly entrenched but are able to put flood flows onto their floodplains. Although in a few areas on South Fork Box Creek, the stream is moderately entrenched resulting in the loss of wetland riparian area, and conversion to upland vegetation and now are unable except possibly extremely high floods from accessing the now abandoned floodplains. Some of these areas might be where beaver dam complexes existed in the past, but for unknown reason(s) are not there now (aspen and willows decline in the immediate area, irrigators, trappers, cattle, and or flooding blowing, or moving them out are likely possibilities however).

GIS Coverage's: Fishlake waterbody, stream, past activity, contour, ownership, travel route, existing vegetation, precipitation, watershed, hydrology point, management areas, fire history, soils, and public water systems. Forest digital raster grid coverage (electronic version of a topographic map) and Forest SEQ quads were also used.

Additional Data: **NOAA precipitation frequency Estimates from NOAA Atlas 14** for the project unit (NWS 2007). This resource gives reasonable calculations of likely precipitation frequencies or specific year storm rates in inches per unit of time (i.e. a 2-yr storm event that is 0.61 inches in 30 minutes at the Box Creek Station). Annual precipitation is approximately 30-32 inches in the project area (Fishlake Precipitation Coverage).

Utah Division of Environmental Quality-Division of Water Resources Utah Lake and Reservoirs information such as location, photographs, morphometry, and characteristics for Lower Box Creek Reservoir, and Manning Meadow Reservoir.

Disturbed WEPP Model Assumptions and Results (Elliot, William J. et al. 2000)

Disturbed Water Erosion Prediction Project (WEPP) gives the probabilities of annual erosion to disturbed forest conditions, where a forest quickly re-vegetates following a disturbance. To estimate an average annual erosion, Disturbed WEPP generates a stochastic climate for the climate selected, for the number of years specified. The WEPP model then runs a daily simulation for the specified period of time, and calculates the average annual runoff, erosion, and sediment yield values.

To determine the probability values of runoff, erosion, and sedimentation, Disturbed WEPP is run for the number of years requested, and the annual values of runoff, erosion, and sediment yield are generated by WEPP. Disturbed WEPP then sorts the annual values by magnitude. For a 50-year run, the largest values estimate a 50-year return period (or 0.02 probability of occurring) value; the second largest, a 25-year return period; the fifth largest a ten-year return; and the 20th largest a 2.5-year return period. The average value is the same as a 2-year return period regardless of the number of years of simulation selected.

For forest conditions, there are two levels of forest age: 5-year-old and 20-year-old. By the time a forest reaches 20 years of age, the impact of the canopy and residue accumulation is sufficient to provide as much erosion protection as can be achieved from vegetation. The 5-year-old forest is considered a reasonable condition to describe a forest that has been heavily logged, leaving some side trees and considerable groundcover, or to describe a forest one to two years after a prescribed fire, or two to three years after a wildfire. The skid trail condition describes a compacted, bladed skid trail with very little cover. The WEPP Model is therefore a tool that can be used to analyze the risk involved (probabilities) of various events.

Analysis was done using the Water Erosion Prediction Project (WEPP) model. The WEPP model uses soils information, slope, and ground cover similar to the special protection areas but with the addition of climate statistical information. The probability of erosion and sediment yield was predicted for short period following treatment when the thinning and prescribed burn areas will be most vulnerable to the effects from high intensity storm events (Table 5). The thinning and burn area have been designed with adequate riparian special protection areas to maintain a

probability below or equal to four percent probability that there will be sediment yield in the year following thinning (large storm events only). The WEPP model predicts that treated hillslopes will have an increased probability of sediment delivery to streams from 2 up to 4 percent (increase of two percent). A treatment unit with a probability of 4 percent or less will begin to deliver sediment to streams if a 25-year storm or greater (large storm events) occurs the year following the thinning or fire activities. It is expected that the probabilities will decrease each subsequent year following treatment until vegetation occurs.

Table 5: WEPP Probabilities of Erosion, and Sedimentation.
The WEPP results can be found in the project file. Similar erosion rates are expected from nearly all drainages in the project area to those of Manning and Box Creeks shown in this table from mechanical (similar to thinning) and prescribed fire. These values can be used to compare no action, mechanical treatments and prescribed burn slopes with or without treatments.

Activity and location	**Probability there is erosion (%)**	**Probability there is sediment delivery (%)**
Skid Trails (sedimentation and erosion likely from 50-yr storm event or greater with a 0-2% chance of occurring in first year following treatment).	0-2%	0-4%
Hillslope without mechanical treatment or prescribed fire above the streams for **Box Creek (No Action)**	~0%	0-4%
Hillslope mechanical treatment from **Box Creek** (sedimentation and erosion likely from 50-yr storm event or greater with a 0-2% chance of occurring in first year following treatment).	0-2%	0-4%
Low Severity Fire from Box Creek (sedimentation likely from 25-yr storm event or greater with a 0-4% chance of occurring first year following treatment).	0-36%	0-4%
High Severity Fire from Box Creek (sedimentation likely from 5-yr storm event or greater with a 0-20% chance of occurring first year following treatment).	100%	0-32%
Low Severity Fire from Manning Hillslope downstream of reservoir (sedimentation likely from 25-yr storm event or greater with a 0-4% chance of occurring first year following treatment).	0-42%	0-4%
High Severity Fire from Manning Hillslope downstream of reservoir (sedimentation likely from 5-yr storm event or greater with a 0-20% chance of occurring first year following treatment).	100%	0-34%

PROCESS DESCRIPTIONS AND INDICATORS FOR THE PRINCIPLE ISSUES

Hydrologic Responses to Fires and Mechanical Treatments

Fires can alter soil and vegetation characteristics resulting in increased quantity of flows: Reduction of vegetation and forest floor litter results in decreases in interception and evapotranspiration, and infiltration rates. This means increased water becomes available for overland flow and stream runoff. Increased flows in turn lead to increased erosion and sedimentation (Zwolinski 2000). Prescribed fires (low and moderate severity) are designed so that vegetation remains in some form (wood, litter, and duff) to cover soils (Zwolinski 2000). Wildfires (high severity) have no plan or design to them and result in greater reduction in vegetation and soil cover that consequently leads to even greater amounts of stream runoff, erosion, and sedimentation. High severity fires, which may be greater due to past fire suppression activities, can lead to greater effects including water repellent soils since formation is dependent on heating temperatures and soil moisture (Robichaud 2000). Prescribed fires commonly occur during the spring and fall when soils are wetter and therefore, water repellency would be minimal which would lead to not as great of increases in water yield compared to wildfires (Robichaud 2000).

Mechanical and fire treatments alter soil and vegetation characteristics resulting in increased quantity of flows, erosion, and sedimentation**.** Additional effects may impact water quality, soil productivity, aquatic habitat and species, and riparian areas (Elliot et. al. 2010, See Chapters 5-Watershed Effects of Fuel Management and Conclusion section specifically by Robichaud et. al.; Chapters 6-Effects on Channel Erosion; 8-Effects on Water Quality; 9-Effects on Soil Productivity; 10-Effects on Riparian Areas; 11-Effects on Aquatics; 12-Lanscape Scale effects on Water Resources such as this type of project). Some of the effects of mechanical treatments include the impacts of landings, skid trails, and temporary road construction and obliteration of course.

Sediment Production and Delivery

Sediment production and delivery, as used in this analysis, refers to surface erosion from hillslopes from either mechanical treatments or prescribed fire. Increasing fire severity results in greater peakflows (flooding), nutrient losses, and promotes erosion by reducing or eliminating protective organic soil layers and by causing the soil to repel water. The primary indicator of sediment production and delivery is the results and comparison of alternatives from the WEPP modeling for the no action-unburned, no action-wildfire, and proposed action-prescribed fire and mechanical treatments from the various potential action alternatives (Table 5). At best, any predicted runoff or erosion value, by any model, will be within only plus or minus 50 percent of the true value. Erosion rates are highly variable, and most models can predict only a single value. Replicated research has shown that observed values vary widely for identical plots, or the same plot from year to year (Elliot et al. 2000). WEPP can be used to compare both fire and mechanical treatments of vegetation.

DEBRIS FLOW PRONE AREAS

There is always the concern of having debris-flows following fire. Debris flows can lead to damage of channels and values below fires. A tool used to predict whether or not drainages are prone to debris-flows has been created. Susan Cannon and her colleagues who developed a method to predict debris-flow events states: "…Basins burned at moderate and high severities over more than 50 percent of their areas were susceptible to debris-flow activity… The conditions described here are likely to produce debris flows from recently burned basins in the future (Cannon et al. 2003)." Using their basin area/relief ratio threshold method it shows that given sufficient rainfall, that the watersheds found in the watershed analysis data table below are all prone to debris flow events (except for the Upper Box Creek Tributaries, but these tributaries are near the threshold and are still could be prone to debris flows under the right conditions) if 50 percent or more of the drainages were burned at least moderate severity given their relief ratio and areas (Table 6) (Cannon et al. 2003).

Table 6.

Debris-Flow Prone Analysis Watershed Data			
Watershed Name	**Approximate Drainage Area**	**Relief Ratio**	**Debris Flow Prone?**
text	miles2	dimensionless	Y or N
S. Fork Box	5.3	0.08	NO
N. Fork Box	5.7	0.08	NO
Monroe Creek	39.4	0.15	YES
Greenwich (Boundary)	18.6	0.10	YES
S. Fork Greenwich	7.5	0.10	YES
Manning Upper (dam to canyon mouth)	16.4	0.11	YES
Dry Creek Upper to boundary	17	0.10	YES
Dry Canyon (Canyon Mouth)	23.3	0.16	YES
Koosharem to Diversion	5.80	0.11	YES
Thompson Basin (Boundary)	9.60	0.21	YES

This table is used to show that care must be used when implementing prescribed burns with the project area. Nearly every drainage using this method would be considered (or very close to) being debris-flow prone if entire drainages were treated at one time. Another important factor is that many of the smaller tributaries to these drainages too would all likely be debris-flow prone by themselves and so again care should be taken to avoid burning out tributary drainages with moderate and high severity fires over fifty percent of those drainages too. Hence the Forest Fisheries Biologist and Hydrologist have requested to only treat portions of Sub-HUC6 or HUC6 areas over time and then recommend reentry into areas only after some vegetation recovery has occurred. Uses of the listed design features are important to limit or eliminate watershed impacts.

Drainages of concern due to percentages of HUC6, sub-HUC6 or amount of acres on Forest to be treated, or values of importance within or below the drainage are described in the section below.

Box Creek would actually have about 20% additional area treated of the HUC6 area and with Cumulative effects this should be treated with care and potentially over multiple entries using the listed design features. There is a diversion at the boundary that could be affected by flooding and debris from treatment areas below the reservoirs. The reservoirs were constructed to provide irrigation water below the Forest and are managed primarily for irrigation and not much concern is given to the fisheries water quality impairment. The TMDL (Total Maximum Day Load) plan for Lower Box Creek Reservoir is a low priority at this time. The Box Creek Project will likely lead to a good portion of the watershed being considered being restored (about 10%) following the project completion and vegetation recovery.

Dry Canyon would actually have about 50% of the Forest acres of the HUC6 area treated and consequently due to debris-flow prone nature of drainage and community below the drainage this drainage should likely be treated over multiple entries using the described design features. The alluvial fan nature of the mouth of canyon means water and debris could flow anywhere below the fan and must not be thought of only flowing in the current channel on the fan. Again, this basin is highly debris-flow prone.

Greenwich Creek will have up to 17% of the HUC6 treated with even higher percentage of the South Fork tributary of mechanical treatment. So may not be as big of issue if acres to be treated were predominantly fire acres and if treatments use described design features. There is a diversion at the Forest boundary that could be affected by debris and flooding.

Dry Creek Canyon has up to 33% of the drainage being proposed for treatment. Care should be taken to limit flooding events on the road and through culverts near the bottom and below the Forest. Use the listed and described design features to achieve this.

Manning Creek is broken up into many analysis areas but overall this drainage should be treated over multiple entries, especially within the Manning Creek Upper or mainstem, above the reservoir and within the Barney Lake area. Channel conditions are important in this drainage and limiting flooding events of larger magnitude should be a factor on area to be implemented with each entry. This drainage has the uber-important Bonneville Cutthroat Trout fishery within Manning Meadow Reservoir despite there being some water quality issues that will likely lead to a TMDL plan in the future. The TMDL is low priority at this time. Treatment within the drainage actually could be considered by some to be importance to prevent some potential wildfire type issues and to protect the reservoir and Bonneville Cutthroat Trout fishery. It will be a balancing act between water quality and watershed restoration over the life of the project and until vegetation has recovered well enough. Fencing will aid in protecting vegetation recovery to aid in protecting water quality and aid in watershed restoration.

Monroe Creek has up to about 27 to 37% of the drainage being proposed for treatment. With the values downstream of this drainage that includes Monroe, the hydropower plant, fishery, private ponds, and diversions great care should be taken when treating these drainages and of

course using multiple entries. Maintaining the channel access to floodplains and hydrologic function is very important in this case due to the downstream values. The largest Source Water Protection Zones are within this drainage. Use the listed and described design features.

Mill Creek has diversions below the Forest and care should be taken when treating the 10-13% of the area to avoid impacts to the diversion and to the fish hatchery from Little and Birch Creeks. Water is used for irrigation on private lands. Use the design features listed.

Thompson Creek (Basin) is very steep and cliffy in appearance. With the large percentage of the drainage proposed for treatment and with the values below this area (homes and canal) great care should be taken to limit flooding, and debris-flow events. It appears that about 50% of the Forest area is being proposed for treatment. The alluvial fan below Thompson Creek has multiple flow paths below the mouth of canyon and flooding and debris could potentially go anywhere below or on the fan. Over the last decade I have observed new flow paths on the fan every few years. Multiply entries would be imperative in this area to protect values below the Forest. One of the larger Groundwater Source Protection Zones is within this drainage. Large storms frequently move down Clear Creek from the west and blow into this area causing big storms and flooding events. This drainage is highly debris-flow prone. Use listed design features.

Water Creek has the potential to affect diversions downstream of the Forest and add sediment to Big Lake. One of the Groundwater Source Protection Zones is located within this drainage. Water is used for irrigation on private lands. Use listed design features.

Koosharem Creek has about 15% of the area proposed for treatment and has one of the Groundwater Source Protection Zones within it. It has a diversion as well. Water is used for irrigation on private lands. When this project is added to the Monument Peak Project then about 70% of the drainage will be treated and with values downstream including the town of Koosharem great care should be taken to prevent large floods downstream using the existing design criteria.

Drainages that compared to the drainages above do not have the issues, values, or large areas to be treated include Browns Canyon, Pine Canyon, Pole Canyon, Swift Spring, Manning Creek Lower, and Jensen Creek south of Thompson Creek, Gold Creek, Peterson Creek, and Maple Creek. There is not a great need to carry forward analysis of these drainages. However, the general treatment effects will be applied in the general sense of having mechanical or prescribed fire treatments within them throughout this report. Use design features listed.

Direct and Indirect Effects Analysis & Conclusions

The desired condition for watershed resources as stated in the Land and Resource Management Plan for the Fishlake is to maintain water quality to meet State standards, manage municipal watersheds to protect quality of water supplies (The Fishlake only has Groundwater Source Protection Areas), and maintain productive streams, lakes, and riparian areas and mitigate hazards on floodplains (FLRMP 1986, p. IV-4).

The use of riparian special protection zones (buffers or non-treatment areas) is an important indicator of potential effects to floodplains, wetlands, and water quality being mitigated from this type of BMP. If activities do not occur or are not located near riparian resources then the likelihood of negative effects on aquatic resources decreases or is eliminated. Special protection for riparian zones with Boreal toad concerns will occur in the project area. The use of riparian special protection zones treatments in this project area will aid dramatically in limiting or eliminating effects to floodplains, and water quality being mitigated from this type of BMP (meaning were not proposing ignition or mechanical treatment with 100 feet or only on the edges of riparian areas) (Mayer, P.M., et al. 2005., pp. iv, 3-4, 17). The special treatment will be to having fire back into riparian areas or to treat when dry, or during the winter when soils are frozen. The riparian buffers should be an appropriate enough distance away to limit or capture some sedimentation of stream from the project area because of the slopes that are proposed to be treated on the average are less than 40% in gradient (FLRMP. 1986. p. IV-43) and the WEPP Modeling results located in Table 5.

WEPP modeled probability of erosion and sediment delivery (percent probability). The probabilities can be used as a risk assessment comparison for erosion and sedimentation from varying alternatives or treatment methods. Low probability percentages imply that large storm events need to occur for the erosion and sedimentation events to occur whereas high percentages imply that small storms could likely lead to the erosion or sedimentation event (Table 5). Modeling results for skid trails and hillslopes mechanically treated resulted in low probabilities of erosion and sedimentation (0-4%) for the proposed activities. Modeling results for prescribed burns resulted in higher probability of erosion (0-42%), but low probability of sedimentation that is similar to the thinning (0-4%). This suggests that erosion is more likely to occur on burn units but that the eroded sediment typically still stays on site, rather than moving off site into streams. Therefore there is a low probability and risk that water quality will be affected or additionally impaired from the proposed actions and the risk will continue to decrease each year as the disturbed areas become vegetated which could take around 5-years.

The Water Erosion Prediction Project (WEPP) model can be used to predict hillslope erosion from disturbed forest events and as a way to compare alternatives including prescribed fire and wildfires (Elliot et al. 2000). The approach is to predict the erosion occurring after a disturbance by modeling the desired years of climate. The results will emphasize the risk of various erosion events occurring immediately after fires and until the area has recovered (Robichaud 2000). For example, 10 years of storm data will be used to predict the 10-year return interval event that has a probability of 0.1 of occurring. The 5-year return interval and the 2-yr return interval are also predicted (Elliot et al. 2000). A 10-year value will be exceeded, on the average; about once every ten years and that the 2-year value will be exceeded, on the average once every two years, and five times in ten years. There is a 1/10 or ten percent chance that a value equal to or greater than the 10-year value will occur a given year. Conversely, there is ninety percent chance that precipitation; runoff, erosion, or sediment yield will be less than the 10-year value. Also note, the accuracy of a predicted erosion rate is, at best, plus or minus fifty percent due to the fact that erosion rates are highly variable. Even observed study plots have values that vary widely from year to year (Elliot et al. 2000). WEPP uses climate, soil texture, topography, and plant communities in the prediction of sediment yields.

Consequently, the mechanical treatment areas have been designed with adequate riparian special protection areas to maintain a probability below or equal to 4 percent probability that there will be sediment yield in the first year following mechanical treatment. The WEPP model predicts that treated hillslopes will have a probability of sediment delivery to streams around 4 percent. A unit with a probability of 4 percent or less will begin to deliver sediment from skid trails and mechanically treated hillslopes into streams if a 25-year storm or greater occurs the year following the mechanical activities. The risk of implementation of the proposed project is consequently low the first year following treatment and will decrease even further each additional year following treatment as vegetation again becomes more reestablished each year.

Water and Sediment Yields: Water and sediment yields vary depending on precipitation, evapotranspiration, soils, vegetation type, fire severity, geology, topography, and proportion of the vegetation burned (Robichaud 2000). According to Robichaud "Sediment yields after prescribed burns and wildfires range from very low in flat terrain and in the absence of major rainfall events to extreme in steep terrain affected by high intensity thunderstorms. Soil erosion after fires can vary from under 0.4 to 2.6 ton/acre/year from prescribed burns to over 9 to 49 ton/acre/year from wildfires (Robichaud 2000)." It is assumed that our erosion rates will be within the ranges shown above and WEPP runs had values with in this range. Erosion and sedimentation rates typically decrease each year until they return back to the normal undisturbed rates. At best, any predicted runoff or erosion value, by any model, will be within only plus or minus 50 percent of the true value. Erosion rates are highly variable, and most models can predict only a single value. Replicated research has shown that observed values vary widely for identical plots, or the same plot from year to year (Elliot et al. 2000).

The WEPP results leads me to the prediction that beneficial water uses would not be impaired from the proposed project since there is low probabilities for sedimentation from the project area unless a large storm events (25-year storm event or greater) were to occur following thinning.

The small WEPP probability percentages as mentioned above would not likely (low risk) lead to impairment of the State beneficial uses and that effects would be unlikely, negligible and would likely maintain the existing levels and not lead to additional impairment of water quality. The CEAs are in good condition except for in a few small areas where some bank and wetland trampling occurs in the area of the springs and channels and in some hillslope areas of the mountain. The historical uses in the area have led to the existing condition, and the existing water quality levels. The watersheds have recreation, grazing from wildlife and cattle, roads, and cabin uses. These uses will likely continue to occur in the CEAs at rates similar to what they have in the recent past and thus are considered part of the existing and future uses within the analysis area too. The historic and existing uses have not led to any streams having beneficial uses impaired and will not likely to with the addition of this project within the analysis areas or CEAs based on using BMPs, modeling results, and existing water quality of the aquatic resources.

Compliance with State water quality standards will still be maintained in the streams. Lower Box Creek Reservoir water quality will not likely be impaired additionally from the action alternatives because first the likelihood of sediment entering the streams is low (buffers and soil characteristics), and second the sediment would likely be trapped within buffer areas, channel

pools, numerous beaver dams, or Upper Box Creek Reservoir before it could become a problem within Lower Box Creek Reservoir. The Box Creek burn (no land treatments like seeding or mulch were proposed or completed within the burn of the low and moderate burn severities other than some road and culvert work) and Project area will continue to improve and will have additional vegetation recovery by the time the project will begin to be implemented which will aid in improving the uplands even more within the watershed.

A review of historic water quality data for Lower Box Creek Reservoir indicates that measurements have exceeded the total phosphorus (TP) indicator value during the last decade, although concentrations appear to be decreasing slightly (improving water quality) (UDEQ 2006, p.64). A trend assessment of TP measurements indicates that concentrations are exhibiting a decreasing trend (meaning water quality is improving) during the past decade even with the Oldroyd wildfire in the North Fork Box Creek drainage (UDEQ 2006, p. 65 and Figure 3.5). However, light increases until all treatments are completed may be occurring at this time and may do so until the completion of the original Box Creek Fuels Reduction Project, the total vegetation recovery of the Box Creek Fire, and the subsequent treatment from this project.

Direct effects are caused by the action occurring at the same time and place. Tractor skidding a tree on a skid trail would constitute a direct effect if sediment was displaced or soils became compacted at the time of the action. Indirect effects are caused by the action and occur at a later time or farther removed in distance. An example would be possible increased erosion rates from mechanical units in the first year following treatment. Cumulative effects result from the incremental effects of the proposed action when added to the other past, present, and reasonably foreseeable future actions.

Direct effects include to aquatic related resources include the physical disturbance of soil along the temporary roads, skid trails, and landings. Some compaction is likely along skid trails, and landings. The temporary roads will be ample distance away from riparian resources to prevent sedimentation into streams. WEPP model results show that there’s a 0-6% chance of erosion and 0-4% chance of sedimentation occurring from the project boundary. These results lead to the conclusion there is a low probability of water quality being directly additionally impaired as a result of this project. Especially when factoring in special protection areas along riparian resources general soil and watershed characteristics, and use of planned mitigation measures and BMPs.

Indirect effects include increasing erosion rates above their undisturbed rates because of thinning types of disturbances. Although, WEPP and monitoring of thinning show that sedimentation in the area is not likely when mitigation measures and BMPs are used. If large storm events were to occur 25-year storm event or greater then sedimentation rates would increase above undisturbed rates based on the WEPP model and water quality could be temporarily affected (4% chance following first year of treatment and decreasing each year following treatment). There would still not likely be any effects to floodplains from the large storm event. Overall the channels are in good condition and would likely handle any reasonable increase in discharge without affecting the stream channels too negatively. There will not likely be any direct or indirect effects to municipal watershed (Groundwater Source Protection Zones). It is not likely to affect the groundwater from these types of surface or hillslope treatments.

Grazing occurs within the project and analysis area. Recreation use occurs on the private and Forestlands within the analysis area. Travel routes are located throughout the CEAs. Grazing and travel routes have added sediment in to water bodies in the past and will likely continue to do so in the future. Upper Box Creek Reservoir is not impaired even with previous thinning, grazing, travel routes, and recreation use and would likely continue even with the proposed thinning activities occurring in the CEAs because of BMPs, and excluding steep slopes from mechanical treatments. Grazing is typically stopped for a period following prescribed burn to allow the area to recover following being disturbed. This means that cattle grazing effects would actually be halted for a period following treatment within the project area. This will likely lead to improved riparian and channel conditions following treatment in many cases.

Watershed conditions (compaction, erosion, soil cover, etc.) that change because of the treatment activities will likely revert back to those that currently exist in the CEAs in the next few years following treatment.

It is not likely that water quality would be impaired because of not implementing the proposed action unless you considered wildland fire taking place within the analysis area. In this case erosion and sedimentation rates would likely increase above those currently or those of the proposed action (individual WEPP runs for low and high severity wildland fire are included in the project record with the other WEPP runs) and then some impairment could occur (Table 5). Wetlands and channels might be burnt in the event of wildfire, which could change the vegetation composition in these areas as well. Riparian plant species that would not be disturbed from mechanical activities could be burnt and thus eliminating their hydrological functions including buffering sediment from entering streams and keeping water cool enough for aquatic wildlife. Steep slopes and wetlands that were eliminated from thinning project design could be burnt and could add to the negative effects on water quality, wetlands, and hydrological function.

If implemented, the mechanical and fire activities would leave the land with a thinner timber appearance and potentially with only slightly higher erosion rates and sediment yields for a short period of time (approximately five years). Fire is a natural process within the area, so having fire within the analysis area is not adding an unnatural mechanism that previously was not there historically. It just is that wildfire suppression has occurred in the area that has led to increased fuel loadings that can lead to increased severities on soil and water quality. All treatment areas for this project require that special protection for riparian areas will occur to the edges of perennial stream channels, lakes, and ponds, and be treated when soils are dry (normal BMP that is standard with mechanical treatments) or wet (prescribed burn) enough to not impact soils (most likely treat in spring or fall), riparian areas, or lead to additional water quality concerns. There will not likely be any impacts to municipal drinking water sources (Groundwater Source Water Protection Zones) as a result of the proposed thinning activities. The groundwater sources are not likely to be affected from any of the proposed hillslope actions.

DIRECT AND INDIRECT EFFECTS OF EXISTING OR REASONABLE AND FORSEEABLE ACTIVITIES

Past, Present and Reasonably Foreseeable Future Vegetation Related Actions on Monroe Mountain.

The past, present and reasonable foreseeable future actions include: (Some of these actions were summarized from Table below)

- Personal use Christmas tree sales on Monroe Mountain is factored into the existing condition as ongoing activity. Very little impacts or risks and a dispersed type of use.
- Personal use fuelwood gathering on Monroe Mountain is factored into the existing conditions for ongoing activities. Very little impacts or risks and a dispersed type of use.
- Private land development including new homes on Monroe Mountain is factored into existing conditions as ongoing activity. Extremely difficult to predict where, when and for how long with private lands.
- Fuels reduction work on private lands is difficult to predict location and magnitude if any from these activities.
- Recreational use – primarily hiking, horseback riding, mountain biking, OHV use, cross-country skiing, hunting, fishing, and snowmobile use on Monroe Mountain is factored into the existing conditions of the mountain.
- Swift Springs Water Development Project-This project would not likely have any overlap of time or space with this project and will not need to be factored into the effects analysis.
- Livestock grazing is factored into the existing condition. Monroe Mountain Livestock Management Improvement Project will likely improve some riparian areas where new lines are constructed, but will likely off-set the riparian gains with additional upland uses where the new systems and fences now emphasize use.
- Livestock management adjustments under the purview of Forest Service administrative authorities found in 36 CFR 222.4 is factored into the existing conditions as ongoing and existing conditions on Forest lands. These actions are not guaranteed and vary by year, so grazing is still just considered as part of normal allotment activities and rotations.
- Ongoing maintenance of existing range infrastructure; fences, troughs, waterlines, etc. is factored into the existing condition.
- Ongoing maintenance of roads and trails is factored into the existing condition.

The eleven activities in the table below (11 highlighted lines) will need to factor into the cumulative effects analysis for watershed or hydrological resources. The 11 lines are actually just 4 projects for this analysis though with each project highlighted a unique color and symbol. The Box Creek Project and Wildfire lines have been factored into together as Box Creek activities for this analysis. The Two Twin Peak and Monument Peak lines are factored as one project each as well. The North Clover and Cove Mountain projects are near to each other and will be considered as one project for this analysis.

Table 8. Past, Present and Reasonably Foreseeable Future Actions on Monroe Mountain

Name	Type of Action	Year	Acres
*Twin Peaks	Dixie Harrow	2012	578
+Cove Mountain	Harvest	2014	1,774
+North Clover	Harvest	2011	191
@Box Creek Phase 1	Harvest	2012	386
@Box Creek Phase 2	Harvest	2013	284
#Monument Peak	Harvest	2014	400
#Monument Peak	Prescribed Fire	2015	3,120
@Box Creek	Prescribed Fire	2012	650
@Box Creek	Prescribed Fire	2015	2,658
*Twin Peaks	Prescribed Fire	2014	5,169
@Box Creek	Wildfire	2012	1,520

Within the cumulative effects areas there are only a few reasonably foreseeable Forest Service activities that possibly could affect values at risk or hydrologic resources: one project is the **Twin Peaks project***, which is in the process of being implemented. There is only a small amount of acres to be treated within the Swift Springs HUC6 watershed though from this project compared to the actual Twin Peaks Project that will treat about 5,747 (25% of the HUC6 watershed) acres compared to this project that will treat up to about 819 (only 3% more of the HUC6 watershed) acres from Alternatives 2 or 3. Prescribed burning has begun starting this year. I would not expect there to be an overlap of effects in either time or space from these two projects. The harrow acres were completed in 2012 and have already begun to recover. The treatment from this project is predominantly on the Northside of the watershed and the Twin Peaks project is on the Southside of the watershed. There is only one perennial stream reach and that begins on side of the mountain and becomes a losing stream below that in the channel. So fisheries or water quality are not issues. There are no other values of concern within or below this drainage.

Another project is the **Box Creek Project**@. Most of the work has been completed but there is some potential for there to be some overlap of effects in both time and space depending on when this project activity were to begin and the time that vegetation recovery would have returned to nearly pre-treatment areas. There have not been problems from the Box Creek Project on hydrologic resource though so the likelihood of there being cumulative effects would be very low and of a small magnitude. The Box Creek Wildfire, original Box Creek Project and this

proposed project will lead to a strong majority of the HUC6 watershed having been treated, especially when factoring the Oldroyd Fire as well (likely greater than 50% of the watershed being treated). Since, there is a gradual treatment of multiple entries there will not likely be impacts too great to affect the hydrological resources. The Box Creek acres treated from Table 8 resulted in about 5,498 acres and 28% of the watershed being treated. With the proposed max acres to be treated of Alternative 3 at 4,381 from this project that would mean that about 22% more of the drainage or a total of about 50% being treated.

The **Monument Peak Project#** from Table 8 overlaps greatly with those acres proposed from this project. This project proposes treating about up to 15% of the HUC6 watershed. With the Monument Peak Project about 70 to 80% of this HUC6 watershed could be treated. The harvesting acres from Monument Peak from Table 8 above show that treating may begin this year. It would not be unreasonable to think that if this project is approved, than the prescribed burning would take place together from both projects. Due to the very large amount of the watershed being treated there could be cumulative effects on hydrological resources to water quality, stream channels, and the diversion works. Multiple entries should be used as described in the design features. If the treatments are spread-out over time and in the watershed then effects might be minimal to non-existent on watershed resources and especially as vegetation recovery starts.

The **Cove Mountain and North Clover projects+** are similar type harvest activities within the timber management area of the Water Creek-Big Lake HUC6/CEA. The North Clover Project was competed previously with planting occurring this year. The Cove Project will primarily be to re-enter the timber units in the area of the project and take additional trees in the already disturbed areas. The original harvest units are part of the existing condition within this drainage that has led to there not being water quality issues in Big Lake. So, if by having some minor re-entries by the Forest, than we will not likely lead to large impacts on watershed or hydrological resources or lead to water quality issues.

Activities, such as grazing, hunting, and recreation will continue as they have been and are not part of the decision for this environmental assessment. Grazing within the treatment units with prescribed fire will need to have livestock management changes as per the required design criteria and proposed action alternatives.

The current erosion rates and peakflows are the results of past and current activities on the public lands and many other factors such as geology and climate. The streams and hillslopes are in good enough conditions that our streams are complying with State water quality standards and the Clean Water Act. Therefore, it is not very likely that all of these activities together will increase sedimentation to streams or degrade the streams enough to have them listed on the State 303d list of impaired waters.

DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE

Under this alternative, the Forest Service continues to maintain the long-term productivity and hydrologic function of soil and water resources. Sediment and water yields will remain as they have been and will be consistent with meeting all standards and guidelines relating to State water quality standards, assuming no wildfire or other disturbance occurs. The hazardous fuel loadings

will likely continue to increase, which could lead to unwanted, high severity wildfire. In this event, teams would be called upon to fight the fire, and to assess the impacts of the burn, and to decide if emergency stabilization and rehabilitation would need to be implemented.

In the case that wildfire does impact soil and water resources, then the magnitudes of erosion rates and sedimentation would be similar to those described in this report (Tables 5). Soils may become water repellent. Increased peakflows or floods could occur (Elliott et. al. 2010). Erosion rates, landslides, and slumping may increase above those rates of undisturbed and prescribed fires conditions. Channels and stream crossing would be at greater risk from large floods, and water quality would decrease during storm events until the hillslopes recover with vegetation and lose their water repellency. Additional effects associated with wildfire would be those associated with fire suppression. Fireline construction including hand and dozer lines would directly impact soils by displacing top soil and compacting sub-soils, which could lead to additional sedimentation of streams and covering of cold water organism habitat by ash and sediment than that would come off the burned areas. An additional impact could be the addition of retardants on the hillslopes that could inadvertently wash into streams, thus affecting water quality.

DIRECT AND INDIRECT EFFECTS OF THE ACTION ALTERNATIVES

If one of the four proposed action alternative were chosen, prescribed burning and mechanical activities would be implemented. The general type of effects of prescribed fire or mechanical treatments would not change for the most part by alternative. Mechanical treatments as proposed within the four action alternatives will not cause different affects because they are part of different alternatives. Same with prescribed fire will have the same potential affects or impacts no matter which of the four alternatives is chosen. The only real change would be the acres on which each alternative will be proposed by alternative. For example:
Alternative 2 proposes about 8,187 acres of mechanical, 32,832 acres of fire for a total of about 41,019 acres across Monroe Mountain. Alternative 3 is proposing about 13, 643 acres mechanical and 31,195 acres fire for a total of about 44,838 acres. Alternative 4 proposes about 19,835 acres mechanical, 27,276 fire and total about 47,111 acres. Alternative 5 proposes about 15,074 acres mechanical, 26,191 fire and total about 41,265 acres.

Thus Alternative 2-8,187 acres, then Alternative 3-13,643 acres, then Alternative 5-15,074 acres, and then finally Alternative 4-19,835 acres would likely have the most approximate total impact from mechanical treatments based on the total number of approximate acres of Mechanical treatment being proposed at the landscape scale of Monroe Mountain. In addition, Alternative 5-26,191 acres, then Alternative 4-27,276 acres, then Alternative 3-31,195 acres, and finally Alternative 2-32,832 acres would likely have the greatest impacts landscape wise from prescribed fire based on the total acres of fire being proposed.

There would be more specific changes based on the acres being treated within each HUC6 or CEA based on each action alternative of course. Tables 4 and 7, and Maps 1-4 should be used to visually compare the action alternatives to rank the effects of treatment type. In general, fire effects would likely be greater than mechanical treatments on an acre by acre comparison. So, based on Tables 4 and 7, and Maps 1-4 each action alternative might be less or more impactful depending on how each alternative either treats or does not treat acres and whether they are treated by fire or mechanical. There are too many variables or ranges of values that could happen

by each alternative to categorically say which alternative would less or more impactful based on the HUC6 other than to say that I assumed mechanical treating an acre was the same impacts for each alternative and burning an acre was the same across alternatives to estimate impacts to watershed, soil, and hydrological resources. Comparing the no action alternative to the action alternatives is also difficult to predict impacts or what might happen other that the no-action alternative could be a range of less impactful for HUC6s that do not burn by wildfire but could also have greater impacts than from the action alternatives if portions of HUC6 drainages burned at higher proportions of high severities or burning in riparian areas that might not burn during the prescribed burning processes. Burn severities will likely be lower from prescribed fire rather than from wildfires. Region 4-The Intermountain Region of the Forest Service on average has had 15% of wildfires burn at high severity and 27% at moderate severity over the last 13 years; or 42% of wildland fire area are burning pretty hot (R4 Fire Averages from 2000-2013). Obviously the amount of high severity fire could be either less than or greater than average and would depend on a dynamic range of site specific conditions at the time of burning, and the subsequent watershed effects would depend on equally dynamic rain and weather events too.

Ranking of General Potential Hydrological Effects by Alternative for each HUC6 or SubHuc6 drainages by most likely having greatest effects first going to alternative with least amount of effects. No specific values are given, but use this table as means of comparing Alternatives within each drainage. Table 1 values of acres treated were used to visually rank the alternatives for potential Hydrological effects. There's not at this scale a way to say which alternative across these watersheds will have the greatest or least impact, but only within each specific drainage are alternatives able to be compared.

It is likely that there will be negative effects to stream channels, or floodplains from the increased floods generated from some of the prescribed burned areas (Elliott et. al. 2010). However, most channels will be able to pass the magnitude of flows increased from fire activities with relative ease. The probabilities of there being erosion within the first year is relatively low and will decrease each year following burning of areas until they are negligible again as cover increases (Table 5). Sedimentation of channels has nearly the same probability of occurring as erosion (Table 5), but there will not be likely be effects on long term stream water quality from prescribed burns compared to if wildfire were to occur in the same area. Burn severities will likely be lower from prescribed rather than from wildfires. Region 4 on average has 15% of wildfires burn at high severity and 27% at moderate severity over the last 13 years; or 42% of wildland fire area are burning pretty hot (R4 Fire Averages from 2000-2013). It would be expected to have lower percentages than these from prescribed fire. The potential for debris flows and flooding would be much lower from prescribed fire areas then from wildfires because of the likely lower burn severities within the drainages.

CUMULATIVE EFFECTS TO VALUES-AT-RISK

Cumulative effects include the combined impacts of past, present, reasonably foreseeable and proposed management actions. Over the past 100+ years, the exclusion of burning, grazing practices, and climatic conditions have resulted in unnatural accumulation of hazardous fuels within the area. Specifically, there is a serious potential

for uncharacteristic wildfires to occur in close proximity to communities near the area. Associated with these fires is the genuine potential for flooding, mudslides and debris flows if significant portions are damaged by severe wildfire burning conditions (Table 5, Debris-flow prone worksheet-Cannon et al. 2003, and Elliott et. al., 2010).

No Action-No Wildfire and No Action-Wildfire

The streams and hillslopes are in good enough conditions such that water quality parameters are complying with State standards, the Forest Plan, and the Clean Water Act. Therefore, it is not very likely that foreseeable activities will increase sedimentation to streams or decrease that there will not likely be long term effects on

Table 7: Rankings of effects from greatest to least within each drainage by action alternatives on watersheds. See Table 4 and Maps 1-4. The no-action alternative impacts could rank from less than any of the action alternative if a HUC6 watershed is not burned or has only a small fire to greater than all the action alternatives bases on a wildland fire that burns hot and then subsequently has flooding and debris flows following the fire (Clay Springs, Devils Den, and some drainages of the Twitchell Canyon Fire are examples of large flooding and debris flow events that would likely be much more impactful than prescribed fire at lower severity that have occurred on the Forest). Consequently, the no-action alternative is not shown in the table but should be ranked in the range of as being potentially less than the action alternatives up to greater than the action alternatives for all of the watersheds listed in this table.

Box Creek - Above Reservoirs	All Action Alternatives basically equal in effects
Box Creek - Below Reservoirs	Alternative 5 > Alternative 3 > Alternative 2 > Alternative 4
Browns Canyon-Otter Creek	All Action Alternatives basically equal in effects
Dry Canyon	Alternative 3 = Alternative 4 > Alternative 2 = Alternative 5
Dry Canyon - Hunts Lake	All Action Alternatives basically equal in effects
Dry Creek - Lower	All Action Alternatives basically equal in effects
Dry Creek - Upper	Alternative 4 > Alternative 3 > Alternative 2 > Alternative 5
Gold Creek-Sevier River	All Action Alternatives basically equal in effects
Greenwich Creek	Alternative 4 > Alternative 3 > Alternative 2 = Alternative 5
Koosharem Creek-Otter Creek	Alternative 3 > Alternative 4 > Alternative 2 > Alternative 5
Manning Creek - Barney Lake	Alternative 2 > Alternative 3 > Alternative 5 > Alternative 4
Manning Creek - Lower	All Action Alternatives basically equal in effects
Manning Creek - Manning Reservoir	All Action Alternatives basically equal in effects
Manning Creek - Upper	Alternative 4 > Alternative 3 > Alternative 2 > Alternative 5
Maple Creek-Sevier River	All Action Alternatives basically equal in effects

Mill Creek	Alternative 2 > Alternative 4 > Alternative 5 > Alternative 3
Monroe Creek	Alternative 4 > Alternative 3 > Alternative 2 > Alternative 5
Monroe Creek - Magleby	Alternative 2 > Alternative 4 > Alternative 3 = Alternative 5
Peterson Creek	All Action Alternatives basically equal in effects
Pine Canyon-Otter Creek	All Action Alternatives basically equal in effects
Pole Canyon-Otter Creek	All Action Alternatives basically equal in effects
Swift Spring Creek	All Action Alternatives basically equal in effects
Thompson Creek-Sevier River	Alternative 2 = Alternative 3 = Alternative 5 > Alternative 4
Thompson Creek-Sevier River - Annabella Reservoir	Alternative 2 > Alternative 3 = Alternative 5> Alternative 4
Water Creek	Alternative 2 > Alternative 3 > Alternative 4 > Alternative 5
Water Creek - Big Lake	Alternative 2 = Alternative 3 > Alternative 5 > Alternative 4

stream water quality from prescribed burns compared to if wildfire were to occur in the same area. Values at risk, including streams enough to have them listed on the State 303d list of impaired waters, or will lead to their degradation. The hydrologic values-at-risk will not be affected negatively if the no action alternative is chosen, unless high severity fires were to occur in some HUC6 watersheds. But no-one can predict which drainages this will occur or not and when.

If unwanted high severity wildfire were to occur then the effects would be similar to those that have occurred from other wildfire areas on the Forest. For example, hydrophobic or repellent soils will form, runoff, erosion, and sedimentation of streams will occur. Debris flows will be very likely if there is mostly moderate or high severity wildfire occurring from drainages, as was the case on areas of the Cottonwood Fire southwest of Marysville in the area. Channels and floodplains would likely be affected by the increase in flows and would likely be scoured away in areas where debris flow events occurred.

Values-at- risk, including water quality would most likely be affected negatively by wildfire. Flooding events similar to those that occurred from the Cottonwood Fire may occur within the area, and genuinely could occur a few times. Water quality would likely be affected negatively during runoff and storm events until the burned area became revegetated and the water repellent soils nearly rehabilitated. The decrease in water quality would not likely causes streams to be put on the State 303d list, but downstream uses would be affected. Excess sediment could periodically affect livestock and agricultural uses of water. Increased peakflows cumulatively would increase the ranges of sediment being removed from the hillslopes, channels banks and beds above those rates currently occurring in the area. The hydrologic and social values-at-risk would likely be affected if high severity fire were to occur.

Proposed Actions

If the proposed actions were implemented, then the cumulative effects would be based on the indirect and direct effects of the foreseeable actions and the proposed actions.

The result from burning coupled with higher soil temperatures would increase nutrient cycling making more of the stored nutrients available to plants. Plants, especially on units burned in the spring, would quickly capture these nutrients. The riparian areas not ignited or burned along channels would function as filter zones for upslope runoff. Reducing existing fuel loadings would decrease the potential for severe wildfire within the area. The Cumulative Effect Areas (CEAs) on Maps 1-4 and Tables 4 and 7 values and ranges found in Table 5 show predicted values and ranges of current and proposed actions erosion and sedimentation rates of areas within the area.

It is likely that there will be negative effects to stream channels, or floodplains from the increased peakflows generated from the prescribed burned areas somewhere in the projects area. However floodplains and channels function at moving material and water through them and is expected from any flooding to have some floodplain and channel change. Most channels will be able to pass the magnitude of flows increased from fire activities with relative ease though. The probability of there being erosion within the first year is relatively high and will decrease each year following burning of areas until they are negligible again as cover increase (Table 5). Sedimentation of channels has nearly the same probability of occurring as erosion (Table 5), but water quality would not likely be affected negatively from the proposed actions plus the foreseeable actions because no–ignition will occur within but only on the edges of riparian areas. Burn severities will likely be lower from prescribed rather than from wildfires. The potential for debris flows would be much lower from prescribed fire areas then from wildfires because of the likely lower burn severities within the drainages. There are fisheries within or just below the project areas, so there could be effects on fish.

The channels within the CEAs would most likely be able to handle the increase in peakflows, since the channels are hydrologically connected to their floodplains, and the banks and profile are stable. The no-ignition buffers except on edges of riparian areas will limit the amount of sediment making it into the stream. These decreases in water quality would not cause streams to be put on the State 303d list or lead to permanent degradation of the water quality. The sediment production and delivery would be less than from wildfires (Table 5) and would not likely affect diversion structures, or agricultural operations.

Reduction of vegetation and forest floor litter results from fire in decreases in interception and evapotranspiration, and infiltration rates. This means increased water becomes available for overland flow and stream runoff. Increased flows in turn lead to increased erosion and sedimentation (Zwolinski 2000). Prescribed fires (low and moderate severity) are designed so that vegetation remains in some form (wood, litter, and duff) to cover soils (Zwolinski 2000). Wildfires (high severity) have no plan or design to them and result in greater reduction in vegetation and soil cover that consequently leads to even greater amounts of stream runoff, erosion, and sedimentation. High severity fires, which may be greater due to past fire suppression activities, can lead to greater effects including water repellent soils since formation is dependent on heating temperatures and soil moisture (Robichaud 2000). Prescribed fires

commonly occur during the spring and fall when soils are wetter and therefore, water repellency would be minimal which would lead to not as great of increases in water yield compared to wildfires (Robichaud 2000).

Cumulatively water quality is not expected to be degraded in streams enough to lead to listing on the 303d list from any of the proposed action alternatives. However, there could be temporary degradation of water in Lower Box Creek, and Manning Meadows Reservoirs that are currently listed on the 303d list. The degradation of the water would likely start to decrease conversely as vegetation is re-established following treatments and generally takes about 5 years to be re-established. It is not expected to be major shifting of trophic state of the reservoirs though. The reservoirs were on improved trend over the last decade, and will likely again start to trend up again following treatment and improvement of the uplands in the watersheds. This project will be a balance of the need to treat uplands to likely prevent worse impacts from potential wildfires and to still manage the reservoirs.

Lower Box Creek Reservoir was constructed for irrigation use, and despite the listing on the 303d list only little action has been taken to otherwise change management on the reservoir. Actions by the Forest Service include implementing the Box Creek Project to improve or restore upland conditions to improve the water quality of the reservoirs. Additionally some gravelling of roads and closing of illegal ATV trails has taken place to try and aid improving water quality of the reservoirs.

Manning Meadow Reservoir is the uber-important brood stock of Bonneville cutthroat trout and thus managing the uplands is important at maintaining this important fishery. The Forest constructed wood fences in portions of the drainage to aid in improving the water quality of the reservoir and to prevent illegal ATV use around the reservoir. When the Marysvale Peak Fire occurred above Manning Meadow Reservoir the Forest implemented fencing the slope directly west of the reservoir and installed some silt fencing that aided in keeping sediment and nutrients out of the reservoir. Additionally, some gravelling of roads occurred in the vicinity to keep additional sediment and nutrients out of the reservoir. This project will be a balance of the need to treat uplands to likely prevent worse impacts from potential wildfires and to still manage the reservoir for the important fishery.

Soil productivity and the associated soil properties impacts should be kept to a minimal amount due to the Design Features/Mitigation Measures and BMPs for this project. There is a relationship between the amount of area disturbed and the amount of potential erosion, and thus minimizing the amount of disturbance is important. Streamside or riparian buffers are effective in capturing overland flows, removing sediment and nutrients, and aiding in maintaining stream temperature.

Riparian buffers, Mitigation Measures, BMPs will not likely protect all riparian functions during vegetation treatments; however, they will aid in the protection of the riparian areas and maintaining water quality from all the proposed actions at the landscape scale of this project. Site specific impacts might be more dramatic but again at the landscape scale are not expected to lead to drastic loss of riparian vegetation or function. As riparian vegetation re-establishes then riparian function will return in the areas where riparian areas may burn or be treated.

Some of the effects of mechanical treatments include the impacts of landings, skid trails, and temporary road construction and obliteration of course and the effects of these are factored in to other resources impacts of this section.

If one of the four proposed action alternative were chosen, prescribed burning and mechanical activities would be implemented. The general type of effects of prescribed fire or mechanical treatments would not change for the most part by alternative. Mechanical treatments as proposed within the four potential action alternatives will not cause different affects because they are part of different alternatives. Same with prescribed fire that will have the same potential affects or impacts no matter which of the four alternatives is chosen. The only real change would be the acres on which each alternative will be proposed by alternative.

For example:
Alternative 2 proposes about 8,187 acres of mechanical, 32,832 acres of fire for a total of about 41,019 acres across Monroe Mountain. Alternative 3 is proposing about 13, 643 acres mechanical and 31,195 acres fire for a total of about 44,838 acres. Alternative 4 proposes about 19,835 acres mechanical, 27,276 fire and total about 47,111 acres. Alternative 5 proposes about 15,074 acres mechanical, 26,191 fire and total about 41,265 acres.

Thus Alternative 2-8,187 acres, then Alternative 3-13,643 acres, then Alternative 5-15,074 acres, and then finally Alternative 4-19,835 acres would likely have the most approximate total impact from mechanical treatments based on the total number of approximate acres of Mechanical treatment being proposed at the landscape scale of Monroe Mountain. In addition, Alternative 5-26,191 acres, then Alternative 4-27,276 acres, then Alternative 3-31,195 acres, and finally Alternative 2-32,832 acres would likely have the greatest impacts landscape wise from prescribed fire based on the total acres of fire being proposed.

There would be more specific changes based on the acres being treated within each HUC6 or CEA based on each action alternative of course. Tables 4 and 7, and Maps 1-4 should be used to visually compare the action alternatives to rank the effects of treatment type. In general, fire effects would likely be greater than mechanical treatments on an acre by acre comparison. So, based on Tables 4 and 7, and Maps 1-4, each action alternative might be less or more impactful depending on how each alternative either treats or does not treat acres and whether they are treated by fire or mechanical. There are too many variables or ranges of values that could happen by each alternative to categorically say which alternative would less or more impactful based on the HUC6 other than to say that I assumed mechanical treating an acre was the same impacts for each alternative and burning an acre was the same across alternatives to estimate impacts to watershed, soil, and hydrological resources. However, at the next level down or HUC6 or smaller, then an acre of burning was evaluated as likely having greater effects than an acre of mechanical treatment to compare drainages across alternatives. Comparing the no action alternative to the action alternatives is also difficult to predict impacts or what might happen other that the no-action alternative could be a range of less impactful for HUC6s that do not burn by wildfire but could also have greater impacts than from the action alternatives if portions of HUC6 drainages burned at higher proportions of high severities or burning in riparian areas that might not burn during the prescribed burning processes. Burn severities will likely be lower from prescribed fire rather than from wildfires. Region 4-The Intermountain Region of the Forest

Service on average has had 15% of wildfires burn at high severity and 27% at moderate severity over the last 13 years; or 42% of wildland fire area are burning pretty hot (R4 Fire Averages from 2000-2013). Obviously the amount of high severity fire could be either less than or greater than average and would depend on a dynamic range of site specific conditions at the time of burning, and the subsequent watershed effects would depend on equally dynamic rain and weather events too.

It is likely that there will be negative effects to stream channels, or floodplains from the increased floods generated from some of the prescribed burned areas (Elliott et. al. 2010). However, most channels will be able to pass the magnitude of flows increased from fire activities with relative ease. The probabilities of there being erosion within the first year is relative and will decrease each year following burning of areas until they are negligible again as cover increases (Table 5). Sedimentation of channels has nearly the same probability of occurring as erosion (Table 5), but there will not be likely be effects on long term stream water quality from prescribed burns compared to if wildfire were to occur in the same area. Burn severities will likely be lower from prescribed rather than from wild fires. Region 4 on average has 15% of wildfires burn at high severity and 27% at moderate severity over the last 13 years; or 42% of wildland fire area are burning pretty hot (R4 Fire Averages from 2000-2013). It would be expected to have lower percentages than these from prescribed fire. The potential for debris flows and flooding would be much lower from prescribed fire areas then from wildfires because of the likely lower burn severities within the drainages.

CLEAN WATER ACT

Army Corp Discharge, Dredge and Fill Permits
The proposed treatments would not require any permits. No wetlands are being proposed for treatment within the analysis area that would be affected by the proposed actions.

Water Quality Limited Stream Segments
There are no WQLS stream segments listed by the State of Utah within the project or analysis area. None are expected to be after implementation of the proposed action. There are two waterbodies listed on the approved 303d list and include Manning Meadow and Lower Box Creek Reservoirs that could in the short term be affected by the proposed actions. In the long term they are not expected to have water quality impacts from the proposed actions beyond a couple of years following treatment.

Antidegradation Policy for Beneficial Uses
More frequent and less severe wildfires historically occurred within the assessment area. The proposed actions would introduce this type of fire process into the assessment area with some control. Thus, it is not anticipated that the beneficial uses would be degraded by application of the proposed actions. In fact, the results of the proposed actions will likely restore watersheds to function and limit impacts on hydrological values into the future.

The action alternatives would be compliant with the Clean Water Act, Executive Order 11988, and Executive Order 11990.

After this analysis was completed, an additional Northern goshawk nest with its associated territory (NA and PFA) was found in the Indian Peak area. Approximately 310 acres of the NA and PFA overlap this aspen project. The removal of these 310 acres for treatment will not change the overall conclusions of this report on soil and water resources and the conclusions above are still valid at the project scale. Removal of these acres will lessen the effects in the drainages, where these acres are located, on soil and water resources. These 310 acres are a small percentage of the overall acres being proposed for treatment.

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Appendix K – Monroe Mountain Aspen Ecosystems Restoration Project Inventoried Roadless & Draft Unroaded-Undeveloped Areas Specialist Report (Christensen 2015a)

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June 3, 2015

Executive Summary

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions outlined in the Fishlake National Forest's Land and Resource Management Plan. The area affected by the proposal includes Monroe Mountain, located in south-central Utah, south of Richfield, west of Koosharem, and east of Marysvale, encompasses approximately 175,706 acres of National Forest lands administered by the Fishlake National Forest, Richfield Ranger District, and approximately 11,805 acres of private inholdings. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire because of an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. Restoring aspen communities on Monroe Mountain will result in multiple benefits.

This report considers potential effects to wilderness attributes and roadless characteristics as a result of the no action and four action alternatives of the Monroe Mountain Aspen Ecosystems Restoration Project. The five Inventoried Roadless Areas (IRAs) located in the project area presently average low to moderate ratings for the six wilderness qualities or attributes. The southern portion of the Signal Peak IRA is the best area that seems to hold the potential for manageability as a wilderness area. Alternatives 2-5 would leave stumps mostly flush with the ground and a burned appearance. No roads would be constructed, no clear cuts, control lines feathered and reclaimed, sensitive areas would be avoided and timing restrictions imposed as proposed. The proposed actions would only temporarily reduce the qualities or attributes and characteristics until the vegetation grows and improves over a period of about three to five years. Stumps and burned vegetation may be noticeable for a longer time period. Alternatives 2-5 (including mechanical options 1 & 2) would take place without permanently lowering the wilderness qualities or attributes and roadless characteristics; therefore, the existing wilderness eligibility would not change.

The five draft Unroaded/Undeveloped Areas (UUAs) located within the project area presently only average moderate to low ratings for the six wilderness qualities or attributes. The southern portion of the Signal Peak draft UUA is an area that appears to hold the best potential for manageability as a wilderness area. Effects to the draft UUAs would be the same as for the IRAs with the exception of 0.3 miles of temporary road being constructed in alternative 4, and 1.3 miles of temporary road being constructed in alternative 5. These roads would be reclaimed after use and would only temporarily reduce the wilderness qualities or attributes and roadless characteristics; therefore, the existing wilderness eligibility would not change.

The implementation of best management practices such as no new road construction in IRA and little road construction in UUA, reclaiming control lines, reclaiming the temporary roads in UUA, and cutting stumps mostly flush with the ground would manage the IRAs and draft UUAs in a way that would not permanently lower and may over time enhance the wilderness qualities or attributes and roadless characteristics from their present condition.

Cumulatively, changes at the total project management area level are relatively small. The magnitude of the changes combined with past, present and reasonable foreseeable actions resulted in less than a 30% change from existing conditions, overall.

Based upon my findings, I conclude the action alternatives would meet the purpose and need, and that the changes would move conditions closer to desired conditions. Wilderness qualities or attributes and roadless characteristics would remain the same or may even improve over time.

No action would result in not moving toward the desired conditions in the foreseeable future. Wilderness qualities or attributes and roadless characteristics would remain the same or may even decrease over time.

Introduction

Monroe Mountain, located in south-central Utah, south of Richfield, west of Koosharem, and east of Marysvale, encompasses approximately 175,706 acres of National Forest lands administered by the Fishlake National Forest, Richfield Ranger District, and approximately 11,805 acres of private inholdings. Of these 175,706 acres, quaking aspen (*Populus tremuloides*) historically occurred on approximately 71,000 acres on Monroe Mountain. Soil survey information was used to estimate the historic occurrence of aspen. It is widely recognized that aspen ecosystems are capable of supporting one of the largest arrays of plant and animal species due to its high productivity and structural diversity. However, it is also widely recognized that aspen ecosystems have been in decline throughout the Intermountain West during the twentieth century.

On Monroe Mountain, unsustainable aspen ecosystem conditions include, but are not limited to, (1) conifer encroachment due to reduced fire, and (2) lack of recruitment due to domestic and wild browsing by cattle, sheep, elk, and deer. Reduced occurrences of wildland fire due to an increase in wildland fire suppression, and overbrowsing by domestic and wild browsers have been identified by the District as the primary underlying causes for aspen ecosystems on Monroe Mountain being at risk. Aspen of 5 to 15 feet in height ("recruitment") are uncommon on Monroe Mountain, despite continued sprouting of aspen ("regeneration"). Due to high cost and continual maintenance, fencing is not a long-term sustainable response option for protecting aspen sprouts from overbrowsing, and does not address underlying causes of the lack of recruitment.

Aspen is a keystone species and historically was a landscape dominant on Monroe Mountain. Aspen ecosystems support the highest level of biodiversity for interior western forests and the productivity of aspen ecosystem understories (grass, forbs, and shrubs) is higher than all other forest types. Individual aspen trees arise almost exclusively from root suckers and are relatively short-lived (i.e., 100 to 200 years). Aspen is shade intolerant and sprouts heavily following disturbance, such as fire, and benefits from disturbance especially where conifer currently shades and competes with aspen. Mechanical treatments can also be an effective disturbance tool for aspen restoration.

Regulatory Framework

The Fishlake National Forest Land and Resource Management Plan (UDSA 1986) does not provide desired conditions, goals, or standards and guidelines to specifically address or maintain roadless character. However, some of the lands initially inventoried as roadless during the RAREII process were allocated in a way coincident to generally maintaining potential wilderness characteristics, i.e., research natural areas (RNA), critical wildlife winter range or habitat, and semi-primitive non-motorized areas. Other lands also inventoried earlier as roadless have been managed in ways that allowed road construction and other development such as timber harvest.

Pursuant to RARE II of 1979 and incorporated into The Roadless Area Conservation Rule of 2001 (RACR), 36 CFR Part 294, the Fishlake National Forest identified areas having pristine, sensitive, and roadless characteristics as IRAs to prevent the fragmentation of these areas by new road construction or improvements. IRAs represent some of the largest and most extensive tracts of undeveloped land on the Fishlake National Forest and are valued for their roadless nature, undeveloped values, and associated environmental characteristics and attributes.

Pursuant to prior NFMA implementing regulations at 36 CFR 219.17 (as published in 36 CFR 200 to 299 [July 1, 2000 edition]), the Fishlake National Forest created an inventory of draft unroaded/undeveloped areas as part of Land and Resource Management Plan (LRMP) revision efforts. The LRMP revision has not yet been completed for the Fishlake National Forest; however, the information represents the latest inventory data for areas with potential wilderness qualities or attributes. The 2005 draft inventories of unroaded/undeveloped areas were based on direction in the *Intermountain Region Planning Desk Guide: A Protocol for Identifying and Evaluating Areas for Potential Wilderness* (USFS 2004). There is no policy, law, or directive guiding the management of identified draft unroaded/undeveloped areas that lie outside of IRAs or wilderness areas; therefore, the only guidance for these areas is general forest or management area direction in the current Fishlake LRMP. The term "undeveloped area" refers to a geographic area usually of at least 5,000 acres, without developed and maintained roads, and substantially natural.

The review provided in this document addresses potential effects to wilderness qualities or attributes and roadless area characteristics from the no action and proposed action alternatives of the Project.

Resource Issues and Purpose and Need

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions described below and in the EIS. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire because of an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. Restoring aspen communities on Monroe Mountain will result in multiple benefits, which include but are not limited to:

- Improving and increasing the amount of habitat for wildlife species dependent upon aspen ecosystems (i.e., mule deer, elk, and Northern goshawk);
- Improving and increasing the amount of habitat and forage for domestic ungulates (i.e., cattle and sheep);
- Improving native species diversity;
- Reducing hazardous fuel accumulations;
- Reducing the risk for large-scale, intense wildland fires. This results in lower risk to the safety of the public and firefighters. This also results in lower risk to sensitive wildlife species (i.e. Northern goshawk, Western Boreal toad *(Bufo boreas*), and Bonneville cutthroat trout (*Oncorhynchus clarki utah*)); and,
- Increasing the probability that future naturally caused fires can be managed (if possible, not suppressed) and allowed to play the greatest feasible natural role in the aspen ecosystems on Monroe Mountain (Utah Fire Plan 2001).

The interdisciplinary team reviewed the scoping comments from public individuals, interest groups, local governments, and other agencies, to develop a list of issues to address. The issues were separated into two groups: key and non-key issues. Key issues were defined as those directly or indirectly caused by implementing the proposed action. Non-key issues were identified as those: (1) Addressed through LRMP or implementation of LRMP standards and guidelines and best management practices; (2) Addressed through implementation of project-specific mitigation measures/design features; (3) Addressed during processes or analyses

routinely conducted by an interdisciplinary team; (4) Addressed through spatial location of activities during alternative design; (5) Beyond the scope of the project; or (6) general comment. The Council on Environmental Quality (CEQ) NEPA regulations explain these delineations in Sec. 1501.7, "…identify, and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-key issues and reasons regarding their categorization as non-significant is in the project record. Following are the key issues identified by the public and used to focus the analysis or drive alternative development.

Key Issues:

- Impacts to wilderness attributes and roadless area characteristics resulting from mechanical treatments within inventoried roadless areas and draft unroaded-undeveloped areas may result in these areas not being eligible for wilderness designation.
- Prescribed fire activities may impact adjacent private property.
- Project activities may result in Northern goshawks being displaced.
- Project activities may result in Bonneville cutthroat trout and boreal toad habitat being severely degraded.
- Browsing by domestic and wild ungulates on new aspen sprouts post-treatment and/or the continued high levels of aspen browsing in the stable aspen areas may result in complete loss of aspen stands.
- Project activities may result in livestock permittees not having a place to graze their livestock while vegetation is reestablishing on Monroe Mountain (2 or more growing seasons).
- Project activities may result in adverse impacts old growth characteristics.

Overview of the Proposed Action

The action proposed by the District to meet the purpose and need is to conduct a combination of prescribed fire and/or mechanical thinning treatments in stable and seral aspen stands, and spruce/fir and mixed conifer stands to promote the regeneration and recruitment of aspen communities. Some stands currently dominated by spruce/fir and mixed conifer may have been dominated by aspen at some point in the past. Aspen occurs in varying percentages in spruce/fir, mixed conifer, and seral aspen dominated stands. Treating spruce/fir, mixed conifer, and aspen stands would reduce competition for resources, and encourage aspen to regenerate.

The proposed action is similar for all of the alternatives. What vary within the alternatives are the acreages of mechanical thinning verses the acreages of prescribed fire that would be treated depending on the issues, and the mileage of temporary roads proposed for each alternative. The treatment options proposed for the project area are: (1) areas would be mechanically thinned with the associated slash piled and burned, and (2) areas would receive prescribed fire treatments (see chapter 2 of the EIS for detailed descriptions of these treatment options and each alternative).

Addressing the reduced occurrence of wildland fire due to an increase in wildland fire suppression on Monroe Mountain is critical to the long-term restoration of aspen ecosystems. The average fire return intervals for each of the vegetation cover types occurring on Monroe Mountain can be found in chapter 1 of the EIS. This table also shows that the maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen,

spruce/fir, and mixed conifer is 47,274 acres (alternative 4). However, the management guidelines for Northern goshawk require leaving 40 percent interlocking crowns in foraging areas. To be compliant with the guidelines, prescribed burning would only occur when 60 percent of the prescribed fire area is expected to burn. This would leave 40 percent of the area with interlocking crowns intact. As for the areas proposed for mechanical treatments, by removing just conifer and/or removing conifer trees up to 8 inch DBH, using group, and singletree selection, desiring uneven-aged management, and proposing minimal mechanical treatments in the stable aspen stands, 40 percent of the area with interlocking crowns would also remain intact in the mechanical treatment areas. Therefore, the maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen, spruce/fir, and mixed conifer (assuming only 60 percent of the prescribed fire treatment areas are burned) is 36,300 acres (alternative 4). The approximate duration of this project is 10 years; therefore, approximately 18,150 acres would be mechanically treated and/or prescribed burned every 5 years. This number is well within the Forest Service recommended range of area to treat within a 5-year period of 5,000 to 24,000 acres (see chapter 2 of the EIS for a detailed description of the proposed action and alternatives).

Mechanical thinning and prescribed fire treatments are proposed within five Inventoried Roadless Areas (IRAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore) and within five draft Unroaded-Undeveloped Areas (UUAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore). No roads would be constructed within IRAs. Temporary roads would be constructed in treatment areas located outside of the IRAs (for all alternatives) including within draft UUAs (see alternatives 4 and 5). The mileage for these temporary roads varies depending on the alternative (see chapter 2 of the EIS for specific road locations, mileage, and specifications). In addition, temporary fencing would be installed around Manning Meadows Reservoir and Barney Lake (see chapter 2 of the EIS for fencing locations, mileage, and specifications).

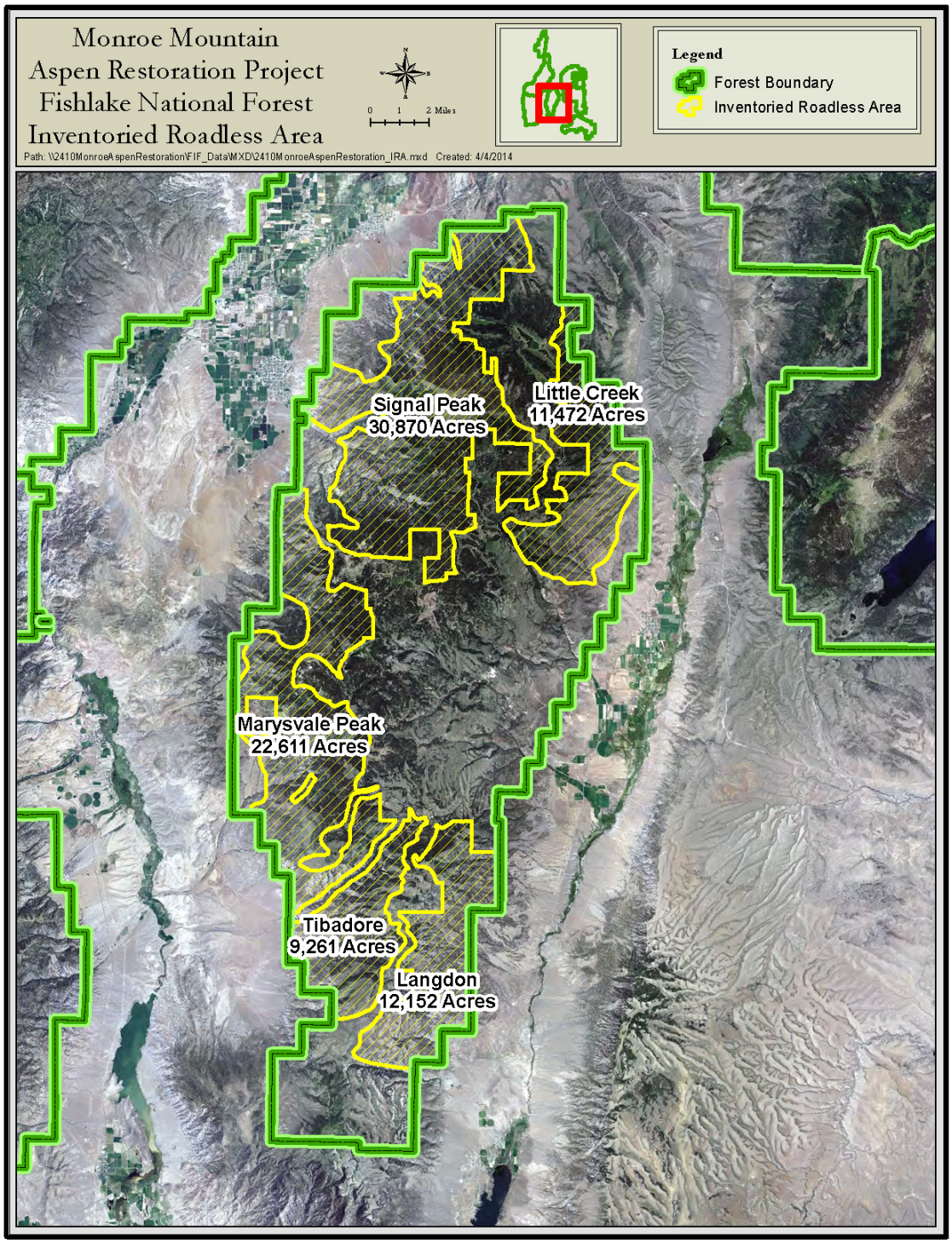
No active treatments are proposed within the sagebrush cover-type where scattered aspen trees and stands occur in portions of the sagebrush communities. These areas are expected to improve through passive restoration (i.e., by trying to allow naturally ignited fires to burn, and changing grazing and browsing management). See chapter 2 of the EIS for a detailed description of the District's proposal to address overbrowsing of aspen.

Affected Environment

Inventoried Roadless Areas (IRAs) represent some of the largest and most extensive tracts of undeveloped land; having pristine, sensitive, and roadless characteristics (USFS 1976). Theoretically, to be classified as an IRA, areas must not contain constructed roads and generally are at least 5,000 acres. A roadless area is also defined as an area that meets the minimum criteria for wilderness. The Monroe Mountain Aspen Ecosystems Restoration Project includes five IRAs that may be affected. These include Signal Peak, Little Creek, Marysvale Peak, Tibidore and Langdon. These five IRAs cover a total 86,366 acres which is 49 percent of the project area for the EIS. Within these IRAs there are many examples of modern human control, manipulation, and civilization in the form of structures, roads (including constructed roads) and other evidence of occupation. The experience of solitude and primitive unconfined recreation is hard to find due to motorized roads and trails, private land developments, dams, waterlines, ditches, relatively skinny strips of IRA, mining, range improvements, and timber harvest. There are beautiful landscape features and views of the surrounding valleys. Only the south portion of the Signal

Peak IRA seems to hold a reasonable opportunity for manageability as wilderness due to its size and roadless characteristics (see Map 1).

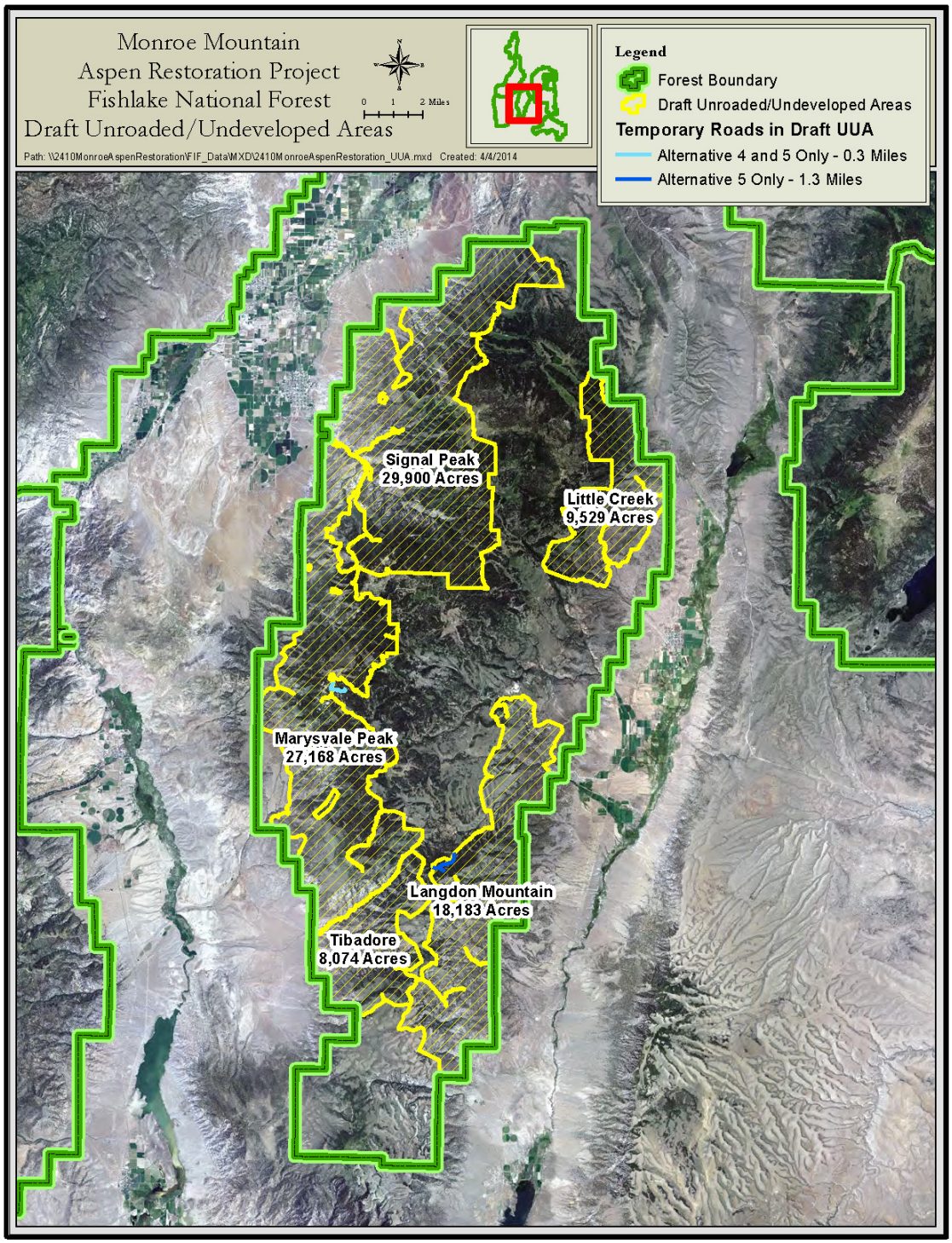
Map 1: Existing Inventoried Roadless Areas (IRAs) and Acreages on Monroe Mountain



Within the Monroe Mountain Aspen Ecosystems Restoration Project area there are also five draft Unroaded/Undeveloped Areas (USFS 2004b; UUAs) of the same names and general locations as the five IRAs. These areas represent the latest draft inventory data for areas with potential wilderness qualities or attributes. The term "undeveloped area" refers to a geographic area usually of at least 5,000 acres, without developed and maintained roads, and substantially natural. There is no policy, law, or directive guiding the management of identified draft unroaded/ undeveloped areas that lie outside of IRAs or wilderness areas. These five draft UUAs cover a total of 92,854 acres which is 53 percent of the project area for the EIS. Within these draft UUAs there are many examples of modern human control, manipulation, and civilization in the form of structures, roads and other evidence of occupation. The experience of solitude and primitive unconfined recreation is hard to find due to motorized roads and trails, private land developments, dams, waterlines, ditches, relatively skinny strips of draft UUA, mining, range improvements, and power lines. There are beautiful landscape features and views of the surrounding valleys. Only the south portion of the Signal Peak draft UUA seems to hold a reasonable opportunity for manageability as wilderness due to its size and roadless characteristics (see Map 2).

Map 2 on the following page displays the existing Monroe Mountain draft UUAs and their associated acreages.

Map 2: Existing Draft Unroaded/Undeveloped Areas (UUAs) and Acreages on Monroe Mountain



The following tables (1-8) describe the existing conditions of the IRAs and draft UUAs on Monroe Mountain.

Table 1: Existing Inventoried Roadless Area (IRA) General Descriptions on Monroe Mountain (USFS 1983)

	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Total Acres	30,870	11,472	22,611	9,261	12,152
% Project Area	18%	7%	13%	5%	7%
Location	Northwest	Northeast	Middle West	Southwest	Southeast
Area Description	Very irregular in shape with six less than 2 mile wide strips and a larger south central area of 7 by 5 miles	Very irregular in shape with the widest point being 3 miles wide and 10 miles long	Very irregular in shape with the widest point being 3 miles wide and 14 miles long	Irregular in shape with the widest point being 3 ½ miles wide and 7 miles long	Very irregular in shape with the widest point being 3 miles wide and 8 miles long
Adjacent Lands to the West	Private, BLM, National Forest	Private, National Forest	Private, BLM, National Forest	BLM, State, National Forest	National Forest
Adjacent Lands to the East	Private, National Forest	Private, BLM, National Forest	Private, National Forest	National Forest	Private, State, BLM

Table 2: Existing Draft Unroaded/Undeveloped Area (UUA) General Descriptions on Monroe Mountain

	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Total Acres	29,900	9,529	27,168	8,074	18,183
% Project Area	17%	5%	15%	5%	10%
Location	Northwest	Northeast	Middle West	Southwest	Southeast
Area Description	Very irregular in shape with a long less than 3 mile wide area and a larger south central area of 6 by 5 miles	Very irregular in shape with the widest point being 2 miles wide and 7 miles long	Very irregular in shape with the widest point being 4 miles wide and 16 miles long	Irregular in shape with the widest point being 3 miles wide and 5 miles long	Very irregular in shape with the widest point being 3 miles wide and 13 miles long
Adjacent Lands to the West	Private, State, BLM, National Forest	Private, National Forest	Private, BLM, National Forest	BLM, State, National Forest	National Forest
Adjacent Lands to the East	Private, National Forest	Private, BLM, National Forest	Private, National Forest	National Forest	State, Private, BLM, National Forest

Table 3: Existing IRA System Roads and Trails

System Routes	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Level 2 Roads (Open to all vehicles, yet may be very rough)	**About 4 miles** #1209, #2700, #1211, #1148, #080, #288, #068 #1150, #2037	**About 4 miles** #2004, #1159, #1160, #166	**About 4½ miles** #075, #1185, #1187, #1188, #1189, #1194, #1230, #182	**About 1½ miles** #1782, #1196, #1197, #200	**About 1½ miles** #1809, #1202
Level 1 Roads (Administative use only)	**About 5½ miles** #168, #170, #171, #172, #810	**About ½ mile** Little Creek			**About 2 miles** Dead Horse Rock Canyon
Trails Open to All Vehicles	**About ½ mile** #762, #984, #932	**About ½ mile** #911, #912, #909, #910	**About 2 miles** #915, #919, #920 #916, #917, #918 #922, #924, #992 #926, #925	**About ½ mile** #941	**About 1/16 mile** #971
60" Motorized Trails	**About 4½ miles** #950, #956, #763 #763A, #955, #761, #762, #761A, #761B	**About ¼ mile** #913	**About ½ mile** #812, #814, #923		**About 5 miles** #868, PST63
50" Motorized Trails	**About 2 miles** PST 66	**About 7½ miles** #764, #767 #260, #807, #793, Paiute 01	**About 12 miles** PST65, #088, #088A, #088B, #088C, #088D, #194, #837, #840 #841, #842, #833 #834, #843, #835 #845, #898, #969		**About 2 miles** #250, #859, #856
Total Miles of System Roads and Trails	**16 ½ Miles**	**12 ¾ Miles**	**19 Miles**	**2 Miles**	**10.5 Miles**

Table 4: Existing IRA Non System Roads

Non-System Roads	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Closed roads that still have a constructed footprint on the ground	**About 3½ miles** Norton Creek Bertelson Can. Nielson Can. Signal Peak	**About 3 miles** Kinney Spring Little Creek East Hunter Flat	**About 2½ miles** Live Oak Bean Hill Manning Cr. Straight Can. Dry Canyon	**About 2 miles** Tuft Draw Buck Hollow Hell Hole	

Table 5: Existing Draft UUA System Roads and Trails

System Routes	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Level 2 Roads (Open to all vehicles, yet may be very rough)	**About ½ mile** #1209, #2700	**About ½ mile** #1159			**About ½ mile** #068X, #082B
Level 1 Roads (Administative use only)		**About ½ mile** Little Creek			
Trails Open to All Vehicles					
60" Motorized Trails	**About 1 mile** #763, #103, #761 #761A, #763A				**About 3 miles** PST63
50" Motorized Trails	**About 2 miles** PST 66	**About 4 miles** #260, #807, #793	**About 14 miles** PST65, #088, #088A, #088B, #088C, #088D, #815A, #815B, #194, #837, #840 #841, #842, #833 #834, #843, #835 #089, #898, #969		**About 9 miles** #250, #859, #853, #852, PST53, PST53A, PST33, #856
Total Miles of System Roads and Trails	**3 ½ Miles**	**5 Miles**	**14 Miles**		**12 ½ Miles**

Table 6: Existing Draft UUA Non System Roads

Non-System Roads	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Closed roads that still have a constructed footprint on the ground	**About 4 miles** Red Butte Can. Thompson Cr. Winget Can. Bertelson Can. Order Dugway Nielson Can.	**About 3 miles** Kinney Spring Little Creek East Hunter Flat	**About 3 miles** Oak Flat Live Oak Dry Canyon Manning Cr. Straight Can. Bean Hill	**About 1 mile** Tuft Draw	

Table 7: Existing IRA Human Developments and Structures

	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Range Improvements	Ponds, troughs, waterlines and fences	Ponds, troughs, waterlines and fences	Ponds, troughs, waterlines and fences	Ponds, troughs, waterlines and fences	Ponds, troughs, waterlines, tanks and fences
Culinary Water Developments	Norton Creek Monroe Creek				
Irrigation Water Developments	Serviceberry Cr.	Koosharem Can.	Anderson Can. Flat Canyon		
Waterlines and Pipelines	Norton Creek Monroe Canyon	Koosharem Can.	Anderson Can. Flat Can.		
Dams	Annabella Res. Deep Lake Washburn Res.		Hunts Lake (Upper & Lower)		
Ditches	Deep Lake Annabella		Hunts Lake Manning Creek Concrete		
Timber Harvest	Monument Peak Annabella Cove Mtn. Monroe Peak Whooton Spr.	Doe Flat	Dry Creek Nielson Can. Collins Creek Big Flat Aspen	Langdon	Dry Lake Langdon
Erosion Control Terracing	Thompson Basin		Live Oak Hunts Lake Monroe Peak Anderson Can.		
Mining	Bertelson Can		Manning Creek Durkee Sprs Miners Ridge Windy Ridge	Tibidore Can.	
Fire	Annabella Flat		Marysvale Peak Blackbird Mine		
Prescribed Fire	Monument Peak	Kinney Spring	Little Table Bean Hill	Tuft Draw Buck Hollow Deer Spring Tibidore Pond	Rock Canyon Pine Canyon Jackie Canyon Schaffers
Other	Mud Lake Cabin Old Monrovian Park Rec Site	Blue Peak Brushsaw work	Nielson Can. Sawmills & Piles Windy Ridge Cabins, Barn, etc Manning Cr. Old Tunnel (100’)		

Table 8: Existing Draft UUA Human Developments and Structures

	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Range Improvements	Ponds, troughs, waterlines and fences	Ponds, troughs, waterlines and fences	Ponds, troughs, waterlines and fences	Ponds, troughs, waterlines and fences	Ponds, troughs, waterlines, tanks and fences
Culinary Water Developments	Red Butte Creek Norton Creek Monroe Canyon				
Irrigation Water Developments	Maple Canyon				
Waterlines and Pipelines	Maple Canyon Red Butte Creek Norton Creek Monroe Canyon 1st Left Hand Cr.				
Dams	Washburn Res.				
Ditches		Mill Creek to Little Creek	Manning Creek Concrete		
Timber Harvest			Sawmill Flat		
Erosion Control Terracing	Thompson Basin		Live Oak Hunts Lake Monroe Peak Anderson Can.		
Mining	Bertelson Can.		Manning Creek Miners Ridge Windy Ridge	Tibidore Can.	
Fire	Annabella Flat		Marysvale Peak Blackbird Mine		
Prescribed Fire	Thompson Basin Monument Peak	Kinney Spring			Rock Canyon Pine Canyon Jackie Canyon
Other	Mud Lake Cabin Old Monrovian Park Rec Site		Neilson Can. Sawmills & Piles Windy Ridge Cabins, Barn, etc Manning Cr. Old Tunnel (100')		

Table 9: Existing IRA Wilderness Quality or Attributes

The Overall Ratings are taken from the RAREII Evaluation of Roadless Areas (USFS 1979)

Wilderness Attributes	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Untrammeled - *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.*	Modern human activities include: Roads, trails dams, ditches, culinary and irrigation water developments, waterlines, fences, troughs, ponds, timber harvest, partial cabin, old Monrovian campground, erosion control terracing, mining, fire and prescribed fire.	Modern human activities include: Roads, trails, irrigation water development, waterlines, fences, troughs, ponds, timber harvest, fire and prescribed fire.	Modern human activities include: Roads, trails, dams, ditches, irrigation water developments, waterlines, fences, troughs, ponds, timber harvest, mining, cabins, erosion control terracing, fire and prescribed fire.	Modern human activities include: Roads, trails, waterlines, mining, fences, troughs, ponds, fire and prescribed fire.	Modern human activities include: Roads, trails, waterlines, fences, troughs, ponds, fire and prescribed fire.
Untrammeled Overall Rating	**Moderate**	**Low**	**Moderate**	**Moderate**	**Low**
Natural - *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.*	Modern effects on ecological systems include: Roads, trails dams, ditches, culinary and irrigation water developments, waterlines, fences, troughs, ponds, timber harvest, partial cabin, old Monrovian campground, erosion control terracing, fire and prescribed fire.	Modern effects on ecological systems include: Roads, trails, irrigation water development, waterlines, fences, troughs, ponds, timber harvest, fire and prescribed fire.	Modern effects on ecological systems include: Roads, trails, dams, ditches, irrigation water developments, waterlines, fences, troughs, ponds, timber harvest, mining, cabins, erosion control terracing, fire and prescribed fire.	Modern effects on ecological systems include: Roads, trails, waterlines, mining, fences, troughs, ponds, fire and prescribed fire.	Modern effects on ecological systems include: Roads, trails, waterlines, fences, troughs, ponds, fire and prescribed fire.
Natural Overall Rating	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Low**

Wilderness Attributes	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Undeveloped - *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation; it is essentially without permanent improvements or modern human occupation.*	Modern human presence or occupation include: Roads, trails dams, ditches, culinary and irrigation water developments, waterlines, fences, troughs, ponds, timber harvest, partial cabin, old Monrovian campground, erosion control terracing, fire, and prescribed fire.	Modern human presence or occupation include: Roads, trails, irrigation water development, waterlines, fences, troughs, ponds, timber harvest, fire, and prescribed fire.	Modern human presence or occupation: Roads, trails, dams, ditches, irrigation water developments, waterlines, fences, troughs, ponds, timber harvest, mining, erosion control terracing, cabins, fire, and prescribed fire.	Modern human presence or occupation: Roads, trails, waterlines, mining, fences, troughs, ponds, fire and prescribed fire.	Modern human presence or occupation: Roads, trails, waterlines, fences, troughs, ponds, fire and prescribed fire.
Undeveloped Overall Rating	**Moderate**	**Moderate**	**High**	**High**	**Moderate**

Wilderness Attributes	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Outstanding opportunities for solitude or a primitive and unconfined type of recreation - *This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude is very limited due to motorized roads and trails, adjacent private developments, dams, waterlines, timber harvest, range improve-ments, erosion control terracing, and an irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations are Roaded Natural (about 5%), Semi-Primitive Motorized (about 5%) and Semi-Primitive Non-Motorized (about 90%). The southern portion contains a larger continuous land area that is Semi-Primitive Non-Motorized which could allow for solitude.	Solitude is very limited due to motorized roads and trails, adjacent private developments, waterlines, timber harvest, range improve-ments, and a very irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations are Roaded Natural (about 40%), and Semi-Primitive Motorized (about 60%).	Solitude is very limited due to motorized roads and trails, adjacent private developments, dams, waterlines, mining, timber harvest, range improvements, cabins, erosion control terracing, and a very irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations are Roaded Natural (about 10%), Semi-Primitive Motorized (about 40%) and Semi-Primitive Non-Motorized (about 50%).	Solitude is very limited due to motorized roads and trails, range improvements, and a very irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations are Roaded Natural (about 50%), and Semi-Primitive Non-Motorized (about 50%).	Solitude is very limited due to motorized roads and trails, waterlines, range improvements, and a very irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations are Roaded Natural (about 10%), and Semi-Primitive Motorized (about 90%).
Solitude Overall Rating	**Moderate**	**Low**	**Moderate**	**Low**	**Low**
Special Features *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	Relatively insignificant cultural resources are present. There are no potential or existing research natural areas.	There are no special features identified, nor are there any potential or existing research natural areas.	There are no special features identified, nor are there any potential or existing research natural areas.	There are no special features identified, nor are there any potential or existing research natural areas.	There are no special features identified, nor are there any potential or existing research natural areas.
Special Feature Overall Rating	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Low**

Wilderness Attributes	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Manageability (as Wilderness) *- A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	The IRA is 30,870 acres and very irregular in shape. Only the southern portion contains a larger continuous land area resulting in a configuration that is possibly manageable as wilderness. It has moderate ratings for untrammeled, natural, undeveloped, solitude, and special features.	The IRA is 11,472 acres and very irregular in shape and would be difficult to manage as wilderness. It has moderate ratings for natural, undeveloped, and special features plus a low ratings for untrammeled and solitude.	The IRA is 22,611 acres and very irregular in shape and would be difficult to manage as wilderness. It has a high rating for undeveloped and moderate ratings for untrammeled, natural, solitude, and special features.	The IRA is 9,261 acres and very irregular in shape and would be difficult to manage as wilderness. It has a high rating for undeveloped, moderate ratings for untrammeled, natural, and special features plus a low rating for solitude.	The IRA is 12,152 acres and very irregular in shape and would be difficult to manage as wilderness. It has low ratings for untrammeled, natural, solitude and for special features plus a moderate rating for undeveloped.
Manageability Overall Rating	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Low**

Table 10: Existing IRA Roadless Characteristics

Roadless Characteristic	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	Soils unsuitable for disturbance occur in the steep canyons. Municipal source protection zones occur in Red Butte, Norton and Monroe Canyons.	Soils unsuitable for disturbance occur in the steep canyons. A municipal source protection zone occurs in Koosharem Canyon.	Soils unsuitable for disturbance occur in the steep canyons.	Soils unsuitable for disturbance occur in the steep canyons.	Soils unsuitable for disturbance occur in the steep canyons.
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are public drinking water systems and sources in Norton and Monroe Canyons. Municipal source protection zones are in Red Butte, Norton, and Monroe Canyons.	There are no developed drinking water systems. A municipal source protection zone is in Koosharem Canyon.	There are no developed drinking water systems.	There are no developed drinking water systems.	There are no developed drinking water systems.

Roadless Characteristic	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	See Specialist Reports: - Arizona willow - Boreal Toad - Bonneville Cutthroat Trout - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl	See Specialist Reports: - Arizona willow - Boreal Toad - Bonneville Cutthroat Trout - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl	See Specialist Reports: - Arizona willow - Boreal Toad - Bonneville Cutthroat Trout - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl	See Specialist Reports: - Arizona willow - Boreal Toad - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl	See Specialist Reports: - Arizona willow - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	Sensitive species: - Arizona willow *(Salix arizonica)* - Bonneville Cutthroat Trout *(Oncorhynchus clarki utah)* - Boreal Toad *(Anaxyrus boreas boreas)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports	Sensitive species: - Arizona willow *(Salix arizonica)* - Bonneville Cutthroat Trout *(Oncorhynchus clarki utah)* - Boreal Toad *(Anaxyrus boreas boreas)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports	Sensitive species: - Arizona willow *(Salix arizonica)* - Bonneville Cutthroat Trout *(Oncorhynchus clarki utah)* - Boreal Toad *(Anaxyrus boreas boreas)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports	Sensitive species: - Arizona willow *(Salix arizonica)* - Boreal Toad *(Anaxyrus boreas boreas)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports	Sensitive species: - Arizona willow *(Salix arizonica)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports

Roadless Characteristic	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 90% of the IRA is in the Semi-Primitive Non-Motorized ROS class, with about 5% of the IRA in the Semi-Primitive Motorized ROS class.	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 60% of the IRA is in the Semi-Primitive Motorized ROS class.	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 40% of the IRA is in the Semi-Primitive Non-Motorized ROS class, with about 50% of the IRA in the Semi-Primitive Motorized ROS class.	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 50% of the IRA is in the Semi-Primitive Non-Motorized ROS class.	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 90% of the IRA is in the Semi-Primitive Motorized ROS class.
Reference landscapes for research study or interpretation *- Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and rock outcrops. As evidenced through the developments surrounding and within the project area the unique reference landscape potential is possible, yet not likely.	The landscape is steeply rolling with canyons and open areas. As evidenced through the developments surrounding and within the project area there is little unique reference landscape potential.	The landscape is steeply rolling with canyons and rock outcrops. As evidenced through the developments surrounding and within the project area the unique reference landscape potential is possible, yet not likely.	The landscape is steeply rolling with canyons and open areas. As evidenced through the developments surrounding and within the project area there is little unique reference landscape potential.	The landscape is steeply rolling with canyons, rock cliffs and open areas. As evidenced through the developments surrounding and within the project area there is little to no unique reference landscape potential.

Roadless Characteristic	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	The desired scenic integrity is 90% high with 10% moderate. The character is steeply rolling with canyons and rock outcrops. Vegetation is pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.	The desired scenic integrity is 50% high and 50% moderate. The character is steeply rolling with canyons and open areas. Vegetation is mostly pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.	The desired scenic integrity is 75% high and 25% moderate The character is steeply rolling with canyons and rock outcrops. Vegetation is pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.	The desired scenic integrity is 100% moderate. The character is steeply rolling with canyons and open areas. Vegetation is mostly pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.	The desired scenic integrity is 50% high and 50% moderate. The character is steeply rolling with canyons, rock cliffs, and open areas. Vegetation is mostly pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	Cultural resources are present; however, they are relatively insignificant lithic scatters.	Cultural resources exist; however, there are no major sites present.	Cultural resources exist; however, there are no major sites present.	There are no known significant archeological sites.	There are no known significant archeological sites.

Roadless Characteristic	Signal Peak IRA	Little Creek IRA	Marysvale Peak IRA	Tibidore IRA	Langdon IRA
Other locally unique characteristics - *Identify any locally unique characteristics.*	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various water bodies, wildlife, trails, meadows and rock outcrops. Popular activities include hiking, horseback riding and hunting.	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various streams, wildlife, and meadows. Popular activities include hunting and ATV riding.	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various water bodies, wildlife, trails, meadows and rock outcrops. Popular activities include hiking, horseback riding, hunting and ATV riding.	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various streams, wildlife, meadows and rock outcrops. Popular activities include hunting.	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various streams, wildlife, meadows and rock outcrops. Popular activities include hunting and ATV riding.

Table 11: Existing Draft UUA Wilderness Quality or Attributes

The Overall Ratings are taken from the2004 Fishlake National Forest Draft Undeveloped Area Evaluation

Wilderness Attributes	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Untrammeled - *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.*	Modern human activities include: Roads, trails, ditches, culinary and irrigation water developments, waterlines, fences, troughs, ponds, partial cabin, old Monrovian campground, erosion control terracing, mining, fire and prescribed fire.	Modern human activities include: Roads, trails, irrigation water development, waterlines, fences, troughs, ponds, timber harvest, fire and prescribed fire.	Modern human activities include: Roads, trails, dams, ditches, irrigation water developments, waterlines, fences, troughs, ponds, timber harvest, mining, erosion control terracing, cabins, fire and prescribed fire.	Modern human activities include: Roads, trails, waterlines, mining, fences, troughs, ponds, fire and prescribed fire.	Modern human activities include: Roads, trails, waterlines, fences, troughs, ponds, fire and prescribed fire.
Untrammeled Overall Rating	**Medium**	**Medium**	**Medium**	**Medium**	**Low**
Natural - *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.*	Modern effects on ecological systems include: Roads, trails, ditches, culinary and irrigation water developments, waterlines, fences, troughs, ponds, partial cabin, old Monrovian campground, erosion control terracing, fire and prescribed fire.	Modern effects on ecological systems include: Roads, trails, irrigation water development, waterlines, fences, troughs, ponds, timber harvest, fire and prescribed fire.	Modern effects on ecological systems include: Roads, trails, dams, ditches, irrigation water developments, waterlines, fences, troughs, ponds, timber harvest, mining, erosion control terracing, cabins, fire and prescribed fire.	Modern effects on ecological systems include: Roads, trails, waterlines, mining, fences, troughs, ponds, fire and prescribed fire.	Modern effects on ecological systems include: Roads, trails, waterlines, fences, troughs, ponds, fire and prescribed fire.
Natural Overall Rating	**High**	**Medium**	**High**	**High**	**Medium**

Wilderness Attributes	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Undeveloped - *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation; it is essentially without permanent improvements or modern human occupation.*	Modern human presence or occupation include: Roads, trails, ditches, culinary and irrigation water developments, waterlines, fences, troughs, ponds, partial cabin, old Monrovian campground, erosion control terracing, fire and prescribed fire.	Modern human presence or occupation include: Roads, trails, irrigation water development, waterlines, fences, troughs, ponds, timber harvest, fire and prescribed fire.	Modern human presence or occupation include: Roads, trails, dams, ditches, irrigation water developments, waterlines, fences, troughs, ponds, timber harvest, mining, erosion control terracing, cabins, fire and prescribed fire.	Modern human presence or occupation include: Roads, trails, waterlines, mining, fences, troughs, ponds, fire and prescribed fire.	Modern human presence or occupation include: Roads, trails, waterlines, fences, troughs, ponds, fire and prescribed fire.
Undeveloped Overall Rating	**Medium**	**Low**	**Medium**	**Medium**	**Low**

Wilderness Attributes	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Outstanding opportunities for solitude or a primitive and unconfined type of recreation - *This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude is very limited due to motorized roads and trails, adjacent private developments, waterlines, range improvements, erosion control terracing, and an irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations are Roaded Natural (about 6%), Semi-Primitive Motorized (about 4%) and Semi-Primitive Non-Motorized (about 90%). The southern portion contains a larger continuous land area that is Semi-Primitive Non-Motorized which could allow for solitude.	Solitude is very limited due to a few motorized roads and trails, adjacent private developments, range improve-ments, and a very irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations are Roaded Natural (about 35%), and Semi-Primitive Motorized (about 65%).	Solitude is very limited due to motorized trails, adjacent private developments, mining, range improvements, erosion control terracing, cabins, and a very irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations are Roaded Natural (about 10%), Semi-Primitive Motorized (about 45%) and Semi-Primitive Non-Motorized (about 45%).	Solitude is very limited due to mining, range improvements, and a very irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations are Roaded Natural (about 40%), and Semi-Primitive Non-Motorized (about 60%).	Solitude is very limited due to motorized roads and trails, waterlines, range improvements, and a very irregular shaped land area. The Recreation Opportunity Spectrum (ROS) designations of Roaded Natural (about 5%), and Semi-Primitive Motorized (about 95%).
Solitude Overall Rating	**Medium**	**Medium**	**Medium**	**Low**	**Low**
Special Features *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	There are no special features identified, nor are there any potential or existing research natural areas.	There are no special features identified, nor are there any potential or existing research natural areas.	Bonneville Cutthroat trout in Manning Creek. There are no potential or existing research natural areas.	There are no special features identified, nor are there any potential or existing research natural areas.	There are no special features identified, nor are there any potential or existing research natural areas.
Special Feature Overall Rating	**Low**	**Low**	**Medium**	**Low**	**Low**

Wilderness Attributes	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Manageability (as Wilderness) *- A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	The UUA is 29,900 acres and very irregular in shape. Only the southern portion contains a larger continuous land area resulting in a configuration that is possibly manageable as wilderness. It has a high rating for natural; medium for untrammeled, undeveloped, and solitude; and low for special features.	The UUA is 9,529 acres and very irregular in shape and would be difficult to manage as wilderness. It has medium ratings for untrammeled, natural, and solitude; and low for undeveloped and special features.	The UUA is 27,168 acres and very irregular in shape and would be difficult to manage as wilderness. It has a high rating for natural; and medium ratings for untrammeled, undeveloped, solitude, and special features.	The UUA is 8,074 acres and very irregular in shape and would be difficult to manage as wilderness. It has a high rating for natural; moderate ratings for untrammeled, undeveloped; and low ratings for solitude and special features.	The UUA is 18,183 acres and very irregular in shape and would be very difficult to manage as wilderness. It has a medium rating for natural; and low ratings for untrammeled, undeveloped, solitude and special features.
Manageability Overall Rating	**Medium**	**Low**	**Medium**	**Medium**	**Low**

Table 12: Existing Draft UUA Roadless Characteristics

Roadless Characteristic	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	Soils unsuitable for disturbance occur in the steep canyons. Municipal source protection zones occur in Red Butte, Norton and Monroe Canyons.	Soils unsuitable for disturbance occur in the steep canyons. A municipal source protection zone occurs in Koosharem Canyon.	Soils unsuitable for disturbance occur in the steep canyons.	Soils unsuitable for disturbance occur in the steep canyons.	Soils unsuitable for disturbance occur in the steep canyons.
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are public drinking water systems, sources, and source protection zones in Norton, Red Butte, and Monroe Canyons.	There are no developed drinking water systems. A municipal source protection zone is in Koosharem Canyon.	There are no developed drinking water systems.	There are no developed drinking water systems.	There are no developed drinking water systems.

Roadless Characteristic	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	See Specialist Reports: - Arizona willow - Boreal Toad - Bonneville Cutthroat Trout - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl	See Specialist Reports: - Arizona willow - Boreal Toad - Bonneville Cutthroat Trout - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl	See Specialist Reports: - Arizona willow - Boreal Toad - Bonneville Cutthroat Trout - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl	See Specialist Reports: - Arizona willow - Boreal Toad - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl	See Specialist Reports: - Arizona willow - Boreal Toad - Bonneville Cutthroat Trout - Northern Goshawk - Townsend's Big-eared Bat - Spotted Bat - Three-toed woodpecker - Flammulated Owl
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	Sensitive species: - Arizona willow *(Salix arizonica)* - Bonneville Cutthroat Trout *(Oncorhynchus clarki utah)* - Boreal Toad *(Anaxyrus boreas boreas)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports	Sensitive species: - Arizona willow *(Salix arizonica)* - Bonneville Cutthroat Trout *(Oncorhynchus clarki utah)* - Boreal Toad *(Anaxyrus boreas boreas)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports	Sensitive species: - Arizona willow *(Salix arizonica)* - Bonneville Cutthroat Trout *(Oncorhynchus clarki utah)* - Boreal Toad *(Anaxyrus boreas boreas)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports	Sensitive species: - Arizona willow *(Salix arizonica)* - Boreal Toad *(Anaxyrus boreas boreas)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports:	Sensitive species: - Arizona willow *(Salix arizonica)* - Bonneville Cutthroat Trout *(Oncorhynchus clarki utah)* - Boreal Toad *(Anaxyrus boreas boreas)* - Northern Goshawk *(Accipiter gentilis)* - Townsend's Big-eared Bat *(Corynorhinus townsendii)* - Spotted Bat *(Euderma maculatum)* - Three-toed woodpecker *(Picoides tridactylus)* - Flammulated Owl *(Otus flammeolus)* See Specialist Reports

Roadless Characteristic	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 90% of the UUA is in the Semi-Primitive Non-Motorized ROS class, with about 4% of the UUA in the Semi-Primitive Motorized ROS class.	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 65% of the UUA is in the Semi-Primitive Motorized ROS class.	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 45% of the UUA is in the Semi-Primitive Non-Motorized ROS class, with about 45% of the UUA in the Semi-Primitive Motorized ROS class.	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 60% of the UUA is in the Semi-Primitive Motorized ROS class.	There are no opportunities for primitive recreation and there is none mapped as Primitive ROS. About 95% of the UUA is in the Semi-Primitive Motorized ROS class.
Reference landscapes for research study or interpretation *- Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and rock outcrops. As evidenced through the developments surrounding and within the project area the unique reference landscape potential is possible, yet not likely.	The landscape is steeply rolling with canyons and open areas. As evidenced through the developments surrounding and within the project area there is little unique reference landscape potential.	The landscape is steeply rolling with canyons and rock outcrops. As evidenced through the developments surrounding and within the project area the unique reference landscape potential is possible, yet not likely.	The landscape is steeply rolling with canyons and open areas. As evidenced through the developments surrounding and within the project area there is little unique reference landscape potential.	The landscape is steeply rolling with canyons, rock cliffs, and open areas. As evidenced through the developments surrounding and within the project area there is little to no unique reference landscape potential.

Roadless Characteristic	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	The desired scenic integrity is 95% high with 5% moderate. The character is steeply rolling with canyons and rock outcrops. Vegetation is pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.	The desired scenic integrity is 50% high and 50% moderate. The character is steeply rolling with canyons and open areas. Vegetation is mostly pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.	The desired scenic integrity is 65% high and 35% moderate The character is steeply rolling with canyons and rock outcrops. Vegetation is pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.	The desired scenic integrity is 100% moderate. The character is steeply rolling with canyons and open areas. Vegetation is mostly pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.	The desired scenic integrity is 40% high and 60% moderate. The character is steeply rolling with canyons, rock cliffs, and open areas. Vegetation is mostly pinion, juniper, mountain shrubs and grass with aspen and conifer in the upper canyons and elevations.
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	Cultural resources are present; however, they are relatively insignificant lithic scatters.	Cultural resources exist; however, there are no major sites present.	Cultural resources exist; however, there are no major sites present.	There are no known significant archeological sites.	There are no known significant archeological sites.

Roadless Characteristic	Signal Peak UUA	Little Creek UUA	Marysvale Peak UUA	Tibidore UUA	Langdon UUA
Other locally unique characteristics - *Identify any locally unique characteristics.*	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various water bodies, wildlife, trails, meadows and rock outcrops. Popular activities include hiking, horseback riding and hunting.	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various streams, wildlife, and meadows. Popular activities include hunting and ATV riding.	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various water bodies, wildlife, trails, meadows and rock outcrops. Popular activities include hiking, horseback riding, hunting and ATV riding.	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various streams, wildlife, meadows and rock outcrops. Popular activities include hunting.	There are no locally unique characteristics, but common to the area are many beautiful features that occur within and adjacent to the project area. Adjacent would include views of the surrounding valleys and mountain vistas. Within the project area include various streams, wildlife, meadows and rock outcrops. Popular activities include hunting and ATV riding.

Monroe Mountain Aspen Ecosystems Restoration Project Alternatives:

No Action Alternative (Alternative 1):

The No Action Alternative represents the existing condition described in the previous pages and in the EIS. This alternative would maintain the status quo and conditions on the ground would not measurably change in respect to wilderness attributes and roadless characteristics. Aspen restoration would not take place except by wildfires and natural succession. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Generally all existing activities would continue. Recreation activities including hunting, fishing, hiking, driving, and off-road vehicle use on designated routes, would continue and are relatively non-impacting. Cattle grazing, with maintenance of associated range improvements such as fences and water developments, would occur. Dam, water source, and waterline maintenance would continue. These activities are not anticipated to impact the existing wilderness quality or attributes and roadless characteristics.

The present qualities or attributes of wilderness; Untrammeled, Natural Integrity, Appearance, Remoteness, Solitude, Special Features, and Manageability, as well as the characteristics of Inventoried Roadless Areas; Soil, water and air, Sources of public drinking water, Diversity of plant and animal communities, Habitat for threatened, endangered, proposed and candidate, and sensitive species and for those species dependent on large, undisturbed areas of land, Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of recreation opportunities, Reference landscapes, Landscape character and scenic integrity, Traditionally cultural properties and sacred sites, and Other locally identified unique characteristics, would remain affected primarily by natural processes.

Alternatives 2-5:

Alternatives 2-5 within Inventoried Roadless Areas (IRAs): Would include mechanical and prescribed fire activities to meet the purpose and need of aspen restoration. Mechanical (2 options) treatments would occur in the four action alternatives as well as prescribed fire. No new access roads or temporary roads would be required within the IRAs. Fire breaks and control lines would be feathered to appear natural. Trees would be cut as close to the ground as possible. Access for mechanical treatments would be existing roads and/or cross country by tracked vehicles.

IRA Analysis table 13 shows the total acres of each IRA. Next is shown the proposed acres within each alternative being treated by mechanical and prescribed fire, plus the percentage of the IRA being treated by mechanical and by prescribed fire as well as the total percent of the combined treated acres. Note that 60% or less is actually being burned across the landscape. Therefore, the result of 60% being treated is the number shown in the Prescribed Fire Mixed Burn Severities Acres (60% Treated) column.

Table 13: Monroe Mountain Aspen Ecosystems Restoration Project – IRA Analysis

		Alt. 1	Alternative 2					Alternative 3				
Inventoried Roadless Area (IRA)	Total IRA Acres	Acres Being Treated	Mechanical & Slash Burning Acres Being Treated	Mechanical & Slash Burning Percent of IRA Being Treated	Prescribed Fire Mixed Burn Severities Acres (60% Treated)	Prescribed Fire Mixed Burn Severities Percent of IRA Treated	All Treatments Combined Percent of IRA Being Treated	Mechanical & Slash Burning Acres Treated	Mechanical & Slash Burning Percent of IRA Being Treated	Prescribed Fire Mixed Burn Severities Acres (60% Treated)	Prescribed Fire Mixed Burn Severities Percent of IRA Treated	All Treatments Combined Percent of IRA Being Treated
Langdon	12,152	0	42	0%	490	4%	4%	223	2%	514	4%	6%
Little Creek	11,472	0	327	3%	1,569	14%	17%	1,422	12%	1,088	10%	22%
Marysvale Peak	22,611	0	217	1%	4,024	18%	19%	925	4%	4,008	18%	22%
Signal Peak	30,870	0	862	3%	8,095	26%	29%	2,439	8%	7,631	25%	33%
Tibadore	9,261	0	61	1%	1,201	13%	14%	122	1%	1,237	13%	15%
All IRAs Combined	83,366	0	1,509	2%	15,379	18%	20%	5,131	6%	14,478	17%	23%

Table 13: Monroe Mountain Aspen Ecosystems Restoration Project – IRA Analysis (Continued)

		Alt. 1	Alternative 4					Alternative 5				
Inventoried Roadless Area (IRA)	Total IRA Acres	Acres Being Treated	Mechanical & Slash Burning Acres Being Treated	Mechanical & Slash Burning Percent of IRA Being Treated	Prescribed Fire Mixed Burn Severities Acres (60% Treated)	Prescribed Fire Mixed Burn Severities Percent of IRA Treated	All Treatments Combined Percent of IRA Being Treated	Mechanical & Slash Burning Acres Treated	Mechanical & Slash Burning Percent of IRA Being Treated	Prescribed Fire Mixed Burn Severities Acres (60% Treated)	Prescribed Fire Mixed Burn Severities Percent of IRA Treated	All Treatments Combined Percent of IRA Being Treated
Langdon	12,152	0	278	2%	514	4%	6%	317	3%	324	3%	6%
Little Creek	11,472	0	2,142	19%	737	6%	25%	1,228	11%	1,028	9%	20%
Marysvale Peak	22,611	0	1,637	7%	3,747	17%	24%	1,517	7%	3,356	15%	22%
Signal Peak	30,870	0	5,009	16%	6,396	21%	37%	3,478	11%	6,633	22%	33%
Tibadore	9,261	0	196	2%	1,237	13%	15%	317	3%	1,047	11%	14%
All IRAs Combined	83,366	0	9,262	11%	12,632	15%	26%	6,857	8%	12,388	14%	22%

Table 14: IRA Acreage of Mechanical and slash burning, and Prescribed Fire in Alternative 2 by Vegetation Type

Alternative 2 - Mechanical & Slash Burning		
IRA	**Vegetation**	**Acres**
Langdon	Seral Aspen	42
Langdon Total		**42**
Little Creek	Seral Aspen	173
	Spruce-Fir	11
	Stable Aspen	143
Little Creek Total		**327**
Marysvale Peak	Seral Aspen	144
	Spruce-Fir	48
	Stable Aspen	25
Marysvale Peak Total		**217**
Signal Peak	Mixed Conifer	1
	Seral Aspen	304
	Spruce-Fir	359
	Stable Aspen	197
Signal Peak Total		**862**
Tibadore	Mixed Conifer	5
	Seral Aspen	53
	Stable Aspen	2
Tibadore Total		**61**
GRAND TOTAL		**1,509**

Alternative 2 - Prescribed Fire Mixed Burn Severities		
IRA	**Vegetation**	**Acres**
Langdon	Mixed Conifer	126
	Seral Aspen	352
	Spruce-Fir	11
	Stable Aspen	1
Langdon Total		**490**
Little Creek	Seral Aspen	951
	Spruce-Fir	22
	Stable Aspen	596
Little Creek Total		**1,569**
Marysvale Peak	Mixed Conifer	371
	Seral Aspen	2,096
	Spruce-Fir	451
	Stable Aspen	1,106
Marysvale Peak Total		**4,024**
Signal Peak	Mixed Conifer	1,254
	Seral Aspen	2,671
	Spruce-Fir	2,169
	Stable Aspen	2,001
Signal Peak Total		**8,095**
Tibadore	Mixed Conifer	198
	Seral Aspen	880
	Spruce-Fir	63
	Stable Aspen	60
Tibadore Total		**1,201**
GRAND TOTAL		**15,379**

Table 15: IRA Acreage of Mechanical and slash burning, and Prescribed Fire in Alternative 3 by Vegetation Type

Alternative 3 - Mechanical & Slash Burning		
IRA	**Vegetation**	**Acres**
Langdon	Seral Aspen	223
Langdon Total		**223**
Little Creek	Seral Aspen	1,018
	Spruce-Fir	46
	Stable Aspen	359
Little Creek Total		**1,422**
Marysvale Peak	Seral Aspen	692
	Spruce-Fir	164
	Stable Aspen	69
Marysvale Peak Total		**925**
Signal Peak	Mixed Conifer	1
	Seral Aspen	913
	Spruce-Fir	1,202
	Stable Aspen	323
Signal Peak Total		**2,439**
Tibadore	Seral Aspen	103
	Stable Aspen	18
Tibadore Total		**122**
GRAND TOTAL		**5,131**

Alternative 3 - Prescribed Fire Mixed Burn Severities		
IRA	**Vegetation**	**Acres**
Langdon	Mixed Conifer	126
	Seral Aspen	376
	Spruce-Fir	11
	Stable Aspen	1
Langdon Total		**514**
Little Creek	Seral Aspen	573
	Spruce-Fir	8
	Stable Aspen	507
Little Creek Total		**1,088**
Marysvale Peak	Mixed Conifer	371
	Seral Aspen	2,098
	Spruce-Fir	428
	Stable Aspen	1,111
Marysvale Peak Total		**4,008**
Signal Peak	Mixed Conifer	1,254
	Seral Aspen	2,477
	Spruce-Fir	1,888
	Stable Aspen	2,012
Signal Peak Total		**7,631**
Tibadore	Mixed Conifer	200
	Seral Aspen	912
	Spruce-Fir	63
	Stable Aspen	62
Tibadore Total		**1,237**
GRAND TOTAL		**14,478**

Table 16: IRA Acreage of Mechanical and slash burning, and Prescribed Fire in Alternative 4 by Vegetation Type

Alternative 4 - Mechanical & Slash Burning		
IRA	**Vegetation**	**Acres**
Langdon	Seral Aspen	278
Langdon Total		**278**
Little Creek	Seral Aspen	1,448
	Spruce-Fir	62
	Stable Aspen	632
Little Creek Total		**2,142**
Marysvale Peak	Seral Aspen	1,086
	Spruce-Fir	425
	Stable Aspen	125
Marysvale Peak Total		**1,637**
Signal Peak	Mixed Conifer	11
	Seral Aspen	1,779
	Spruce-Fir	2,213
	Stable Aspen	1,006
Signal Peak Total		**5,009**
Tibadore	Seral Aspen	177
	Stable Aspen	18
Tibadore Total		**196**
GRAND TOTAL		**9,262**

Alternative 4 – Prescribed Fire Mixed Burn Severities		
IRA	**Vegetation**	**Acres**
Langdon	Mixed Conifer	126
	Seral Aspen	376
	Spruce-Fir	11
	Stable Aspen	1
Langdon Total		**514**
Little Creek	Seral Aspen	380
	Spruce-Fir	8
	Stable Aspen	349
Little Creek Total		**737**
Marysvale Peak	Mixed Conifer	371
	Seral Aspen	1,978
	Spruce-Fir	314
	Stable Aspen	1,084
Marysvale Peak Total		**3,747**
Signal Peak	Mixed Conifer	1,248
	Seral Aspen	2,122
	Spruce-Fir	1,391
	Stable Aspen	1,635
Signal Peak Total		**6,396**
Tibadore	Mixed Conifer	200
	Seral Aspen	912
	Spruce-Fir	63
	Stable Aspen	62
Tibadore Total		**1,237**
GRAND TOTAL		**12,632**

Table 17: IRA Acreage of Mechanical and slash burning, and Prescribed Fire in Alternative 5 by Vegetation Type

Alternative 5 - Mechanical & Slash Burning		
IRA	**Vegetation**	**Acres**
Langdon	Stable Aspen	2
	Seral Aspen	315
Langdon Total		**317**
Little Creek	Seral Aspen	809
	Spruce-Fir	35
	Stable Aspen	384
Little Creek Total		**1,228**
Marysvale Peak	Seral Aspen	847
	Spruce-Fir	340
	Stable Aspen	331
Marysvale Peak Total		**1,517**
Signal Peak	Mixed Conifer	1
	Seral Aspen	1,444
	Spruce-Fir	1,405
	Stable Aspen	628
Signal Peak Total		**3,478**
Tibadore	Seral Aspen	290
	Stable Aspen	27
Tibadore Total		**317**
GRAND TOTAL		**6,857**
Alternative 5 - Prescribed Fire Mixed Burn Severities		
IRA	**Vegetation**	**Acres**
Langdon	Mixed Conifer	126
	Seral Aspen	187
	Spruce-Fir	11
Langdon Total		**324**
Little Creek	Seral Aspen	569
	Spruce-Fir	8
	Stable Aspen	451
Little Creek Total		**1,028**
Marysvale Peak	Mixed Conifer	372
	Seral Aspen	1,736
	Spruce-Fir	320
	Stable Aspen	928
Marysvale Peak Total		**3,356**
Signal Peak	Mixed Conifer	1,255
	Seral Aspen	1,999
	Spruce-Fir	1,579
	Stable Aspen	1,800
Signal Peak Total		**6,633**
Tibadore	Mixed Conifer	200
	Seral Aspen	738
	Spruce-Fir	63
	Stable Aspen	46
Tibadore Total		**1,047**
GRAND TOTAL		**12,388**

Inventoried Roadless Area Wilderness Quality or Attributes and Potential Effects by Alternative

Table 18: Langdon IRA - Effects to Wilderness Quality or Attributes for all Alternatives

Langdon IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire will take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	42 acres (0%) of mechanical and slash burning and 490 acres (4%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time; typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have little effect on these wilderness attributes.	223 acres (2%) of mechanical and slash burning and 514 acres (4%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time; typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have little effect on these wilderness attributes.	278 acres (2%) of mechanical and slash burning and 514 acres (4%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time; typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have little effect on these wilderness attributes.	317 acres (3%) of mechanical and slash burning and 324 acres (3%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time; typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have little effect on these wilderness attributes.

Langdon IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation *– This quality monitors conditions that affect the opportunities for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features - *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the IRA.				
Manageability (as Wilderness) *- A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be a little effect for 3 to 5 years.			

Table 19: Langdon IRA - Effects to Roadless Characteristics for all Alternatives

Langdon IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are no developed drinking water systems.				
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

Langdon IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons, rock cliffs and open areas. As evidenced through the developments surrounding and within the project area there is little to no unique reference landscape potential.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Langdon IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the IRA.				

Table 20: Little Creek IRA - Effects to Wilderness Quality or Attributes for all Alternatives

Little Creek IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire will take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	327 acres (3%) of mechanical and slash burning and 1,569 acres (14%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	1,422 acres (12%) of mechanical and slash burning and 1,088 acres (10%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	2,142 acres (19%) of mechanical and slash burning and 737 acres (6%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	1,228 acres (11%) of mechanical and slash burning and 1,028 acres (9%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.

Little Creek IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation - *This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features - *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the IRA.				
Manageability (as Wilderness) - *A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be a little affect for 3 to 5 years.			

Table 21: Little Creek IRA - Effects to Roadless Characteristics for all Alternatives

Little Creek IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are no developed drinking water systems.				
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

Little Creek IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and open areas. As evidenced through the developments surrounding and within the project area there is little unique reference landscape potential.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Little Creek IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the IRA.				

Table 22: Marysvale Peak IRA - Effects to Wilderness Quality or Attributes for all Alternatives

Marysvale Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire will take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	217 acres (1%) of mechanical and slash burning and 4,024 acres (18%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	925 acres (4%) of mechanical and slash burning and 4,008 acres (18%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	1,637 acres (7%) of mechanical and slash burning and 3,747 acres (17%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	1,517 acres (7%) of mechanical and slash burning and 3,356 acres (15%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.

Marysvale Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation - *This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features - *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the IRA.				
Manageability (as Wilderness) - *A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be affected for 3 to 5 years.			

Table 23: Marysvale Peak IRA - Effects to Roadless Characteristics for all Alternatives

Marysvale Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are no developed drinking water systems.				
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

Marysvale Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and rock outcrops. As evidenced through the developments surrounding and within the project area the unique reference landscape potential is possible, yet not likely.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Marysvale Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the IRA.				

Table 24: Signal Peak IRA - Effects to Wilderness Quality or Attributes for all Alternatives

Signal Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire would take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	862 acres (3%) of mechanical and slash burning and 8,095 acres (26%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	2,439 acres (8%) of mechanical and slash burning and 7,631 acres (25%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	5,009 acres (16%) of mechanical and slash burning and 6,396 acres (21%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	3,478 acres (11%) of mechanical and slash burning and 6,633 acres (22%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.

Signal Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation - *This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features - *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the IRA.				
Manageability (as Wilderness) - *A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be affected for 3 to 5 years.			

Table 25: Signal Peak IRA - Effects to Roadless Characteristics for all Alternatives

Signal Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	Municipal watersheds occur within the project area. No change would take place.	Municipal watersheds do occur within the project area. Buffers would be in place to protect public drinking water systems.			
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

Signal Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and rock outcrops. As evidenced through the developments surrounding and within the project area the unique reference landscape potential is possible, yet not likely.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Signal Peak IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the IRA.				

Table 26: Tibadore IRA - Effects to Wilderness Quality or Attributes for all Alternatives

Tibadore IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire would take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	61 acres (1%) of mechanical and slash burning and 1,201 acres (13%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	122 acres (1%) of mechanical and slash burning and 1,237 acres (13%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	196 acres (2%) of mechanical and slash burning and 1,237 acres (13%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	317 acres (3%) of mechanical and slash burning and 1,046 acres (11%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.

Tibadore IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation *- This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the IRA.				
Manageability (as Wilderness) *- A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be affected for 3 to 5 years.			

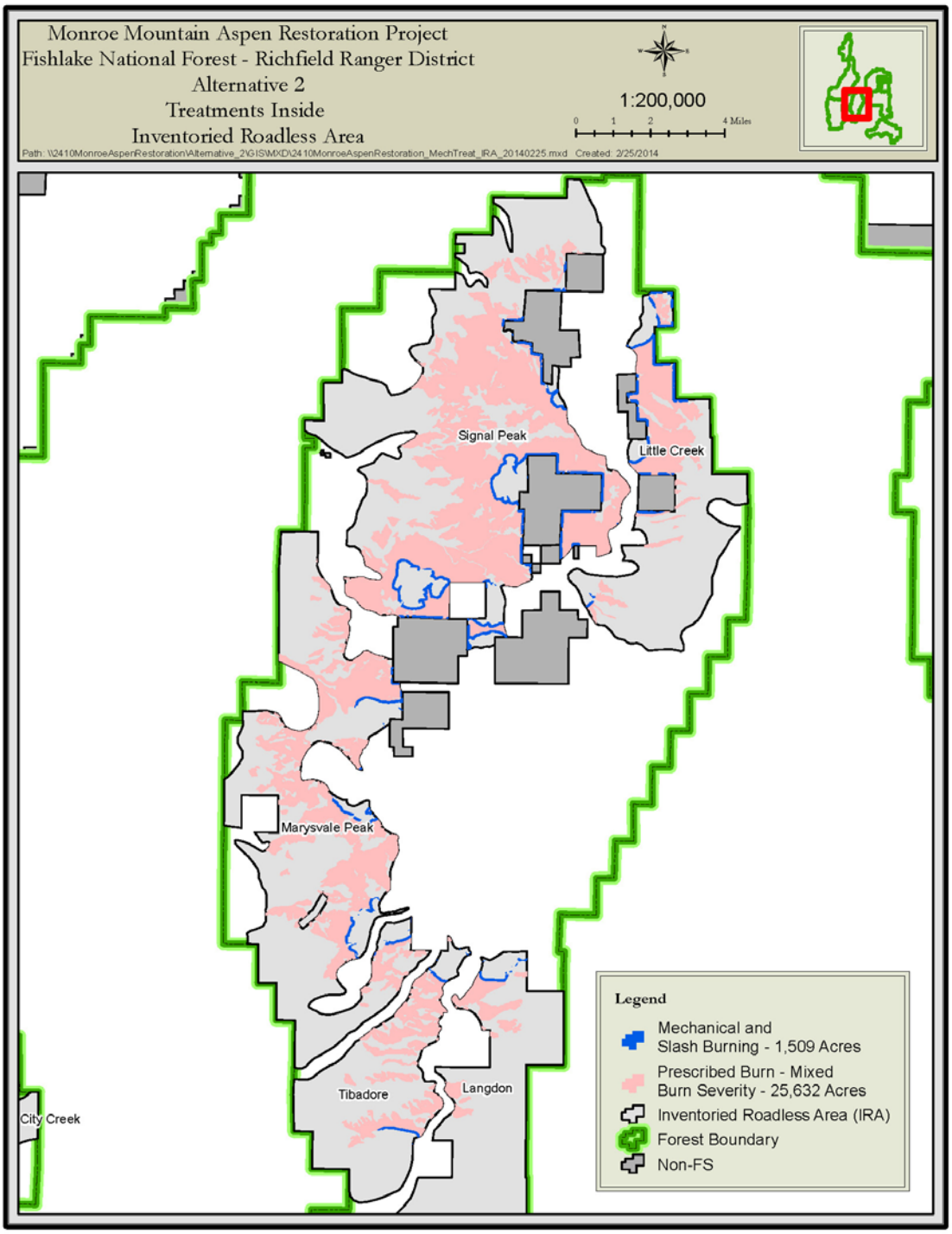
Table 27: Tibadore IRA - Effects to Roadless Characteristics for all Alternatives

Tibidore IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are no developed drinking water systems.				
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

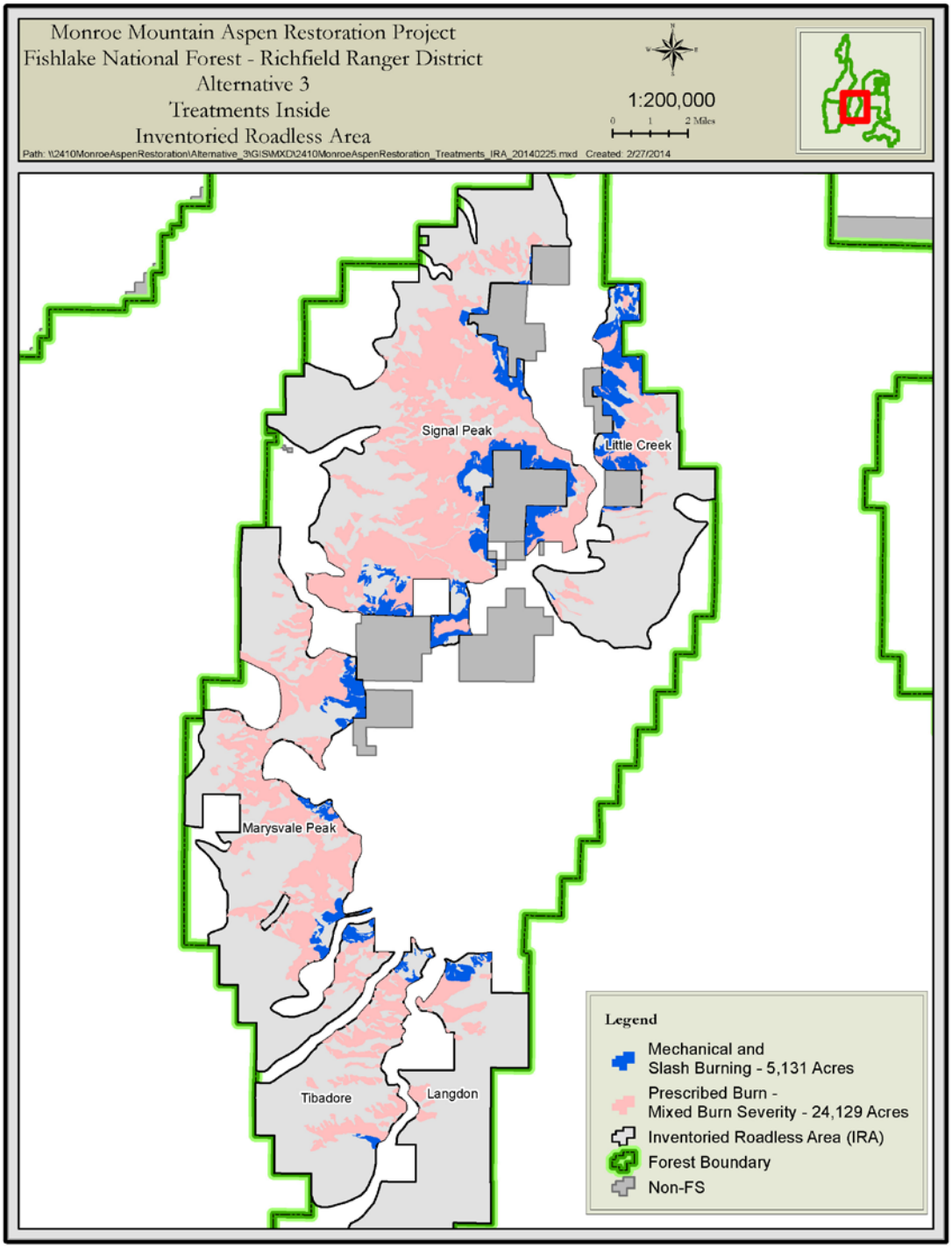
Tibidore IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and open areas. As evidenced through the developments surrounding and within the project area there is little unique reference landscape potential.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Tibidore IRA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the IRA.				

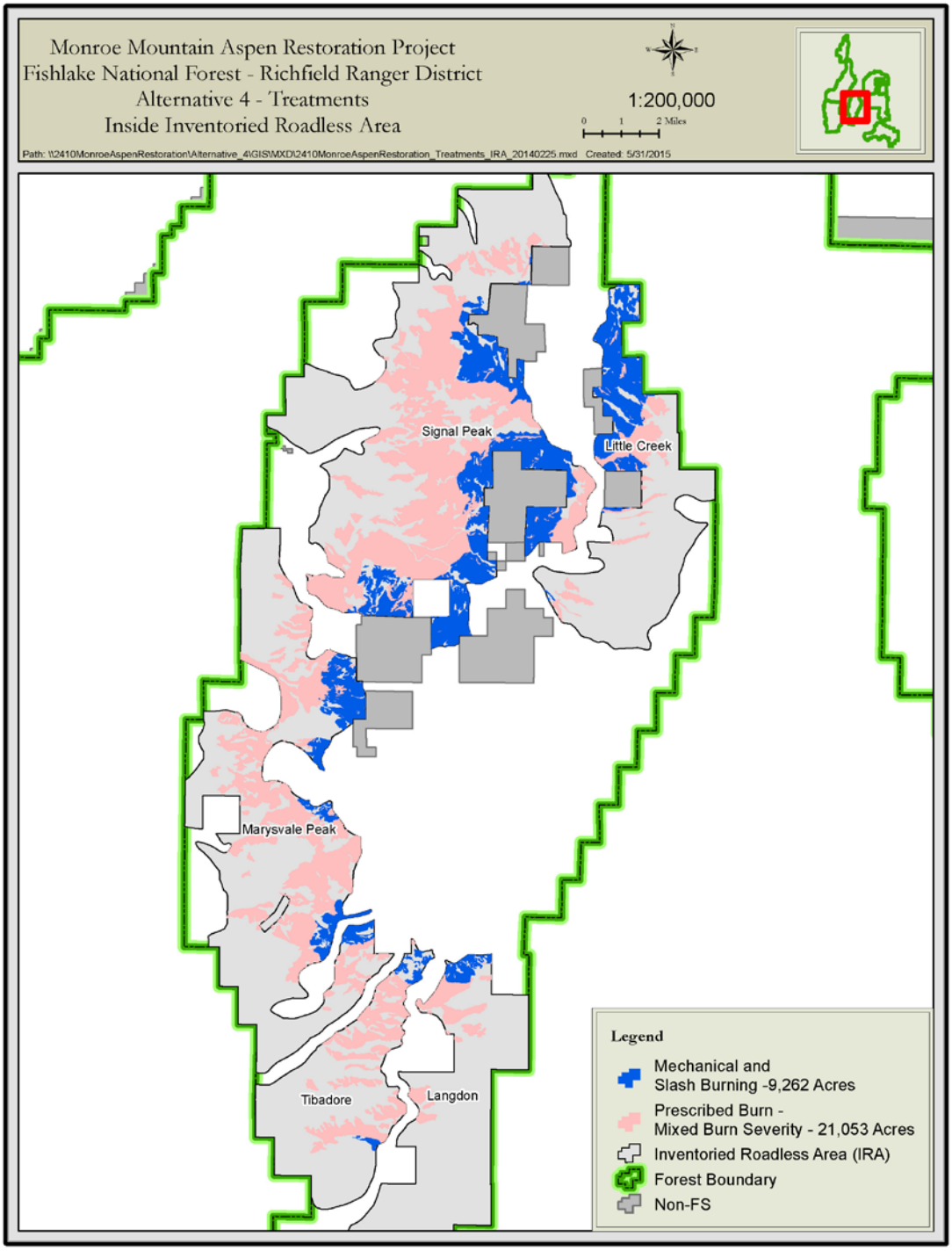
Map 3: Alternative 2 Treatments inside Inventoried Roadless Areas



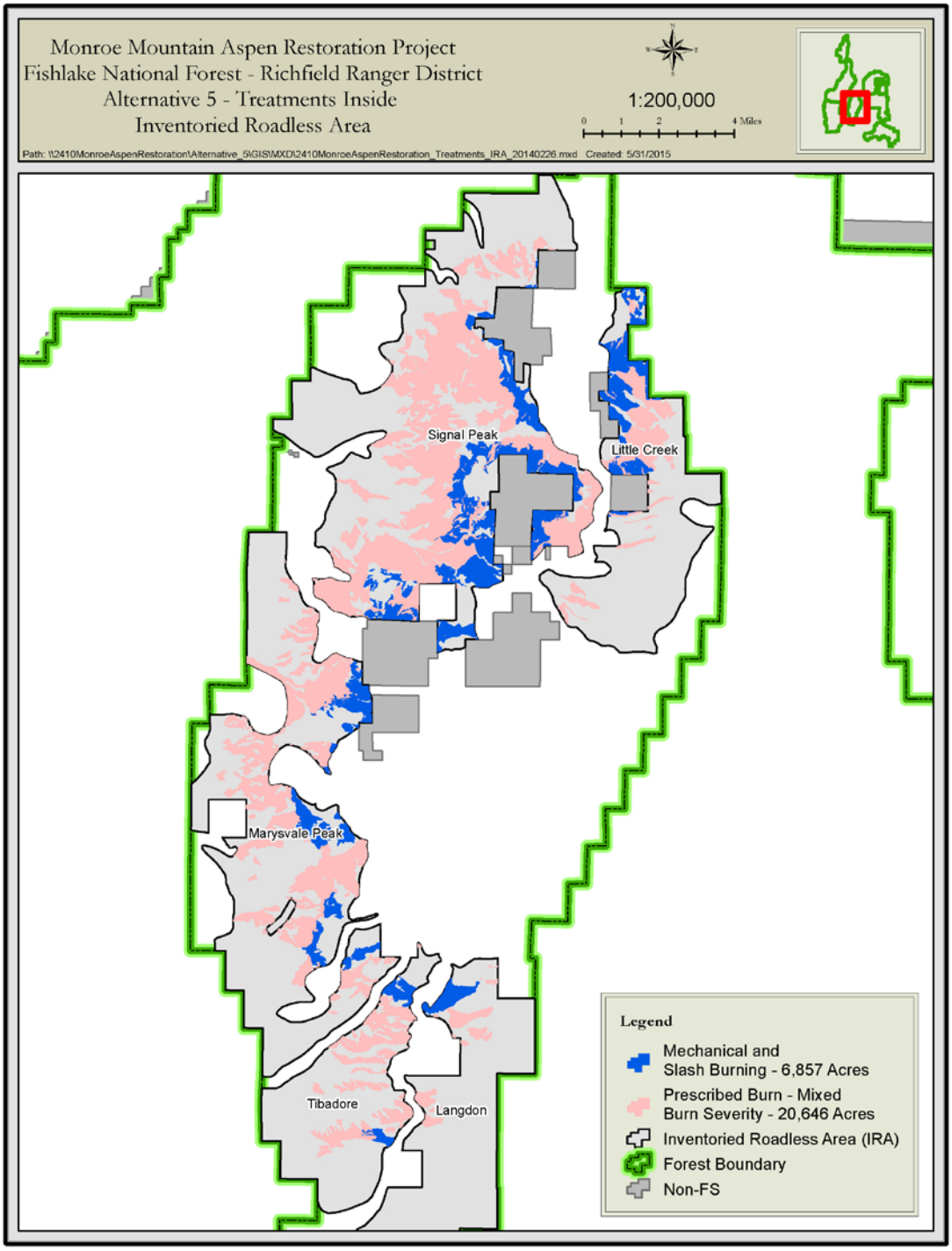
Map 4: Alternative 3 Treatments inside Inventoried Roadless Areas



Map 5: Alternative 4 Treatments inside Inventoried Roadless Areas



Map 6: Alternative 5 Treatments inside Inventoried Roadless Areas



Action Alternatives 2-5 within draft Unroaded/Undeveloped Areas (UUAs): Would include mechanical (2 options) and prescribed fire activities to meet the purpose and need of aspen restoration. Mechanical treatments would occur in the four action alternatives as well as prescribed fire. Approximately 0.3 miles of temporary road would be constructed in Alternative 4 and 1.3 miles of temporary road would be constructed in Alternative 5 in the draft UUAs to access mechanical treatments. Temporary roads would be rehabilitated upon project completion. Fire breaks and control lines would be feathered to appear natural. Trees would be cut as close to the ground as possible. Access for mechanical treatments would be existing roads, cross country travel by tracked vehicles, and temporary roads in Alternatives 4 and 5.

Draft UUA Analysis Table 28 shows the total acres of each draft UUA. Next is shown the proposed acres within each alternative being treated by mechanical and prescribed fire, plus the percentage of the draft UUA being treated by mechanical and by prescribed fire as well as the total percent of the combined treated acres. Note that 60% or less actually being burned across the landscape. Therefore, the result of 60% being treated is the number shown in the Prescribed Fire Mixed Burn Severities Acres (60% Treated) column.

Table 28: Monroe Mountain Aspen Ecosystems Restoration Project – Draft UUA Analysis

		Alt. 1	Alternative 2					Alternative 3				
Draft Unroaded/Undeveloped Area (UUA)	Total Draft UUA Acres	Acres Being Treated	Mechanical & Slash Burning Acres Being Treated	Mechanical & Slash Burning Percent of UUA Being Treated	Prescribed Fire Mixed Burn Severities Acres (60% Treated)	Prescribed Fire Mixed Burn Severities Percent of UUA Treated	All Treatments Combined Percent of UUA Being Treated	Mechanical & Slash Burning Acres Treated	Mechanical & Slash Burning Percent of UUA Being Treated	Prescribed Fire Mixed Burn Severities Acres (60% Treated)	Prescribed Fire Mixed Burn Severities Percent of UUA Treated	All Treatments Combined Percent of UUA Being Treated
Langdon	18,183	0	79	0%	987	5%	5%	268	1%	1,033	6%	7%
Little Creek	9,529	0	127	1%	1,220	13%	14%	685	7%	894	9%	16%
Marysvale Peak	27,168	0	220	1%	4,977	18%	19%	1,016	4%	4,958	18%	22%
Signal Peak	29,900	0	583	2%	6,318	21%	23%	1,536	5%	6,273	21%	26%
Tibadore	8,074	0	42	1%	1,119	14%	15%	56	1%	1,143	14%	15%
All IRAs Combined	92,854	0	1,051	1%	14,620	16%	17%	3,561	4%	14,301	15%	19%

Table 28: Monroe Mountain Aspen Ecosystems Restoration Project – Draft UUA Analysis (Cont.)

		Alt. 1	Alternative 4					Alternative 5				
Draft Unroaded/Undeveloped Area (UUA)	Total Draft UUA Acres	Acres Being Treated	Mechanical & Slash Burning Acres Being Treated	Mechanical & Slash Burning Percent of UUA Being Treated	Prescribed Fire Mixed Burn Severities Acres (60% Treated)	Prescribed Fire Mixed Burn Severities Percent of UUA Treated	All Treatments Combined Percent of UUA Being Treated	Mechanical & Slash Burning Acres Treated	Mechanical & Slash Burning Percent of UUA Being Treated	Prescribed Fire Mixed Burn Severities Acres (60% Treated)	Prescribed Fire Mixed Burn Severities Percent of UUA Treated	All Treatments Combined Percent of UUA Being Treated
Langdon	18,183	0	363	2%	1,033	6%	8%	513	3%	725	4%	7%
Little Creek	9,529	0	1,033	11%	685	7%	18%	669	7%	894	9%	16%
Marysvale Peak	27,168	0	1,918	7%	4,623	17%	24%	1,621	6%	4,251	16%	22%
Signal Peak	29,900	0	3,283	11%	5,504	18%	29%	2,426	8%	5,318	18%	26%
Tibadore	8,074	0	56	1%	1,143	14%	15%	285	4%	972	12%	16%
All IRAs Combined	92,854	0	6,654	7%	12,989	14%	21%	5,514	6%	12,161	13%	19%

Table 29: Draft UUA Acreage of Mechanical and slash burning, and Prescribed Fire in Alternative 2 by Vegetation Type

Alternative 2 - Mechanical & Slash Burning		
Draft UUA	**Vegetation**	**Acres**
Langdon Mountain	Mixed Conifer	2
	Seral Aspen	77
Langdon Mountain Total		**79**
Little Creek	Seral Aspen	70
	Stable Aspen	57
Little Creek Total		**127**
Marysvale Peak	Seral Aspen	144
	Spruce-Fir	53
	Stable Aspen	23
Marysvale Peak Total		**220**
Signal Peak	Mixed Conifer	1
	Seral Aspen	246
	Spruce-Fir	181
	Stable Aspen	154
Signal Peak Total		**583**
Tibadore	Mixed Conifer	5
	Seral Aspen	37
Tibadore Total		**42**
GRAND TOTAL		**1,051**

Alternative 2 - Prescribed Fire Mixed Burn Severities		
Draft UUA	**Vegetation**	**Acres**
Langdon Mountain	Mixed Conifer	381
	Seral Aspen	547
	Spruce-Fir	23
	Stable Aspen	36
Langdon Mountain Total		**987**
Little Creek	Seral Aspen	771
	Spruce-Fir	2
	Stable Aspen	447
Little Creek Total		**1,220**
Marysvale Peak	Mixed Conifer	433
	Seral Aspen	2,747
	Spruce-Fir	573
	Stable Aspen	1,224
Marysvale Peak Total		**4,977**
Signal Peak	Mixed Conifer	1,273
	Seral Aspen	2,571
	Spruce-Fir	913
	Stable Aspen	1,561
Signal Peak Total		**6,318**
Tibadore	Mixed Conifer	220
	Seral Aspen	826
	Spruce-Fir	23
	Stable Aspen	49
Tibadore Total		**1,118**
GRAND TOTAL		**14,620**

Table 30: Draft UUA Acreage of Mechanical and slash burning, and Prescribed Fire in Alternative 3 by Vegetation Type

Alternative 3 - Mechanical & Slash Burning		
Draft UUA	**Vegetation**	**Acres**
Langdon Mountain	Seral Aspen	268
Langdon Mountain Total		**268**
Little Creek	Seral Aspen	554
	Spruce-Fir	2
	Stable Aspen	128
Little Creek Total		**685**
Marysvale Peak	Seral Aspen	749
	Spruce-Fir	187
	Stable Aspen	79
Marysvale Peak Total		**1,016**
Signal Peak	Mixed Conifer	1
	Seral Aspen	760
	Spruce-Fir	576
	Stable Aspen	199
Signal Peak Total		**1,536**
Tibadore	Seral Aspen	51
	Stable Aspen	6
Tibadore Total		**56**
GRAND TOTAL		**3,561**

Alternative 3 - Prescribed Fire Mixed Burn Severities		
Draft UUA	**Vegetation**	**Acres**
Langdon Mountain	Mixed Conifer	382
	Seral Aspen	592
	Spruce-Fir	23
	Stable Aspen	36
Langdon Mountain Total		**1,033**
Little Creek	Seral Aspen	489
	Spruce-Fir	1
	Stable Aspen	404
Little Creek Total		**894**
Marysvale Peak	Mixed Conifer	433
	Seral Aspen	2,748
	Spruce-Fir	549
	Stable Aspen	1,228
Marysvale Peak Total		**4,958**
Signal Peak	Mixed Conifer	1,273
	Seral Aspen	2,523
	Spruce-Fir	846
	Stable Aspen	1,631
Signal Peak Total		**6,273**
Tibadore	Mixed Conifer	222
	Seral Aspen	849
	Spruce-Fir	23
	Stable Aspen	49
Tibadore Total		**1,143**
GRAND TOTAL		**14,301**

Table 31: Draft UUA Acreage of Mechanical and slash burning, and Prescribed Fire in Alternative 4 by Vegetation Type

Alternative 4 - Mechanical & Slash Burning		
Draft UUA	**Vegetation**	**Acres**
Langdon Mountain	Seral Aspen	363
Langdon Mountain Total		**363**
Little Creek	Seral Aspen	781
	Spruce-Fir	2
	Stable Aspen	250
Little Creek Total		**1,033**
Marysvale Peak	Seral Aspen	1,278
	Spruce-Fir	507
	Stable Aspen	134
Marysvale Peak Total		**1,918**
Signal Peak	Mixed Conifer	11
	Seral Aspen	1,644
	Spruce-Fir	984
	Stable Aspen	643
Signal Peak Total		**3,283**
Tibadore	Seral Aspen	51
	Stable Aspen	6
Tibadore Total		**56**
GRAND TOTAL		**6,654**

Alternative 4 - Prescribed Fire Mixed Burn Severities		
Draft UUA	**Vegetation**	**Acres**
Langdon Mountain	Mixed Conifer	382
	Seral Aspen	592
	Spruce-Fir	23
	Stable Aspen	36
Langdon Mountain Total		**1,033**
Little Creek	Seral Aspen	353
	Spruce-Fir	1
	Stable Aspen	331
Little Creek Total		**685**
Marysvale Peak	Mixed Conifer	432
	Seral Aspen	2,589
	Spruce-Fir	400
	Stable Aspen	1,202
Marysvale Peak Total		**4,623**
Signal Peak	Mixed Conifer	1,267
	Seral Aspen	2,178
	Spruce-Fir	663
	Stable Aspen	1,396
Signal Peak Total		**5,504**
Tibadore	Mixed Conifer	223
	Seral Aspen	849
	Spruce-Fir	23
	Stable Aspen	49
Tibadore Total		**1,144**
GRAND TOTAL		**12,989**

Table 32: Draft UUA Acreage of Mechanical and slash burning, and Prescribed Fire in Alternative 5 by Vegetation Type

Alternative 5 - Mechanical & Slash Burning		
Draft UUA	**Vegetation**	**Acres**
Langdon Mountain	Seral Aspen	474
	Stable Aspen	39
Langdon Mountain Total		**513**
Little Creek	Seral Aspen	539
	Spruce-Fir	2
	Stable Aspen	128
Little Creek Total		**669**
Marysvale Peak	Seral Aspen	933
	Spruce-Fir	407
	Stable Aspen	281
Marysvale Peak Total		**1,621**
Signal Peak	Mixed Conifer	1
	Seral Aspen	1,252
	Spruce-Fir	596
	Stable Aspen	577
Signal Peak Total		**2,426**
Tibadore	Seral Aspen	279
	Stable Aspen	7
Tibadore Total		**285**
GRAND TOTAL		**5,514**

Alternative 5 - Prescribed Fire Mixed Burn Severities		
Draft UUA	**Vegetation**	**Acres**
Langdon Mountain	Mixed Conifer	382
	Seral Aspen	308
	Spruce-Fir	23
	Stable Aspen	13
Langdon Mountain Total		**725**
Little Creek	Seral Aspen	489
	Spruce-Fir	1
	Stable Aspen	404
Little Creek Total		**894**
Marysvale Peak	Mixed Conifer	433
	Seral Aspen	2,336
	Spruce-Fir	406
	Stable Aspen	1,076
Marysvale Peak Total		**4,251**
Signal Peak	Mixed Conifer	1,273
	Seral Aspen	1,979
	Spruce-Fir	702
	Stable Aspen	1,364
Signal Peak Total		**5,318**
Tibadore	Mixed Conifer	222
	Seral Aspen	682
	Spruce-Fir	23
	Stable Aspen	45
Tibadore Total		**972**
GRAND TOTAL		**12,161**

Draft Unroaded/Undeveloped Area Wilderness Characteristics and Potential Effects by Alternative

Table 33: Langdon Draft UUA - Effects to Wilderness Quality or Attributes for all Alternatives

Langdon UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire will take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	79 acres (0%) of mechanical and slash burning and 987 acres (5%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time; typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have little effect on these wilderness attributes.	168 acres (1%) of mechanical and slash burning and 1,033 acres (6%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time; typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have little effect on these wilderness attributes.	363 acres (2%) of mechanical and slash burning and 1,033 acres (6%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time; typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have little effect on these wilderness attributes.	513 acres (3%) of mechanical and slash burning and 725 acres (4%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time; typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have little effect on these wilderness attributes.

Langdon UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation *– This quality monitors conditions that affect the opportunities for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features - *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the draft UUA.				
Manageability (as Wilderness) *- A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be a little effect for 3 to 5 years.			

Table 34: Langdon Draft UUA - Effects to Roadless Characteristics for all Alternatives

Langdon UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are no developed drinking water systems.				
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

Langdon UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons, rock cliffs and open areas. As evidenced through the developments surrounding and within the project area there is little to no unique reference landscape potential.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Langdon UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the draft UUA.				

Table 35: Little Creek Draft UUA - Effects to Wilderness Quality or Attributes for all Alternatives

Little Creek UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire will take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	127 acres (1%) of mechanical and slash burning and 1,220 acres (13%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	685 acres (7%) of mechanical and slash burning and 894 acres (9%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	1,033 acres (11%) of mechanical and slash burning and 685 acres (7%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	669 acres (7%) of mechanical and slash burning and 894 acres (9%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.

Little Creek UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation - *This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features - *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the draft UUA.				
Manageability (as Wilderness) - *A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be a little affect for 3 to 5 years.			

Table 36: Little Creek Draft UUA - Effects to Roadless Characteristics for all Alternatives

Little Creek UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are no developed drinking water systems.				
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

Little Creek UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and open areas. As evidenced through the developments surrounding and within the project area there is little unique reference landscape potential.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Little Creek UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the draft UUA.				

Table 37: Marysvale Peak Draft UUA-Effects to Wilderness Quality or Attributes for all Alternatives

Marysvale Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire will take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	220 acres (1%) of mechanical and slash burning and 4,977 acres (18%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	1,016 acres (4%) of mechanical and slash burning and 1,958 acres (18%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	1,918 acres (7%) of mechanical and slash burning and 4,623 acres (17%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	1,621 acres (6%) of mechanical and slash burning and 4,251 acres (16%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.

Marysvale Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation - *This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features - *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the draft UUA.				
Manageability (as Wilderness) - *A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be affected for 3 to 5 years.			

Table 38: Marysvale Peak Draft UUA - Effects to Roadless Characteristics for all Alternatives

Marysvale Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are no developed drinking water systems.				
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

Marysvale Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and rock outcrops. As evidenced through the developments surrounding and within the project area the unique reference landscape potential is possible, yet not likely.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Marysvale Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the draft UUA.				

Table 39: Signal Peak Draft UUA - Effects to Wilderness Quality or Attributes for all Alternatives

Signal Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire would take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	583 acres (2%) of mechanical and slash burning and 6,318 acres (21%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	1,536 acres (5%) of mechanical and slash burning and 6,273 acres (21%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	3,283 acres (11%) of mechanical and slash burning and 5,504 acres (18%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	2,426 acres (8%) of mechanical and slash burning and 5,318 acres (18%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.

Signal Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation - *This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features - *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the draft UUA.				
Manageability (as Wilderness) - *A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be affected for 3 to 5 years.			

Table 40: Signal Peak Draft UUA - Effects to Roadless Characteristics for all Alternatives

Signal Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	Municipal watersheds occur within the project area. No change would take place.	Municipal watersheds do occur within the project area. Buffers would be in place to protect public drinking water systems.			
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

Signal Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and rock outcrops. As evidenced through the developments surrounding and within the project area the unique reference landscape potential is possible, yet not likely.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Signal Peak UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the draft UUA.				

Table 41: Tibadore Draft UUA - Effects to Wilderness Quality or Attributes for all Alternatives

Tibadore UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Untrammeled *This quality monitors modern human activities that directly control or manipulate the components or processes of ecological systems; it is essentially unhindered and free from modern human control or manipulation.* ***Natural -*** *This quality monitors both intended and unintended effects of modern people on ecological systems; they are substantially free from the effects of modern civilization.* ***Undeveloped -*** *This quality monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation.*	0 acres of mechanical and prescribed fire would take place. Fuel loadings would continue to increase with a greater likelihood of large uncharacteristic fire and damage to private land. Conifer encroachment in aspen would continue and canopy closures in conifers would continue to increase. Recreation activities, range administration, dam, water source, and waterline maintenance would continue. No action would not trend toward the desired condition, yet this would still have little effect on these wilderness attributes.	42 acres (1%) of mechanical and slash burning and 1,119 acres (14%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	56 acres (1%) of mechanical and slash burning and 1,143 acres (14%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	56 acres (1%) of mechanical and slash burning and 1,143 acres (14%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.	285 acres (4%) of mechanical and slash burning and 972 acres (12%) of prescribed fire with mixed burn severities. Stumps would remain in the mechanically treated areas. Fire would be noticeable after implementation and would fade over time, typically three to five years for vegetation to regenerate. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used to accomplish mechanical treatments. Due to the relatively small percentage of the area being treated, increased regeneration and the methods being used; the proposed actions would have a minor short term effect on these wilderness attributes.

Tibadore UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Outstanding opportunities for solitude or a primitive and unconfined type of recreation *- This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation; including the values of inspiration and physical and mental challenge.*	Solitude would not be affected and the Recreation Opportunity Spectrum (ROS) designations would not change.	Solitude would only be affected during the implementation of the project and the Recreation Opportunity Spectrum (ROS) designations would not change.			
Special Features *(Ecological, Geologic, Scientific, Educational, Scenic or Historical Values)*	No significant special features would be directly or indirectly affected because there are not any in the draft UUA.				
Manageability (as Wilderness) *- A measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements above.*	There wound not be any change to the boundary, shape, size, location, or access.	The proposed actions of mechanical treatment and prescribed fire would not change the boundary, shape, size, location, or access. The above elements would only be affected for 3 to 5 years.			

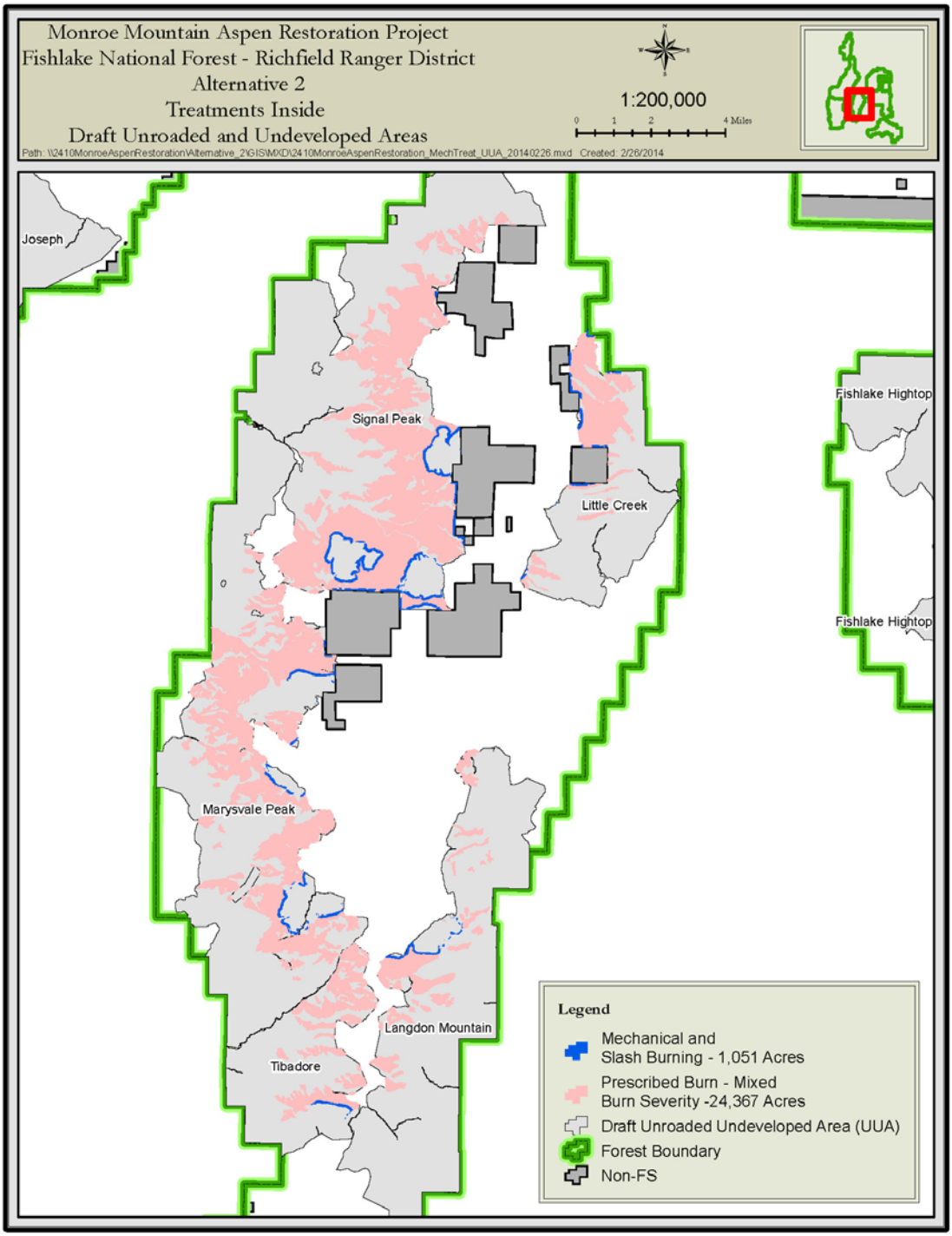
Table 42: Tibadore Draft UUA - Effects to Roadless Characteristics for all Alternatives

Tibidore UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil, water and Air resources - *Identify any unique or critical watershed or airshed resource and the habitats that depend on them.*	No impacts to threatened, endangered, sensitive, or MIS plant resources and animal species. See specialist reports.	Mechanical treatments would disturb soils and remove vegetation while prescribed fire would impart a charred appearance on the land. See aquatic, wildlife, and botany specialist reports. Actions will be consistent with the Clean Air Act.			
Sources of public drinking water - *Identify any public drinking water systems or sources within the project area.*	There are no developed drinking water systems.				
Diversity of plant and animal communities - *Discuss the diversity of plant and animal communities. Identify any unique plant and animal communities within the area.*	No change.	The mechanical and prescribed burn treatments would create areas of early seral plant species that would increase plant size, age, and species diversity thereby improving animal diversity as well. Refer to the wildlife, aquatics, and botany speciaist reports to see effects to plant and animal communities on the landscape scale.			
Habitat for TES and species dependent on large undisturbed areas of land - *Identify any TES or sensitive species within the Roadless area.*	No change.	Implementation of the mechanical and prescribed burn portions of the proposed action would be completed in a mosaic burn pattern creating a patchwork of burned and unburned areas. These areas would contain early seral plant species improving plant size, age, and species diversity important to maintaining a properly functioning ecosystem. See specialist reports.			

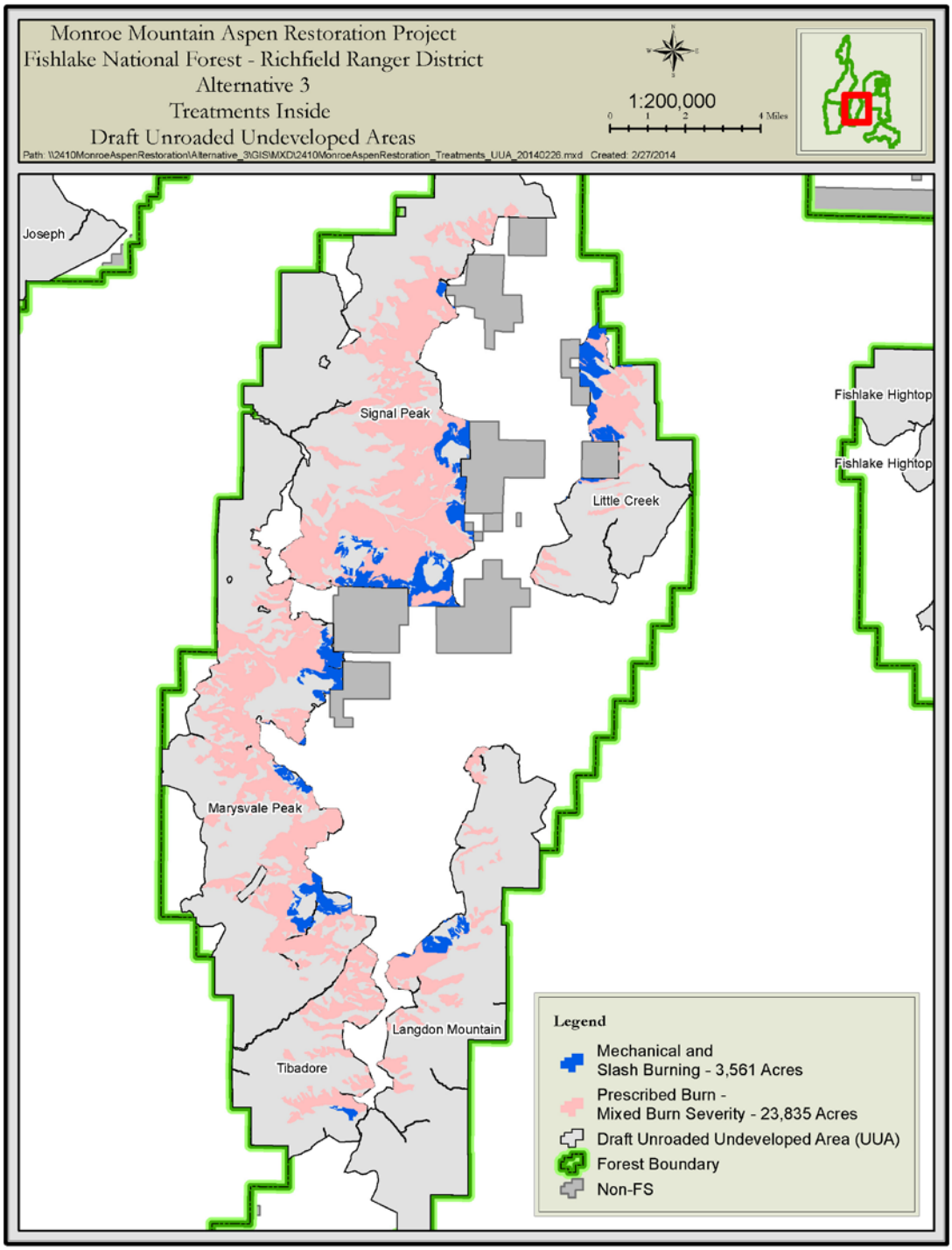
Tibidore UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Primitive and semi-primitive classes of recreation - *Describe current recreation opportunities for primitive and semi-primitive classes of recreation within the Roadless area.*	No effect on semi-primitive classes of recreation.	Mechanical treatments and prescribed burning would temporarily detract from semi-primitive classes of recreation. Subsequent vegetation regeneration would eliminate this in three to five years.			
Reference landscapes for research study or interpretation - *Describe the landscape that is present. Describe any unique reference landscapes that exist within the Roadless area.*	The landscape is steeply rolling with canyons and open areas. As evidenced through the developments surrounding and within the project area there is little unique reference landscape potential.				
Landscape character and integrity - *Describe the current scenic quality and character of the area.*	Scenic values would not be changed.	The areas treated through mechanical and prescribed burning would temporarily detract from scenic values of the area. Vegetation regeneration and growth would eliminate these effects in three to five years.			
Traditional cultural properties and sacred sites - *Identify generically any significant cultural resources within the Roadless area.*	No change.	The mitigation measure of avoiding cultural resources would be employed during project implementation, which would prevent adverse effects to heritage resources eligible to the National Register of Historic Places, as described in the Heritage Resources Report. No concerns were raised by local tribes.			

Tibidore UUA	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Other locally unique characteristics - *Identify any locally unique characteristics.*	No locally unique characteristics would be directly or indirectly affected because there are not any in the draft UUA.				

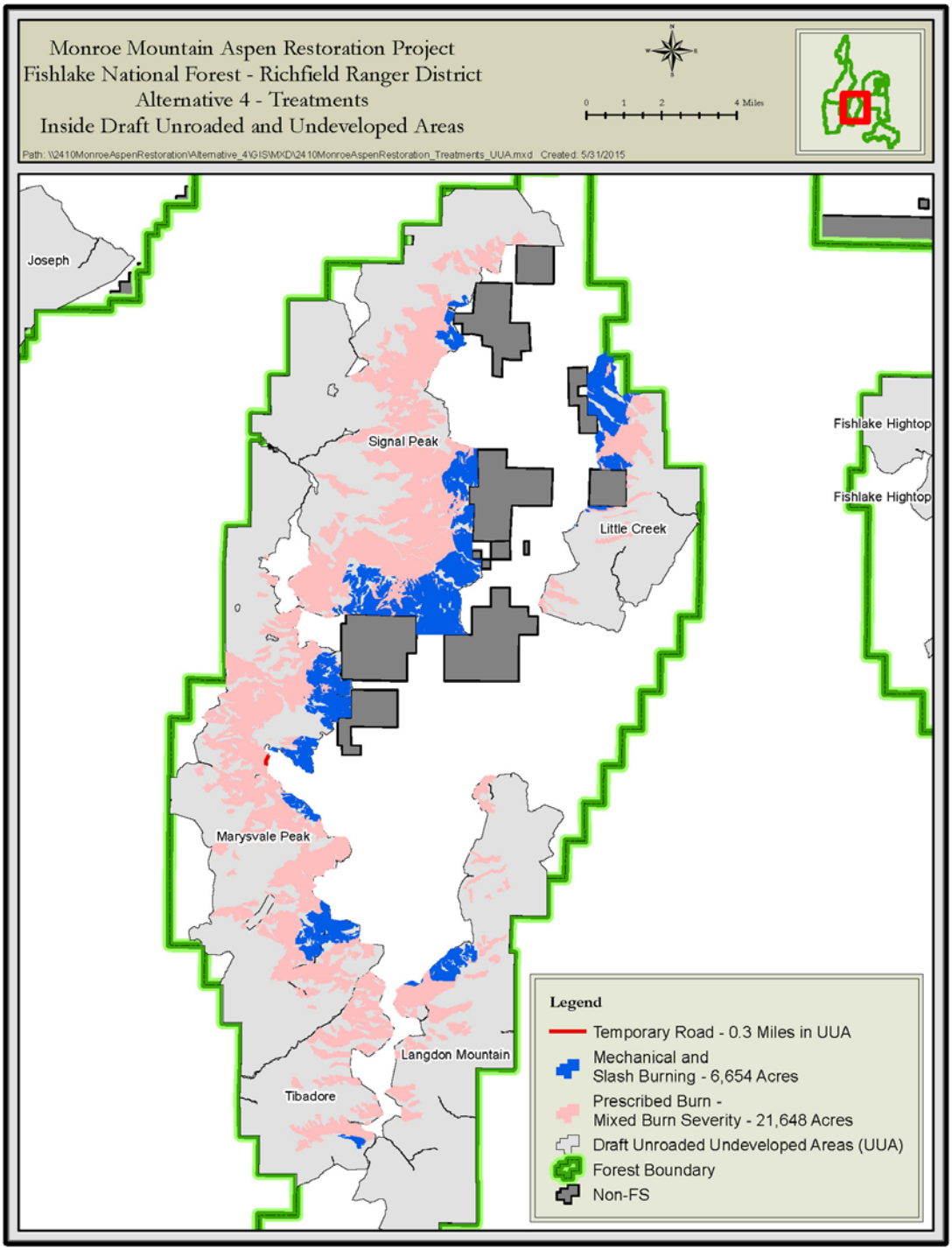
Map 7: Alternative 2 Treatments inside draft Unroaded/Undeveloped Areas



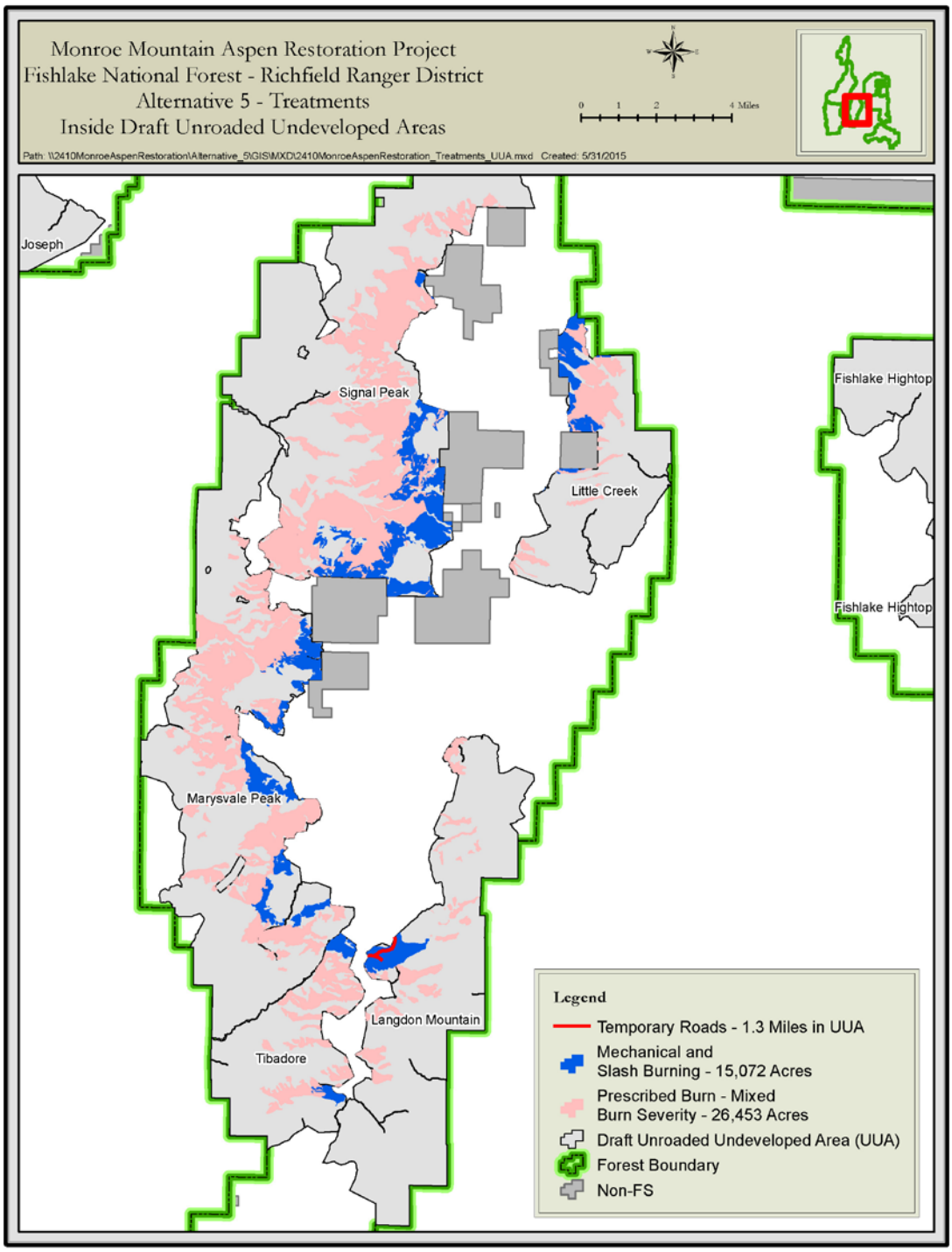
Map 8: Alternative 3 Treatments inside draft Unroaded/Undeveloped Areas



Map 9: Alternative 4 Treatments inside draft Unroaded/Undeveloped Areas



Map 10: Alternative 5 Treatments inside draft Unroaded/Undeveloped Areas



Cumulative Effects for All Alternatives

Past, present and reasonable foreseeable actions on the Monroe Mountain were reviewed to determine the cumulative effects to Inventoried Roadless Areas and draft Undeveloped/Unroaded Areas. (Refer to Tables 3, 4, 5, 6, 7, and 8 in this report.) Impacts to IRAs and draft UUAs from their geographic location, human activities, and from forest management activities that exist on the ground contribute to the current moderate to low ratings for wilderness qualities or attributes and roadless characteristics. Reasonably foreseeable actions would not permanently lower the wilderness attributes and roadless characteristics.

Desired Condition

The desired condition for Inventoried Roadless Areas and draft Unroaded/Undeveloped Areas is to “make practicable their preservation and use in an unimpaired condition” (Intermountain Region Planning Desk Guide; USFS 2004a). The action alternatives 2-5 would temporarily affect the wilderness qualities or attributes and roadless characteristics. Over time they would stay the same or even improve as aspen ecosystems are improved.

Conclusions

The five Inventoried Roadless Areas (IRAs) located in the project area presently average low to moderate ratings for the six wilderness qualities or attributes. The southern portion of the Signal Peak IRA is the best area that seems to hold the potential for manageability as a wilderness area. Alternatives 2-5 would leave stumps mostly flush with the ground and a burned appearance. No roads would be constructed, no clear cuts, control lines feathered and reclaimed, sensitive areas would be avoided and timing restrictions imposed as proposed. The proposed actions would only temporarily reduce the qualities or attributes and characteristics until the vegetation grows and improves over a period of about three to five years. Stumps and burned vegetation may be noticeable for a longer time period. Alternatives 2-5 (including mechanical options 1 & 2) would take place without permanently lowering the wilderness qualities or attributes and roadless characteristics; therefore, the existing wilderness eligibility would not change.

Effects to the draft Unroaded/Undeveloped Areas (UUAs) would be the same as for the IRAs with the exception of temporary roads in Alternatives 4 and 5 being constructed. These roads would be reclaimed after use and would only temporarily reduce the wilderness qualities or attributes and roadless characteristics; therefore, the existing wilderness eligibility would not change.

After this analysis was completed, an additional Northern goshawk nest with its associated territory (NA and PFA) was found in the Indian Peak area which is within the Signal Peak IRA. Approximately 310 acres of the NA and PFA overlap this aspen project. If these 310 acres were not treated, the reduction of treatments in the Signal Peak IRA would not change the existing wilderness eligibility. In addition, these 310 acres are not located in the Signal Peak draft UUA.

Table 43: Mechanical Treatment Acres in IRAs and Draft UUAs by Alternative.

	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Total IRA Only Acres	0	582	2,086	3,719	2,107
Total Draft UUA Only Acres	0	125	516	1,111	763
Total Overlap of Both IRA and Draft UUA Acres	0	926	3,045	5,543	4,751
Total Combined IRA and Draft UUA Acres	**0**	**1,633**	**5,647**	**10,373**	**7,621**

The implementation of best management practices such as no new road construction in IRA and little road construction in draft UUA, reclaiming control lines, reclaiming the temporary roads in draft UUA, and cutting stumps mostly flush with the ground would manage the IRAs and draft UUAs in a way that would not permanently lower and may over time enhance the wilderness attributes and roadless characteristics from their present condition.

Compliance with the Forest Plan and Other Regulatory Direction

The Fishlake National Forest Land and Resource Management Plan (UDSA 1986) does not provide desired conditions, goals, or standards and guidelines to specifically address or maintain roadless character.

As described in chapter 1 of the EIS, the desired conditions and the purpose and need for this project are consistent with the Forest's goals, the objectives found in chapter IV of the LRMP, and the Utah Fire Amendment (USFS 2001). The District has also compared the action alternatives with the general direction and the standards and guidelines listed in the LRMP to determine compliance, and found that the action alternatives are compliant with the LRMP. This review, along with supporting rationale is found in the project record.

The District did a 2001 Roadless Area Conservation Rule (RACR) consistency review to determine compliance. The District determined this project complies with §294.13(b)(1)(i) and (ii), and (2) of the 2001 Roadless Rule. The review and supporting rationale is found in the project record. The Intermountain Region also concurred that this project complies with the 2001 RACR (USDA 2014).

Literature Cited

National Forest Management Act of 1976 (NFMA)

USDA Forest Service, 1983, Appendix C, NFMA analysis of roadless areas used for Fishlake NF Land Resource Management Plan.

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USDA Forest Service, 2004, Intermountain Region Planning Desk Guide: A Protocol for Identifying and Evaluating Areas for Potential Wilderness

USDA Forest Service, 2007, Forest Service Handbook 1909.12 Chapter 70

USDA Forest Service, 2004, Fishlake National Forest, Draft Undeveloped Area Evaluation

USDA, Forest Service, 1979, Fishlake National Forest, RARE II Evaluation of Roadless Areas, 36 CFR 294

USDA, Forest Service, 2014, Intermountain Region, Concurrence for Roadless Project Review

Appendix L – Monroe Mountain Aspen Ecosystems Restoration Project Rangeland Resources Specialist Report (Partridge 2015)

Prepared by:

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For:

Richfield Ranger District
Fishlake National Forest

June 16, 2015

Executive Summary

This Monroe Mountain Aspen Ecosystems Restoration Project focuses on restoring aspen on Monroe Mountain with mechanical and prescribed fire treatments in the aspen, mixed conifer, and spruce-fir cover types. Aspen is a keystone species and historically was a landscape dominant on Monroe Mountain. Aspen historically occurred on approximately 71,000 acres of Monroe Mountain. Aspen-dominated cover currently occurs on approximately 17,009 acres. This report considers the effects of five alternatives on the rangeland resources of Monroe Mountain.

Vegetation treatments on the Forest are usually positive for rangeland resources as old decadent vegetation is removed and young tender vegetation is allowed to replace it. This change in the vegetation community usually starts off with a decrease in vegetation as the treatment occurs. Then as the treated area recovers there is an increase in vegetation. This increased vegetation provides better forage conditions for grazing animals.

Monroe Mountain has approximately 175,705 acres of National Forest System (NFS) lands and the treatments proposed for restoring the aspen range from approximately 41,000 to 47,000 acres. This represents about 23 - 26% of the NFS acres on Monroe Mountain. When the proposed treatments are added to the past, present and reasonably foreseeable future projects listed in Appendix A the amount of NFS acres treated on Monroe Mountain would be between 51 - 54%.

Alternative 1, the No Action Alternative would result in continued decline of the aspen ecosystems and movement away from desired conditions. If the No Action Alternative is chosen the desired conditions would not be achieved in the foreseeable future and aspen ecosystems may be irretrievably lost due to the delay in achieving desired conditions. With many demands for forage in the West, including elk, deer, and permitted livestock grazing the decision to take No Action and face losing such prolific producers of forage as aspen are capable of should not be acceptable.

Based upon my findings, I conclude Alternatives 2 through 5 would move aspen ecosystem conditions closer to desired conditions. Though the difference in effects may be minor, Alternative 4 would be the best alternative for rangeland resources on Monroe Mountain because more acres would be treated. This alternative has the potential to produce the biggest increase in forage resources for grazing animals. It includes the most mechanical treatment which makes it possible to selectively decide which vegetation to remove.

Introduction

This report looks at the effects of the proposed Monroe Mountain Aspen Ecosystems Restoration Project on the rangelands on Monroe Mountain. This project is subject to the goals, objectives, standards, and guidelines found in the Fishlake National Forest Land and Resource Management Plan.

The rangelands on Monroe Mountain provide valuable forage and habitat for the permitted livestock and wildlife species which use Monroe Mountain. The Forest Service manages the forage, habitat, and permitted livestock grazing in the project area while the State of Utah Division of Wildlife Resources manages the wildlife populations.

Through ecological succession the number of acres aspen historically dominated on Monroe Mountain has been reduced. This project is designed to restore the aspen ecosystems on Monroe Mountain.

Regulatory Framework

The Fishlake National Forest Land and Resource Management Plan (LRMP) sets forth in detail the direction for managing the land and resources of the forest. The desired conditions for the project are based on the objectives, goals, standards, and guidelines outlined in the LRMP. This analysis tiers to the Forest's Final EIS and LRMP (USFS 1986), as encouraged by 40 CFR 1502.20. Best available science was used to develop desired conditions that are consistent with the LRMP.

The desired conditions described below, the purpose and need for this project, and the action alternatives are consistent with the Forest's goals, the objectives found in Chapter IV of the LRMP, and the Utah Fire Amendment (USFS 2001). Review of the LRMP guidance was completed by the Interdisciplinary Team (ID team) of specialists working on this project.

The proposed treatment units are within management areas 2B – Rural and Roaded Natural Recreation; 4A – Fish Habitat Improvement; 4B – Habitat for Management Indicator Species; 5A – Big Game Winter Range - Non-forested; 6B – Intensive Livestock Management; 7B – Wood-Fiber Production - Genetics; and 9F – Improved Watershed. Relevant goals and objectives are listed below:

1. Ecosystems are restored and maintained, consistent with land uses and historic fire regimes, through wildland fire use and prescribed fire (Utah Fire Amendment, pg. A-40).
2. Manage forest cover types to provide variety in stand sizes shape, crown closure, edge contrast, age structure and interspersion (LRMP p. IV-99).
3. Prescribed fire is authorized forest-wide (Utah Fire Amendment, pg. A-41).
4. Use prescribed fire to reduce fuel buildup and meet resource objectives (LRMP p. IV-5).

5. Reduce hazardous fuels; the full range of reduction methods is authorized, consistent with forest and MA emphasis and direction (Utah Fire Amendment, pg. A-41).
6. Identify and improve habitat for sensitive, threatened, and endangered species including participation in recovery efforts for both plants and animals (LRMP IV-4).
7. Improve or maintain the quality of habitat on big game winter ranges (LRMP IV-4).
8. Maintain structural diversity of vegetation on management areas dominated by forested ecosystems (LRMP IV-11).
9. Manage aspen for retention where needed for wildlife, watershed, or esthetic purposes (LRMP IV-11).
10. Manage seral aspen stands for a diversity of age classes (LRMP IV-11).
11. Manage aspen to perpetuate the species and improve quality (LRMP IV-4).
12. Provide wood fiber while maintaining or improving other resource values LRMP IV-4).
13. Improve timber age class distribution and maintain species diversity (LRMP IV-4).
14. Manage tree stands using both commercial and noncommercial methods. Enhance visual quality, diversity, and insect and disease control (LRMP IV-62 and IV-84d).
15. Maintain and manage forested inclusions to provide a high level of forage production, wildlife habitat, and diversity (LRMP IV-112).
16. The area would have a mosaic of fully stocked stands that follow natural patterns and avoid straight lines and geometric shapes (LRMP IV-113).
17. Prevent and control insect infestation and disease (LRMP IV-5)

Table 1 displays the management areas located within the project area, LRMP emphasis, and the relationship between the management area total acreage to the project.

Table 1: Fishlake National Forest Land and Resource Management Plan (LRMP) Management Areas (MAs) within the project area

LRMP MA	Description	Forest Plan Emphasis	Forest-wide MA Acres	Maximum MA Acres Proposed	Maximum Percentage of MA Treated
MA 2B	Rural and Roaded Natural	Emphasis is for rural and roaded-natural recreation opportunities.	27,855	4	0.0001%
MA 4A	Fish Habitat Improvement	Emphasis is on fish habitat improvement where aquatic habitat is	2,474	171	0.07%
MA 4B	Habitat for Management Indicator	Management emphasis is on the habitat needs of one or more	354,732	26,546	0.07%

LRMP MA	Description	Forest Plan Emphasis	Forest-wide MA Acres	Maximum MA Acres Proposed	Maximum Percentage of MA Treated
MA 5A	Big Game Winter Range – Non-Forested	Treatments are applied to increase forage production of grass, forb, and browse species or to alter plant species composition for	66,720	475	0.007%
MA 6B	Intensive Livestock Management	Range resource management level D (intensive	658,704	4,849	0.007%
MA 7B	Wood Fiber Products – Thru Genetics	Manage wood-fiber production and utilization of large roundwood of a size and quality suitable	6,061	2,610	43%
MA 9F	Improved Watershed	Improving watershed condition to eliminate the watershed improvement backlog, and maintaining projects already	135,842	1,646	0.01%

Resource Issues and Purpose and Need

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions described below. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire primarily because of an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. Restoring aspen communities on Monroe Mountain will result in multiple benefits, which include but are not limited to:

- Improving the quality of habitat and forage for wildlife species dependent upon aspen ecosystems (i.e. black-tailed deer (*Odocoileus hemionus*), Rocky Mountain elk (*Cervus elaphus*), and Northern goshawk (*Accipiter gentilis*)).
- Improving the quality of habitat and forage for domestic ungulates (i.e. livestock)
- Improving native species diversity.
- Reducing hazardous fuel accumulations.
- Reducing the risk for large scale, intense wildland fires. This results in lower risk to the safety of the public and firefighters. This also results in lower risk to sensitive wildlife species (i.e. Northern goshawk, Flammulated owl (*Psiloscops flammeolus*), Western boreal toad *(Bufo boreas*), and Bonneville cutthroat trout (*Oncorhynchus clarki utah*)).
- Increasing the probability that future naturally caused fires can be managed (if possible, not suppressed) and allowed to play the greatest feasible natural role on the aspen ecosystems on Monroe Mountain.

There were two issues effecting rangeland resources identified during project scoping. **Issue 5** – Browsing by domestic and wild ungulates on new aspen sprouts post-treatment and/or the continued high levels of aspen browsing in the stable aspen areas may result in complete loss of aspen stands; **Issue 6** – Project activities may result in livestock permittees not having a place to graze their livestock while vegetation is reestablishing on Monroe Mountain (2 or more growing seasons).

Methodology for Analysis

This analysis will examine the current vegetation condition and the desired vegetation condition on Monroe Mountain. It will identify the gap between the two conditions and will analyze the proposed alternatives and the design features of the alternatives to determine the effects that each alternative would have on the rangeland resources on Monroe Mountain.

The analysis will discuss the acres to be treated by alternative and includes a simple analysis on the value of forage for livestock grazing.

The environmental indicators to be measured are:

1. The number of acres to be treated or disturbed by alternative.
2. The percentage of the historical aspen ecosystem acres on Monroe Mountain to be treated.
3. The percentage of National Forest System (NFS) Land on Monroe Mountain to be treated.
4. An estimated cost per Animal Unit Month (AUM).

There are slight differences in the number of acres to be treated in the alternatives. The percentage of the historical aspen ecosystem acres to be treated by each alternative gives a reference of how much of the historical aspen will be treated. The percentage of NFS lands on Monroe Mountain to be treated provides a big picture view of just how much of Monroe Mountain will be treated by the project for cumulative effects purposes.

The estimated cost per AUM measure provides an insight of the impact to the permittees from resting treated areas.

Timeframes and Spatial Boundaries

The expected timeframe to fully implement this project is 10 years minimum. This project will occur entirely on Monroe Mountain. The priority is to treat the southern part of Monroe Mountain first then move to the northern part of the mountain and conclude with the middle part of the mountain (See Sequencing Map in EIS).

Mechanical treatments would be done before prescribed burn treatments are done. Mechanical treatments are proposed in areas adjacent to private lands, and within/adjacent to Northern goshawk, boreal toad, and Bonneville cutthroat trout habitat. These aspen, spruce/fir, and mixed conifer areas would be treated first within each

sequence area (areas 1, 2, and 3). Implementing these mechanical treatments first would help reduce the risk of impacts from prescribed fire to private property, Northern goshawk, boreal toad, and Bonneville cutthroat trout.

Treatments would target upland non-riparian areas first. No more than 15% of the upland areas within a Hydrologic Unit Code (HUC) 6 would be treated in any one year. After the upland areas have been treated (15%) and have recovered [comparable] watershed function and aspen restocking (1,000 aspen saplings per acre) is achieved, additional upland areas (15%) in the same HUC 6 could occur.

When the upland areas that have been treated in a given HUC 6, recover [comparable] watershed function and aspen restocking (1,000 aspen saplings per acre), the aspen/conifer in riparian areas could be treated. No more than 5-10% of the riparian areas within a HUC 6 would be treated in any one year. After the riparian areas have been treated (5-10%) and have recovered additional riparian areas (5-10%) in the same HUC 6 could occur. Similar design features are also included for four HUC 7s.

Overview of the Proposed Action

The action proposed by the District to meet the purpose and need is to conduct a combination of prescribed fire and/or mechanical thinning treatments in stable and seral aspen stands, and spruce/fir and mixed conifer stands to promote the regeneration and recruitment of aspen communities. Some stands currently dominated by spruce/fir and mixed conifer may have been dominated by aspen at some point in the past. Aspen occurs in varying percentages in spruce/fir, mixed conifer, and seral aspen dominated stands. Treating spruce/fir, mixed conifer, and aspen stands would reduce competition for resources, and encourage aspen to regenerate.

The proposed action is similar for all of the alternatives. The variation within the alternatives are acreages of mechanical thinning verses the acreages of prescribed fire that would be treated and the mileage of temporary roads proposed for each alternative. The treatment options proposed for the project area are: (1) areas would be mechanically thinned with the associated slash piled and burned, and (2) areas would receive prescribed fire treatments.

The maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen, spruce/fir, and mixed conifer is 47,274 acres (Alternative 4). However, the management guidelines for Northern goshawk require leaving 40 percent interlocking crowns in foraging areas. To be compliant with the guidelines, prescribed burning would only occur when 60 percent of the prescribed fire area is expected to burn. This would leave 40 percent of the area with interlocking crowns intact. As for the areas proposed for mechanical treatments, by removing just conifer and/or removing conifer trees up to 8 inch DBH, using group and single tree selection, desiring uneven-aged management, and proposing minimal mechanical treatments in the stable aspen stands, 40 percent of the area with interlocking crowns would also remain intact in the mechanical treatment areas. Therefore, the maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen, spruce/fir, and mixed conifer (assuming

only 60 percent of the prescribed fire treatment areas are burned) is 36,300 acres (Alternative 4). The approximate duration of this project is 10 years; therefore, approximately 18,150 acres would be mechanically treated and/or prescribed burned every 5 years.

There are two mechanical treatment options being considered in this analysis for seral and stable aspen dominated stands.

1. Conifers would be removed and the existing aspen would be retained regardless of the size of the conifer or if it is located within an IRA or draft UUA. To access the conifer, some incidental cutting of aspen may occur. This option would occur throughout the project area.
2. Within IRAs and draft UUAs, conifer would be thinned from below up to 8 inch DBH and the existing aspen would be retained. In all areas outside the IRAs and draft UUAs, conifers would be removed and the existing aspen would be retained regardless of the size of the conifer.

There are also two mechanical treatments options being considered in this analysis for spruce/fir and mixed dominated conifer stands:

1. This option would occur throughout the project area.
    a) If present, beetle killed conifer trees would be removed while ensuring consistency with the LRMP for snags and down woody debris (salvage harvest).
    b) If conifer trees are currently infected by beetles and are in the process of dying, the infected trees would be removed while ensuring consistency with the LRMP for snags and down woody debris (sanitation harvest).
    c) In areas of spruce/fir or mixed conifer where LRMP stocking levels are below plan guidance due to bark beetle impacts, replanting of spruce or mixed conifer may occur. If the remaining live trees are greater than a Basal Area (BA) of 90, the remaining live trees would be thinned using uneven- aged management[1] to a BA of 90 with single and group tree selection.
    d) If no beetle killed or infested trees are present initially, trees would be thinned using uneven aged management to a BA of 90 with single and group tree selection.
2. Within IRAs and draft UUAs, conifer would be thinned from below up to 8 inch DBH. In all areas outside the IRAs and draft UUAs, treatments would occur as in option 1 for spruce/fir and mixed conifer dominated stands.

Prescribed fire would be implemented utilizing aerial and/or hand ignition techniques targeting spruce/fir, mixed conifer, and seral aspen with mosaic burn patterns and mixed burn severities as an objective.

[1] Uneven-aged management – a planning sequence of treatments designed to maintain and regenerate a stand with three or more age classes (Helms 1998). This is opposed to even-aged management that describes a stand as trees composed of a single age class.

Mechanical thinning and prescribed fire treatments are proposed within five Inventoried Roadless Areas (IRAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore) and within five draft Unroaded-Undeveloped Areas (UUAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore). No roads would be constructed within IRAs. Temporary roads would be constructed in treatment areas located outside of the IRAs (for all alternatives) including within draft UUAs (see Alternatives 4 and 5). The mileage for these temporary roads varies depending on the alternative.

The Monroe Mountain Working Group (MMWG) submitted to the Fishlake National Forest a document titled, "Browsing Thresholds and Adaptive Management Pursuant to Aspen Restoration on Monroe Mountain (MMWG 2014)." The MMWG recommended this document for inclusion and analysis in the EIS. The Forest has reviewed this document and is proposing to adopt the browse thresholds and response options recommended by the MMWG. The document in its entirety is incorporated by reference. The UDWR, Southern Region Resource Advisory Committee (RAC) and the Utah Wildlife Board have reviewed and support this document. The following is a summary of the document with a description of the goals, thresholds, monitoring techniques, and response options.

The goals of the, "Browsing Thresholds and Adaptive Management Pursuant to Aspen Restoration on Monroe Mountain," document are three-fold: (1) establish thresholds of maximum percent aspen browse that would be acceptable following mechanical and/or prescribed fire treatments in the seral aspen, spruce/fir, and mixed conifer areas; (2) establish thresholds for the stable aspen areas where passive treatments are proposed; and (3) establish timely response options that would take place if the thresholds are not met. The thresholds and response options are expected to result in adequate recruitment to perpetuate both seral and stable aspen stands in order to move toward the desired conditions described below.

Following mechanical and prescribed fire treatments, healthy aspen roots systems typically are able to sustain vigorous shoot growth for a limited time (2 to 3 years), providing a brief opportunity to modify management if browsing exceeds threshold levels. Areas treated mechanically and/or with prescribed fire would be rested from livestock use for 2 to 3 growing seasons to reduce livestock browse pressure on new aspen sprouts. During this timeframe, if aspen browse thresholds are exceeded, the District would implement one or more of the following responses in order to achieve balanced livestock and wildlife use, and to ensure aspen browse thresholds are not continually being exceeded:

1. If not already being implemented, the District may recommend to the UDWR, RAC and the Utah Wildlife Board a reduction of wild ungulate browsing pressure using antlerless hunts as needed at levels expected to result in sufficient reduction in browse to avoid surpassing browse thresholds. This recommendation is supported by the UDWR, RAC, and the Utah Wildlife Board.
2. The District may coordinate with the UDWR to hire or contract an adequate number of seasonal employees and/or coordinate the use of volunteers (i.e. Dedicated Hunter Program) to spend time in treatment areas hazing wildlife at

levels expected to result in sufficient reduction in browse to avoid surpassing browse thresholds.
3. The District may coordinate with the UDWR to fence treatment areas for 4 to 6 years until the new aspen shoots reach 6 feet height.
4. The District may restrict livestock use longer than 2 to 3 growing seasons until aspen recovery objectives are met.

After livestock are allowed to return to treatment areas, if browse thresholds are exceeded in a treatment area(s) that is grazed by both wild ungulates and livestock, the District would implement one or more of the responses listed above or the responses listed below in order to achieve balanced livestock and wildlife use, and to ensure aspen browse thresholds are not continually being exceeded:

1. The District may recommend to the UDWR, RAC, and the Utah Wildlife Board a reduction of wild ungulate browsing pressure using antlerless hunts as needed at levels expected to result in sufficient reduction in browse to avoid surpassing browse thresholds. This recommendation is supported by the UDWR and the Utah Wildlife Board.
2. The District may coordinate with the UDWR to hire/contract an adequate number of seasonal employees and/or coordinate the use of volunteers (i.e. Dedicated Hunter Program) to spend time in treatment areas hazing wildlife at levels expected to result in sufficient reduction in browse to avoid surpassing browse thresholds.
3. The District may coordinate with the UDWR to fence treatment areas for 4 to 6 years until the aspen new shoots reach 6 feet height.
4. The District may seek opportunities to improve time, timing, and intensity of livestock grazing. This may include resting treatment areas again from livestock use, temporary reductions in livestock numbers, reducing the length of time that livestock are in certain pastures, and/or adjusting the timeframe of when livestock are in certain pastures.
5. The District may coordinate with the UDWR to utilize their Grass Bank Program on state Wildlife Management Areas to help offset temporary loss of livestock opportunities.

As described in the EIS, 58 transects have already been established in various stable aspen stands on Monroe Mountain. Data have been collected on overstory condition, aspen regeneration and recruitment (including browse use), fecal pellets and cow pies. These data provide a baseline dataset from which to detect change in subsequent years. The District proposes to continue monitoring aspen shoot density, height, and percent browse on an annual basis at these sites. Overstory and understory data would continue to be collected at longer intervals (3 to 5 years). Additional transects could be added as needed.

The aspen stands associated with each of the 58 transects are classified as stable aspen stand type 1 (SA1), type 2 (SA2), or type 3 (SA3). Stable Aspen 1, SA2, and SA3 stands differ in the relationship of recruitment density to overstory. For example, within SA2 and SA3, the stands are defined as currently being full self-replacing (F), transitional self-replacing (T), marginal self-replacing (M), or non-self-replacing (N). To have adequate recruitment to perpetuate the aspen stands, the desire is for these stable aspen stands to move towards SA1, SA2-F, or SA3-F.

The stable aspen classes and recruitment levels are thus based directly upon the densities of stems that reach heights relatively safe from browsing of top leaders, and do not initially take into account the browse intensity values that clearly influence those aspen stem densities. Patterns in annual browse data would be analyzed over time in the stable aspen areas with the objective of determining how they might be incorporated to improve assessments of stable aspen condition and determine the trajectory of the stable aspen stands on Monroe Mountain.

The District anticipates that mechanical and prescribed fire treatments in seral aspen, spruce/fir, and mixed conifer areas will have an indirect beneficial effect related to aspen browse in the stable aspen areas within three years following treatments. As mechanical and prescribed fire treatments occur in adjacent areas, the stable aspen stands would continue to be monitored. For the stable aspen stands not already in SA1, SA2-F, or in SA3-F, a minimum benchmark of success in restoring stable aspen on Monroe Mountain would be an average improvement for all eligible stands (SA2 and SA3 levels T, M, and N) that is equal to one full level increase as a benefit of doing mechanical and prescribed fire treatments in adjacent areas. Thus, for every stand that fails to move up a level, another would have to move up two levels. Stand degradation (drop in levels) would also be factored in.

The District proposes the stable aspen responses be proportional (percentage) to the area treated mechanically and/or with prescribed fire. Accurately predicting how browse relief would be distributed spatially following treatments would be difficult. Therefore, the District proposes that stable aspen improvement be interpreted at the broadest spatial scale (all 58 stands). For example, one year might allow that 10 percent of the project area be treated mechanically and/or with prescribed fire. Of the 58 stable aspen stands, 47 stands are classified as being eligible for improvement; therefore, a threshold for reclassification to at least one level higher would be needed in 4 to 5 stands (10 percent) of the 47 eligible stands, with no stands being downgraded in response to the mechanical and/or prescribed fire treatments or any other factors. The District anticipates the stable aspen stand level changes may be detectable within 3 years of treatment.

If monitoring does not detect sufficient improvement of stable aspen stands after an appropriate lag time (within approximately 3 years following treatments in adjacent areas; allowing some flexibility for unknowns such as extreme weather events), the District would implement one or more of the following responses in order to achieve balanced livestock and wildlife use, and to ensure stable aspen stand conditions improve:

1. The District may recommend to the UDWR, RAC, and the Utah Wildlife Board a reduction of wild ungulate browsing pressure using antlerless hunts as needed at levels expected to result in sufficient reduction in browse to avoid surpassing the stable aspen stand thresholds. This recommendation is supported by the UDWR and the Utah Wildlife Board.
2. The District may coordinate with the UDWR to hire or contract an adequate number of seasonal employees and/or coordinate the use of volunteers (i.e. Dedicated Hunter Program) to spend time in stable aspen stand areas hazing wildlife at levels expected to result in sufficient reduction in browse to avoid surpassing stable aspen stand thresholds.
3. The District may coordinate with the UDWR to fence stable aspen areas until 1,000 new aspen shoots reach 6 feet height.
4. The District may seek opportunities to improve time, timing, and intensity of livestock grazing. This may include resting stable aspen areas from livestock use, temporary reductions in livestock numbers, reducing the length of time that livestock are in certain pastures, and/or adjusting the timeframe of when livestock are in certain pastures.
5. The District may coordinate with the UDWR to utilize their Grass Bank Program on state Wildlife Management Areas to help offset temporary loss of livestock opportunities.

Although management changes that reduce wild or domestic ungulate numbers may be necessary to restore healthy aspen communities on Monroe Mountain, such changes are viewed by the District as temporary and should not be interpreted as permanent or long-term reductions in stocking levels or population objectives.

To complement the monitoring plan and associated responses that could occur if thresholds are exceeded, and to gain a better understanding of wildlife use on aspen in the absence of livestock, the District proposes two options to rest areas from livestock grazing. The first option is to rest the Dairies pasture in the Koosharem Allotment for the duration of this project. The second option is to set aside six smaller exclosures in Rock Springs, Koosharem, Manning Creek, Hunts Lake, and Scrub Flat Allotments (See Table 2). The second option would require approximately 2.5 miles of livestock fence be constructed.

In addition, temporary fencing (approximately 7.2 miles) would be installed around Manning Meadows Reservoir and Barney Lake to enclose 633 acres. This fence would be approximately 8 feet tall and constructed with net wire, t-post, and wooden post. Maintenance of the temporary fence would occur for 4 to 6 years until the aspen sprouts are greater than 6 feet tall, after which the fence would be removed.

No active treatments are proposed within the sagebrush cover-type where scattered aspen trees and stands occur in portions of the sagebrush communities. These areas are

expected to improve through passive restoration (i.e., by trying to allow naturally ignited fires to burn, and changing grazing and browsing management).

Design Features

The design features for this project are outlined in Chapter 2 of the EIS. The design features that apply to the Range Management Program are listed below:

- Treated areas would be rested from livestock grazing for at least 2 growing seasons post implementation, and possibly 3 to reduce livestock browse pressure on new aspen sprouts.
- Invasive and noxious weeds are not known to occur in the aspen/conifer areas; however, treatment areas would be monitored post implementation. If noxious and/or invasive weeds are detected, the District would take the appropriate actions to control spread and eliminate the noxious and/or invasive weeds from the treatment areas.
- Equipment would be washed and inspected, prior to entering National Forest System lands, to remove any soil and debris that may contribute to the spread of noxious weeds.
- Treatments would target upland non-riparian areas first. No more than 15% of the upland areas within a HUC 6 would be treated in any one year. After the upland areas have been treated (15%) and have recovered [comparable] watershed function, additional upland areas (15%) in the same HUC 6 could occur.
- After the upland areas have been treated and have recovered [comparable] watershed function and aspen restocking (1,000 aspen saplings per acre) are being achieved, then the aspen/conifer in riparian areas could be treated.
- No more than 5-10% of the riparian areas within a HUC 6 would be treated in any one year. After the riparian areas have been treated (5-10%) and have recovered [comparable] watershed function, additional riparian areas (5-10%) in the same HUC 6 could occur.
- Ground based mechanical treatments would only occur on slopes less than 40 percent.
- Within riparian areas, equipment operations would occur when soils are dry, frozen or snow levels are sufficient to prevent wheels or tracks from coming in contact with soil.
- A combination of skid trails, temporary roads, and existing roads would be used to facilitate the mechanical treatments that occur outside IRAs. Temporary roads would be reclaimed upon completion of the mechanical treatments.
- No skid trails or landings would be constructed inside riparian areas.
- Non-merchantable trees and slash would be consolidated and either piled and burned, or hauled off-site. Non-merchantable trees could also be made available for firewood cutting. Inside IRAs, if existing roads and skid trails do not allow for the removal of biomass, trees and slash may be consolidated, piled, and burned on-site.
- No mechanical treatments using feller bunchers or skid-steers would occur in the stable aspen stands that have little to no conifer presence (less than 40

conifer stems per acre) in the aspen understory. These areas may still be mechanically treated with hand crews equipped with chainsaws, bow saws, or loppers.
  - Jack-strawing on a small scale, in site-specific areas to help impede ungulate access may occur.

Monitoring

Approximately 120 to 140 long-term aspen transects would be used to monitor status and trend of aspen following implementation of the selected alternative. Sixty to seventy transects would be in the seral aspen, spruce/fir, and mixed conifer areas, and 60-70 in the stable aspen areas. Monitoring would address aspen regeneration/recruitment and understory conditions.

Monitoring for this project is also outlined in Chapter 2 of the EIS. See the bullets below for monitoring details:

- Approximately 120-140 long-term plots would be used to monitor status and trend of aspen following implementation of the selected alternative.
- Monitoring would address aspen regeneration/recruitment and understory conditions.
- Monitoring would be in conjunction and coordinated with aspen monitoring/research currently being done on Monroe Mountain by Brigham Young University.
- During the first 2-3 growing seasons while treatment areas are being rested from livestock grazing, if monitoring indicates unsustainable browsing of aspen by wild ungulates (as defined by the thresholds document), considering the response options outlined in the thresholds document, the District would work cooperatively with Utah Division of Wildlife Resources, the Resource Advisory Committee (RAC), Utah Wildlife Board, permittees, and other interested stakeholders to reduce this pressure on aspen. The goal is to keep browse levels below the browse thresholds as outlined in the thresholds document.
- After livestock are allowed to return to treatment areas, if monitoring indicates unsustainable browsing (as defined by the thresholds document) of aspen by livestock and/or wildlife, considering the response options outlined in the thresholds document, the District would take the necessary management actions to reduce this livestock related browsing pressure on aspen and/or work cooperatively with Utah Division of Wildlife Resources, RAC, Utah Wildlife Board and other interested stakeholders to reduce this pressure on aspen. The goal is to keep browse levels below the browse thresholds as outlined in the thresholds document.
- Efforts would be based on achieving aspen ecosystem restoration and achieving the desired conditions described below.

Fifty eight transects have already been established in various stable aspen stands on Monroe Mountain. Data have been collected on overstory condition, aspen regeneration and recruitment (including browse use), fecal pellets. These data provide a baseline

dataset from which to detect change in subsequent years. The District proposes to continue monitoring aspen shoot density, height, and percent browse on an annual basis at these sites. Overstory and understory data would continue to be collected at longer intervals (3 to 5 years). Additional transects could be added as needed.

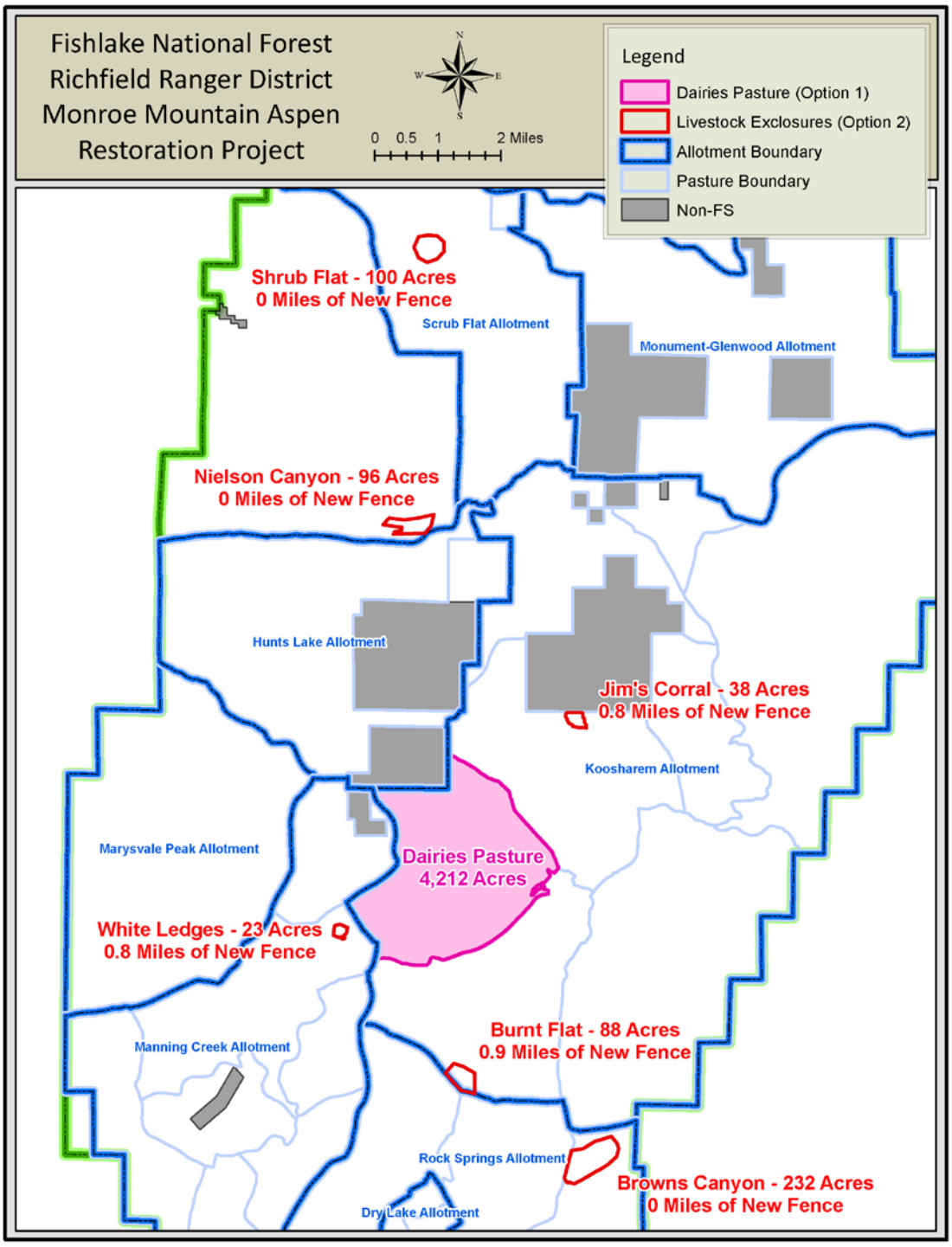
To complement the above monitoring plan and associated responses that could occur if thresholds are exceeded, and to gain a better understanding of wildlife use on aspen in the absence of livestock, the District is considering two additional monitoring options:

1) Rest from livestock grazing the Dairies pasture; 4,212 acres in the Koosharem Allotment for the duration of this project. Stable and seral aspen stands occur in the Dairies pasture and it is an area regularly used by both livestock and wild ungulates. Part of the 2012 Box Creek Fire also occurred in the Dairies pasture. After the Box Creek Fire, approximately 400 acres of aspen were fenced inside the Dairies pasture. This 8-foot high fence was built to exclude all animals from entering the 400 acres. By resting the Dairies from livestock and considering the 400 acres that is fenced to exclude all animals, much can be learned about wildlife use on aspen in the absence of livestock. This would also provide an opportunity to monitor stable aspen in the absence of livestock.
2) Establish and monitor for the duration of the project six livestock exclosures located at various locations across Monroe Mountain. Locations and specific details for these six exclosures are included in Figure 5 and Table 2. These six exclosures, given their locations in diverse stable aspen communities with varying wild ungulate usage, would be expected to give representative data. Three of the exclosures would be located in areas that have no livestock use or are in sheep allotments and would not need new fencing. The other three exclosures would be located in cattle allotments and would take advantage of existing fences but would need to have some additional fence installed to keep livestock from utilizing the area. The total amount of new livestock fence needed would be approximately 2.5 miles.

Table 2: Six Proposed Monitoring Livestock Exclosures (575 acres)

					Elk Use		
Exclosure Name	**Allotment**	**Pasture**	**Cattle or Sheep**	**Acres**	**Season**	**Intensity**	**Fence Needed**
Scrub Flat	Scrub Flat	NA	Sheep	100	Winter	Medium	No
Nielson Canyon	Hunts Lake	NA	Sheep	96	Summer	Medium	No
Jim's Corral	Koosharem	Squaw Springs	Cattle	38	Summer	High	Yes
White Ledges	Manning Creek	Windy Ridge	Cattle	23	Summer	High	Yes
Burnt Flat	Koosharem	Burnt Flat	Cattle	88	Transitional	High	Yes
Browns Canyon	Rock Springs	Spring	Cattle	230	Winter	Medium	No

Figure 5: Location of the Dairies Pasture and the Six Livestock Exclosures



Affected Environment (Current Condition)

The Fishlake National Forest (FNF) manages 1.7 million acres of National Forest System (NFS) land of which more than 1,036,000 acres are rangelands. There are 74 designated

grazing allotments managed by the FNF. Livestock are trailed to and from forest grazing allotments in early summer and fall. There are numerous structural (water trough, pipelines, fences, corrals, etc.) and nonstructural (seedings, chainings, prescribed burns, etc.) range improvements on the forest associated with these allotments. Many of these range improvements provide water and forage for wildlife as well as livestock.

This aspen ecosystems restoration project focuses on restoring aspen on Monroe Mountain with mechanical and prescribed burn treatments in the aspen, mixed conifer, and spruce-fir cover types. Monroe Mountain is located in south-central Utah, south of Richfield, west of Koosharem, and east of Marysvale. It encompasses approximately 175,705 acres of NFS lands administered by the Fishlake National Forest - Richfield Ranger District, and approximately 11,805 acres of private inholdings. It is divided into 11 livestock grazing allotments. The proposed action is to implement treatments designed to restore aspen on 10 of the allotments. The 10 affected allotments are divided into 33 pastures/units.

Aspen is a keystone species and historically was a landscape dominant on Monroe Mtn. Aspen is an early successional tree species (sun loving and shade intolerant). Individual aspen trees arise almost exclusively from root suckers. Aspen sprouts heavily following disturbance and is relatively short-lived (i.e., 100-200 years). As it matures natural selection, self-thinning, and competition from other tree species work to reduce and replace aspen with late successional vegetation. Without some kind of a disturbance (i.e. fire or logging) aspen will eventually be replaced by late successional species. Grazing of aspen by animals tends to speed up the succession process because some of the aspen seedlings don’t survive after being grazed. Stable aspen is not replaced by late successional species, but in the lack of disturbance to stimulate it to sprout, the aspen may die.

Range conditions on Monroe Mountain are different today than they were before Euro-American settlement. Changes in human uses (grazing, timber harvests, recreation, water use, etc.), disturbance regimes (fire, insects, etc.), climatic conditions, and wildlife species density have led to a decline in aspen and an increase in conifer species. Of the 175,705 NFS acres on Monroe Mountain, aspen historically occurred on approximately 71,000 acres. Aspen-dominated cover currently occurs on approximately 17,009 acres. Much of this aspen dominated cover has a component of mixed conifer in the understory (primarily subalpine fir (*Abies lasiocarpa*)). Approximately 31,129 acres are dominated by seral aspen; much of this seral aspen co-exists with mixed conifer (primarily subalpine fir). Approximately 5,210 acres on Monroe Mountain are dominated by mixed conifer (Engelmann spruce, Douglas fir, ponderosa pine, and white fir (*A. concolor*)). Much of this mixed conifer co-exists with aspen. Approximately 13,667 acres are dominated by spruce/fir with an aspen component. Approximately 43,877 acres in the project area are dominated by sagebrush cover types (primarily big sagebrush (*Artemisia tridentata*)), some (approximately 12,231 acres) of which may have been aspen communities in the recent past. Dominance by sagebrush is not a successional pathway for aspen; however, in the absence of recruitment, aspen can be replaced with shrub cover types. These sagebrush-dominated communities still have some scattered aspen trees/stands.

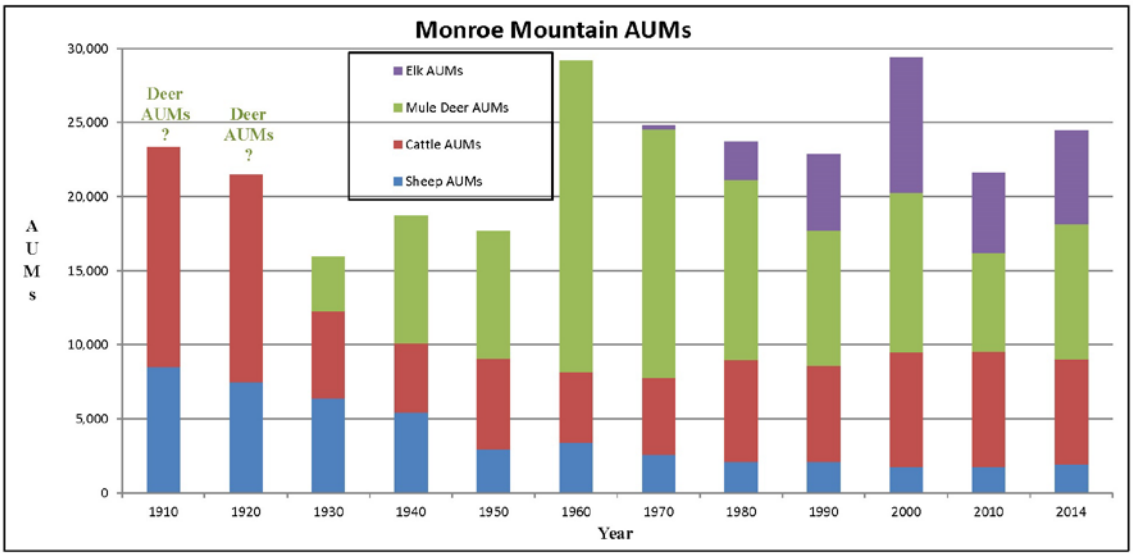
These changes have resulted in a smaller forage base for livestock and wildlife. Charles Kay (2003) reported that, "On average, aspen communities produce around 2,000 lbs. of air-dried forage per acre, while conifers typically produce 150 lbs. or less (Muggler 1988). Historically, there were over 300,000 acres of aspen on the Fishlake National Forest, but today, aspen occupies only about 150,000 acres (Bartos and Campbell 1998). As aspen communities have been converted to conifers, approximately 150,000 AUMs (Animal Unit Months) have been lost on the Fishlake."

In 2008 Stam et al. (2008) reported that conifer cover affected aspen understory biomass in a major way in studies done on the Cedar City Ranger District of the Dixie National Forest (NF), the Richfield Ranger District of the Fishlake NF, and private land on Cedar Mountain east of Cedar City, UT. Their 2003 data showed a range of 1482 kg ha^{-1} at 0% conifer cover to a low of 10 kg ha^{-1} at 60% conifer cover. They quoted Mueggler, "Production can reportedly be reduced by 50% when conifers make up as little as 15% of the total tree basal area on the site (Mueggler 1985, 1988)."

In a 2004 study titled "Quantifying Losses of Understory Forage in Aspen Stands on the Dixie and Fishlake National Forests," by Stam et al. (2004) they reported approximately $10,000,000 - $13,000,000 in additional revenue could be realized if historic aspen sites on the Dixie and Fishlake National Forests had not experienced reduced forage production because of conifer encroachment. This revenue would only be realized by livestock producers if additional forage was allocated totally to livestock grazing. They also reported that the additional grazing capacity could generate as much as $309,297 in the current year alone in livestock grazing fees for the two forests, if it was all allocated to livestock.

Historically, cattle and sheep use on Monroe Mountain was much higher than current use (Figure 1). Cattle and sheep use began in the late 1800s, and peaked around 1910 with use of about 23,300 AUMs. There was a steep decline (about 3 fold) in livestock AUM use on Monroe Mountain reaching a low in the 60s and 70s of about 7,700 AUMs. Cattle use declined since 1910 by about 10,000 AUMs and sheep use about 6,700 AUMs. Livestock use has remained fairly flat since the 1950s. Although Figure 1 shows total AUMs in 2014 are similar to total AUMs in 1910, the 1910 AUMs displayed in Figure 1 are likely conservative because mule deer AUMs are not included. In 1910 the AUMs were cattle and sheep and an unknown number of deer while in 2014 the AUMs were cattle, sheep, deer, and elk. All these animals browse aspen.

Figure 1: Monroe Mountain AUM History



Historical deer use is particularly hard to estimate, but using harvest data as a surrogate, mule deer use increased from 1930 reaching a peak of about 21,000 AUMs in the 1960s. Mule deer use has declined since the 1960s to about 9,100 AUMs today. Certainly the number of deer in central Utah is nowhere near the peak numbers of the 1960s.

Elk use of Monroe Mountain appears much heavier than historically. Old-time residents of the region can recall seeing their first elk on Monroe Mountain in the 1960s. Using winter counts as a basis to estimate, elk AUMs have increased from 0 in the 1960s to a peak of about 9,100 AUMs in 2000 and about 6,300 in 2014.

Noxious weeds and invasive species (ex. cheatgrass) management are a big concern on rangelands managed by the FNF. Various weed and vegetation treatments have been implemented to control the spread of noxious weeds and invasive species. There have not been large infestations of noxious weeds identified on Monroe Mountain. No noxious weeds are known to occur where prescribed fire or mechanical treatments are proposed.

Desired Condition

Aspen communities are persistent with multi-aged stems and adequate recruitment. Aspen ecosystems contain a variety of age classes and structural components distributed across the landscape (See Tables 3 and 4). Aspen systems regain dominance, reclaimed mainly from Engelmann spruce/subalpine fir and mixed conifer types accompanied by marked increases in understory vegetation and groundcover. Conifers occupy less than 15% of the canopy (Campbell and Bartos, 2001). Mature and old aspen stands comprise about 40% of the structural class distribution. Young aspen comprise about 20% of the structural class distribution (See Table 4). Dominant aspen trees are generally less than 100 years old. Other age classes are evenly distributed between early, young, and mid

age classes. Diverse aspen conditions support a large variety of animals. Associated herbaceous and woody vegetation are highly variable. Perennial grasses and forbs dominate the understory areas with a range of shrub cover resulting in minimal bare ground within aspen systems. Site productivity generally determines individual stand densities. Aspen regeneration success is achieved through an integrated sprout protection program (See Appendix D). Fire regimes are adequate to perpetuate aspen, particularly in areas seral to conifer.

Table 3: Current and desired aspen stand structure in areas currently classified as seral aspen, spruce/fir, or mixed conifer

		Aspen Sprouts/Acre (<6 feet in height)			Aspen Saplings/Acre (6-12 feet in height)			Aspen Recruits/Acre (>12 feet in height)		
		Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
Current Condition	Aspen: Seral Stands	0	3,286	592	0	911	119	59	615	276
	Spruce/Fir Stands	0	4,433	1,121	0	183	38	0	301	137
	Mixed Conifer Stands	0	1,255	677	0	233	108	0	286	117
Desired Condition[2]	Aspen Structure After Implementation of Mechanical and/or Prescribed Fire Treatments	5,000	No Max	10,000 to 20,000	1,000	No Max	1,000 to 2,000	400	No Max	400 to 600

[2] These numbers demonstrate that the desired condition of having aspen communities with multi-height stems with adequate recruitment to perpetuate the aspen communities are being met.

Table 4: Current and desired vegetation structural stage (VSS) for aspen, mixed conifer, and spruce/fir stands; DBH = diameter at breast height

		VSS 1: Grass-Forb/Shrub (DBH: 0-1 inch)			VSS 2: Seedling-Sapling (DBH: 1-5 inches")			VSS 3: Young Forest (DBH: 5-12 inches)		
		Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
Current Condition	Aspen: Stable Stands	19%	24%	22%	6%	36%	23%	40%	63%	50%
	Aspen: Seral Stands	0%	18%	13%	5%	47%	15%	37%	82%	58%
	Mixed Conifer Stands	8%	17%	13%	5%	37%	20%	24%	52%	42%
	Spruce/Fir Stands	4%	20%	13%	7%	26%	16%	23%	63%	41%
Desired Condition	All Stands	****	****	10%	****	****	10%	****	****	20%
		VSS 4: Mid-Aged Forest (DBH: 12-18 inches)			VSS 5: Mature Forest (DBH: 18-24 inches)			VSS 6: Old Forest (DBH: 24 plus inches)		
		Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
Current Condition	Aspen: Stable Stands	0%	11%	5%	0%	0%	0%	0%	0%	0%
	Aspen: Seral Stands	0%	32%	13%	0%	5%	1%	0%	5%	0%
	Mixed Conifer Stands	6%	43%	19%	2%	6%	4%	0%	5%	2%
	Spruce/Fir Stands	4%	31%	21%	0%	14%	6%	0%	13%	2%
Desired Condition	All Stands	****	****	20%	****	****	20%	****	****	20%

Stable aspen is a term used to describe aspen stands in which conifer trees play little or no role. The stable aspen stands were classified into three broad categories based upon the density of living canopy trees. In addition to the dominant canopy trees, aspen recruits (greater than 12 feet tall but clearly below the dominant canopy), aspen saplings (6 to 12 feet tall and at low risk to being top-browsed), and aspen sprouts (less than 6 feet tall and at relatively high risk to being top-browsed) are also generally present.

Data was collected from 58 stable aspen stands on Monroe Mountain. The stands were divided into the following categories listed in order of decreasing health **full (F)** for fully self-replacing; **transitional (T),** with recruitment levels that are borderline to those necessary for self-replacement; **marginal (M)**, where recruitment is happening but at a level that might not be sufficient for self-replacement; and **non-self-replacing (N)** where recruitment is not happening, or is at a level that is clearly too low to maintain the stand through time. The stands were then further classified by the density of the canopy trees. The categories for canopy density are greater than 1,000 canopy trees per acre **high density Stable Aspen Class 1 (SA1), low density Stable Aspen Class 2 (SA2)** with canopy tree densities of less than 200 trees per acre, and **intermediate-density Stable Aspen Class (SA3)** is defined by a density of 200 to 1000 canopy trees per acre. Overall, in 2013, 11 of 58 (19 %) stable aspen stands were classified as fully self-replacing, five

(9 %) as transitional, 13 (22 %) as marginal and 29 (50 %) as non-self-replacing (Table 5). To move towards the desired conditions of having persistent aspen communities, with multi-height stems and adequate recruitment to perpetuate the aspen communities, the desire is for the stable aspen stands to be in SA1, SA2-F, or SA3-F; therefore, 79 % (47 stands) of the stable aspen stands need to improve.

Table 5: Classification of 58 stable aspen stands on Monroe Mountain. Data for these stands was collected in 2013.

Classification	Number of Aspen Stands
SA1	1
SA2 -F	5
SA2-T	3
SA2-M	7
SA2-N	15
SA3-F	5
SA3-T	2
SA3-M	6
SA3-N	14

Environmental Consequences

This aspen ecosystem restoration project focuses on restoring aspen on Monroe Mountain with mechanical and prescribed burn treatments in the aspen, mixed conifer, and spruce-fir cover types. The cumulative effects boundary for this analysis will be the area considered as Monroe Mountain (See Project Vicinity Map in EIS). There are five alternatives being considered for detailed analysis. The acres to be treated under the alternatives range from 0 under Alternative 1 (No Action) to 47, 274 acres under Alternative 4 (See Tables 6 & 7). Table 6 also show the miles of temporary roads that are proposed for each alternative.

Table 6

	Mechanical Treatments and Associated Slash Burning	Prescribed Fire - Mixed Burn Severities	Total Acres	Miles of Temporary Roads / Acres Disturbed
Alternative 1 - No Action	0	0	0	0
Alternative 2	8,186	32,991	41,177	8.8 / 21
Alternative 3	13,647	31,357	45,004	8.8 / 21
Alternative 4	19,838	27,436	47,274	13.3 / 32
Alternative 5	15,072	26,453	41,525	12.8 / 31

Table 7

Alternative	Acres on Monroe Mountain Treated/ Disturbed	% of Historical Aspen on Monroe Mountain Treated	% of NFS Land on Monroe Mountain Treated
Alternative 1	0	0%	0%
Alternative 2	41,177	58%	23%
Alternative 3	45,004	63%	26%
Alternative 4	47,274	67%	27%
Alternative 5	41,525	58%	24%

The expected timeframe to fully implement this project is 10 years minimum. The scale and timing of the mechanical and prescribed fire treatments are likely to affect the level of impacts that both wild and domestic grazers have on aspen response to treatments. Under all of the alternatives most of the rangeland resources will continue to be managed as they are currently being managed with pasture rotations based on utilization standards. Appendix C shows how many acres would be treated in each grazing allotment by pasture under each alternative and the percent of the pasture that it represents. There will be a temporary loss of vegetation when areas are treated and temporary roads are built and used. After areas are treated they would be rested from livestock grazing for at least two growing seasons to allow the vegetation some recovery time. It is expected that diversity and amount of understory vegetation in conifer/aspen stands will improve as the treatments are completed.

The rest from livestock grazing would be a work in progress depending on the specifics and timing of the individual treatments. The treatments may require anything in between entire allotments/pastures being rested to a very small portion of an allotment/pasture needing rest. Grazing rotations would be modified as needed, which may result in not following existing rest or deferment schedules for a limited time (i.e. one to three years).

Herding and temporary electric fences can help minimize the effects to the permittees brought on by the required rest period after treatment. If these are ineffective then complete rest of the allotment/pasture would be considered. The planning and implementation of livestock grazing rest for treatment areas will require a solid working relationship between the Forest Service and livestock grazing permittees. This working relationship will play a key role in the success of this aspen restoration project.

Wildlife would still be grazing treatment areas after they are treated. This continued wildlife grazing presents a risk to aspen recovery following treatments. To address this risk, the District is proposing quantifiable aspen browsing thresholds and response

options to aid in accomplishing desired conditions. See the overview of the proposed action section of this report and Appendix D for details.

Any time vegetation is treated or soil is disturbed on the forest there is a risk of noxious weed establishment. Currently there are no noxious weeds known to occur in the proposed treatment areas and there are weed related design features to help minimize the potential effects (see Design Features section).

Alternative 1 - No Action

The No Action Alternative is to continue with the current management. This alternative does not address the stated purpose and need of the project as described above. Under this alternative zero acres of the aspen ecosystems targeted in this project would be treated. The most likely time aspen disturbance would occur is during a wildfire event or until a National Environmental Policy Act (NEPA) environmental analysis is completed to authorize the treatment of aspen.

Direct Effects

Consequences of this alternative are continued degradation of the aspen ecosystem and continued loss of understory habitat and forage. Aspen dominated acres are expected to decline without disturbance to remove competition and stimulate the aspen to regenerate. This decline in aspen would reduce the forage that is available for livestock.

Indirect Effects

Continued livestock and wildlife grazing would speed up the rate of aspen decline (succession) as aspen sprouts are grazed. This could lead to a need to reduce livestock grazing as the carrying capacity of the land changes.

Cumulative Effects

A list of the past, present, and reasonably foreseeable projects on Monroe Mountain has been assembled and is attached in Appendix A. Many of those projects are vegetation manipulation projects. Usually there is a short term loss of vegetation associated with vegetation projects followed by an increase in rangeland vegetation (grasses, forbs, shrubs, and aspen). Rangeland resources benefit from the increased vegetation. The increase in vegetation provides more forage for grazing animals which reduces the intensity and frequency of grazing on the plants. It also provides beneficial ecological effects such as plant species diversity, plant age class diversity, and decreased bare ground etc.

Other projects listed in Appendix A include projects to manage livestock grazing. Effects of grazing (livestock/wildlife) have played a part of Monroe Mountain’s history and the aspen ecosystem decline. Grazing of aspen sprouts tends to speed up vegetation succession from early seral aspen plant communities to late seral (conifer) communities. Grazing would continue to play a role in the future condition of Monroe Mountain as wildlife use the forest and livestock are permitted to graze on the forest.

Aspen ecosystems on Monroe Mountain are still declining despite numerous small-scale past vegetation treatments (mechanical & fire). The forest hasn’t been able to do large

enough vegetation treatments and control ungulate grazing on the treatment areas to improve the aspen ecosystems on the Monroe Mountain landscape. The cumulative effects of this No Action Alternative added to the lack of large scale vegetation manipulation projects in the past, present, and reasonably foreseeable future increases the risk of losing the aspen ecosystem from Monroe Mountain entirely. Approximately 76% of the historic aspen ecosystem acres have already been lost or is experiencing a conversion of dominant cover type (See Figures 2 & 3). Appendix A indicates that presently and in the foreseeable future approximately 28% of the NFS acres on Monroe Mountain have been or will still be treated if the No Action Alternative is chosen.

Irreversible and Irretrievable Commitments of Resources

Losing the aspen ecosystems entirely because of No Action (no treatment, reduced recruitment, continued grazing, and succession) would be an irreversible and irretrievable commitment of resources.

Alternatives 2 – 5 (Actions Applicable all Action Alternatives)

Under all the alternatives there are two monitoring options being considered to complement the established and already on going monitoring of aspen stands on Monroe Mountain. These monitoring options are expected to give better understanding of wildlife use of treated areas in the absence of livestock grazing. The first option being considered is a proposal to rest the 4,212 acre Dairies pasture of the Koosharem Allotment for the duration of this project, 10 years. The permittees on the Koosharem Allotment would have to get through the implementation of this project with seven pastures instead of eight. Approximately 782 acres would be treated in the Dairies Pasture under alternatives 2 – 5. Additional acres in the Dairies pasture have been or are currently being treated under the Box Creek Fuels Reduction Project. Loss of this pasture could result in large impacts to the permittees on the Koosharem Allotment if the other pastures don’t have enough forage for their livestock.

The second monitoring option is to have six exclosures which would rest 575 acres on five grazing allotments for the duration of this project, 10 years (See Table 2). This option would rest 3,637 fewer acres and would spread it across five allotments instead of one allotment. It allows the exclosures to be placed in different types of wildlife range (summer, transitional, winter) and on different kinds of livestock grazing allotments (cattle, sheep). This option also increases the number of permittees sharing the impacts of resting the monitored locations and reduces the impact to individual permittees. There is some fencing that will need to be done to implement this option. Approximately 2.5 miles of livestock fence would be built to implement this option. Ground disturbance associated with this fence installation would be approximately 2.4 acres (2.5 mi x 5,280’ x 8’/43,560’ = 2.4 acres).

Temporary fencing (approximately 7.2 miles) would be installed around Manning Meadows Reservoir and Barney Lake to enclose 633 acres. This fence would be approximately 8 feet tall and constructed with net wire, t-posts, and wooden posts. Maintenance of the temporary fence would occur for 4 to 6 years until the aspen sprouts are greater than 6 feet tall, after which the fence would be removed. Ground disturbance associated with this fence would be between approximately 2 acres and 7 acres depending on the width of the disturbance needed to put up the fence (7.2 mi x 5,280’ x 2’ /43,560= 1.7 acres, 7.2 mi x 5,280’ x 8’ / 43,560’= 7.0 acres).

One of the treatment options considered for the mechanical treatments is to thin conifer up to 8 inch DBH from below within IRAs and draft UUAs. This option would leave conifer trees that are greater than 8 inch DBH in the stand so conifers would continue to make up part of the basal area of the stand. The increase in early seral plants (biomass/forage) after treatment would be reduced because the larger conifers are left and make up part of the basal area in the stand. The treatment may have a shorter life span because the larger conifer trees that are left continue to grow and shade the ground. If the trees that are left are affected by bugs the shading effect might not be as bad and the trees might eventually fall and breakdown opening the canopy so aspen and understory plants could increase. Stam et al. (2008) reported that conifer cover affected aspen understory biomass in a major way. They cited Mueggler, "Production can reportedly be reduced by 50% when conifers make up as little as 15% of the total tree basal area on the site (Mueggler 1985, 1988)."

Alternative 2

This alternative is to treat 41,177 acres of Monroe Mountain with a combination of mechanical and prescribed fire treatments. This alternative would include 8,186 acres of mechanical and 32,991 acres of prescribed fire treatments. There would be 8.8 miles of temporary road construction under this alternative. Approximately 2.4 acres are disturbed for each mile of road constructed (15' road width, 20' disturbance width, (20' X 5,280')/43,560' = 2.4 acres/mile). About 21 acres would be disturbed for temporary road construction.

This Alternative would allow the treatment of the least amount of acres of any of the alternatives excluding Alternative 1- No Action.

Maps of the Alternatives are included in the EIS.

Direct Effects

The direct effects of Alternative 2 treatments on the rangelands of Monroe Mountain are a short term loss of vegetation followed by an increase in early seral vegetation (grasses, forbs, shrubs, and aspen) and vegetative diversity. To control the amount of vegetation lost at one time and allow for recovery of treated areas before more acres are treated, restrictions on the amount of a HUC 6 that can be treated at one time and grazing rest are design features of this alternative (see Design Features).

When vegetation is removed and ground is disturbed for temporary road construction and mechanical treatments there is an increased risk of invasive plant and noxious weed establishment. To reduce the risk of invasive plant and noxious weed establishment equipment would be washed and inspected, prior to entering National Forest System lands, to remove any soil and debris that may contribute to the spread of noxious weeds. Treatment areas would be monitored post implementation. If noxious and/or invasive weeds are detected, the District would take the appropriate actions to control spread and eliminate the noxious and/or invasive weeds from the treatment areas.

Indirect Effects

The short term loss of vegetation could result in a loss of Animal Unit Months (AUMs). The timeframe for this project is approximately 10 years which would be treating about 4,100 acres per year.

Resting treated areas from livestock grazing could lead to a loss of grazing opportunities for livestock permittees, through reducing the season of use or authorized numbers of livestock. If grazing opportunities are lost, permittees will have to find other feed (AUMs) for their livestock during the rest period. Generally, finding feed to replace lost AUMs on the forest is more expensive because the current grazing fee charged by the forest is $1.35/AUM. If permittees have to feed hay the cost of an AUM could be about $90 (1 AUM equals 900 lbs. of forage and hay is $200/ton, then (900/2000) x $200 = $90/AUM). Impacts to the permittees would be minimized through the use of herding and temporary electric fences so that treatment areas can be rested while non-treatment areas can continue to be grazed. Continued livestock grazing in the non-treatment areas is subject to the Fishlake National Forest forage utilization standards and guidelines. Annual monitoring and enforcement of these standards and guidelines would continue.

Cumulative Effects

A list of the past, present and reasonably foreseeable actions that are relevant to range management on Monroe Mountain is included in Appendix A. Most of the projects identified in Appendix A are vegetation management and livestock grazing improvement projects. Vegetation management projects usually end up being beneficial for the rangeland resources. The livestock management projects distribute grazing over a larger area to reduce the impact to any particular location. Most of the acres treated on Monroe Mountain have been through the use of fire (prescribed fire & wildfire). Prescribed fire is the treatment which will be used to treat most of the acres included in all the alternatives.

The past treatments in the aspen communities have been relatively small and the aspen regeneration (sprouts) have suffered from the effects of grazing, as animals keyed in on those small treatments which produced more and better forage. Appendix A shows that approximately 49,000 (28% of NFS acres on Monroe Mountain) acres of vegetation (mixed vegetation types) have been or will be treated from 1969 – 2015 (46 years) a little over 1,000 acres per year. Alternative 2 would treat almost that many acres (41,000) in the aspen ecosystem in a ten year period 4,100 acres per year. Browse thresholds and response options are also proposed to help minimize impacts from overbrowsing of aspen by ungulates.

Alternative 2 is a large scale vegetation project designed to restore the aspen ecosystem on Monroe Mountain. Approximately 58% (41,177/71,000 = 58%) of the historical aspen ecosystem on Monroe Mountain will be treated by this alternative. The thought behind this large scale treatment is that to restore the aspen communities large landscape scale projects are needed so grazing animals won’t overuse any one area and wipe out the aspen regeneration. This should be beneficial to the rangeland resources and provide more forage for grazing animals that are using the Monroe Mountain aspen ecosystem.

This 41,177 acres represents 23% (41,177/175,705 = 23%) of the NFS acres on Monroe Mountain. When added with the past, present and reasonably foreseeable actions the cumulative effect that Alternative 2 would have on the environment is that approximately 51% of the NFS acres on Monroe Mountain would have better forage conditions.

Alternative 3

Under this alternative 45,004 acres will be treated which is 3,827 (9%) more acres of aspen treatment than Alternative 2. Alternative 3 would include 13,647 acres of

mechanical and 31,357 acres of prescribed fire treatments. There would be 8.8 miles of temporary road construction under this alternative. About 21 acres would be disturbed for temporary road construction.

Maps of the Alternatives are included in the EIS.

Direct Effects

The direct effects of proposed Alternative 3 treatments on the rangelands of Monroe Mountain are a short term loss of vegetation followed by an increase in early seral vegetation (grasses, forbs, shrubs, and aspen) and vegetative diversity. To control the amount of vegetation lost at one time and allow for recovery of treated areas before more acres are treated, restrictions on the amount of a HUC 6 that can be treated at one time and grazing rest are design features of this alternative (see Design Features).

When vegetation is removed and ground is disturbed for temporary road construction and mechanical treatments there is an increased risk of invasive plant and noxious weed establishment. To reduce the risk of invasive plant and noxious weed establishment equipment would be washed and inspected, prior to entering National Forest System lands, to remove any soil and debris that may contribute to the spread of noxious weeds. Treatment areas would be monitored post implementation. If noxious and/or invasive weeds are detected, the District would take the appropriate actions to control spread and eliminate the noxious and/or invasive weeds from the treatment areas.

Indirect Effects

The short term loss of vegetation could result in a loss of Animal Unit Months (AUMs). The timeframe for this project is approximately 10 years which would be treating about 4,500 acres per year.

Resting treated areas from livestock grazing could lead to a loss of grazing opportunities for livestock permittees, through reducing the season of use or authorized numbers of livestock. If grazing opportunities are lost permittees will have to find other feed (AUMs) for their livestock during the rest period. Generally finding feed to replace lost AUMs on the forest is more expensive because the current grazing fee charged by the forest is $1.35/AUM. If permittees have to feed hay the cost of an AUM could be about $90 (1 AUM equals 900 lbs. of forage and hay is $200/ton, then (900/2000) x $200 = $90/AUM). Impacts to the permittees would be minimized through the use of herding and temporary electric fences so that treatment areas can be rested while non-treatment areas can continue to be grazed. Continued livestock grazing in the non-treatment areas is subject to the Fishlake National Forest forage utilization standards and guidelines. Annual monitoring and enforcement of these standards and guidelines would continue.

Cumulative Effects

A list of the past, present and reasonably foreseeable actions that are relevant to range management on Monroe Mountain is included in Appendix A. Most of the projects identified in Appendix A are vegetation management and livestock grazing improvement projects. Vegetation management projects usually end up being beneficial for the rangeland resources. The livestock management projects distribute grazing over a larger area to reduce the impact to any particular location. Most of the acres treated on Monroe

Mountain have been through the use of fire (prescribed fire & wildfire). Prescribed fire is the treatment which will be used to treat most of the acres included in Alternative 3.

The past treatments in the aspen communities have been relatively small and the aspen regeneration (sprouts) have suffered from the effects of grazing, as animals keyed in on those small treatments which produced more and better forage. Appendix A shows that approximately 49,000 (28% of NFS acres on Monroe Mtn.) acres of vegetation (mixed vegetation types) have been or will be treated from 1969 – 2015 (46 years) a little over 1,000 acres per year. Alternative 3 would treat almost that many acres (45,000) in the aspen ecosystem in a ten year period 4,500 acres per year. Browse thresholds and response options are also proposed to help minimize impacts from overbrowsing of aspen by ungulates.

Alternative 3 is a large scale vegetation project designed to restore the aspen ecosystem on Monroe Mountain. Approximately 63% (45,004/71,000 = 63%) of the historical aspen ecosystem on Monroe Mountain will be treated by this alternative. The thought behind this large scale treatment is that to restore the aspen communities large landscape scale projects are needed so grazing animals won't overuse any one area and wipe out the aspen regeneration. This should be beneficial to the rangeland resources and provide more forage for grazing animals that are using the Monroe Mountain aspen ecosystem.

This 45,004 acres represents 26% (45,004/175,705 = 26%) of the NFS acres on Monroe Mountain. When added with the past, present and reasonably foreseeable actions the cumulative effect that Alternative 3 would have on the environment is that approximately 54% of the NFS acres on Monroe Mountain would have better forage conditions.

Alternative 4

Alternative 4 is to treat 47,274 acres of Monroe Mountain with a combination of mechanical and prescribed fire treatments. Of the five alternatives being analyzed this alternative proposes the most acres for treatment. It includes 6,097 (15%) more acres for treatment than Alternative 2. This alternative would include 19,838 acres of mechanical and 27,436 acres of prescribed fire treatments. There would be 13.3 miles of temporary road construction under this alternative. About 32 acres would be disturbed for temporary road construction.

Maps of the Alternatives are included in the EIS.

Direct Effects

The direct effects of proposed Alternative 4 treatments on the rangelands of Monroe Mountain are a short term loss of vegetation followed by an increase in early seral vegetation (grasses, forbs, shrubs, and aspen) and vegetative diversity. To control the amount of vegetation lost at one time and allow for recovery of treated areas before more acres are treated, restrictions on the amount of a HUC 6 that can be treated at one time and grazing rest are design features of this alternative (see Design Features).

When vegetation is removed and ground is disturbed for temporary road construction and mechanical treatments there is an increased risk of invasive plant and noxious weed establishment. To reduce the risk of invasive plant and noxious weed establishment equipment would be washed and inspected, prior to entering National Forest System lands, to remove any soil and debris that may contribute to the spread of noxious weeds.

Treatment areas would be monitored post implementation. If noxious and/or invasive weeds are detected, the District would take the appropriate actions to control spread and eliminate the noxious and/or invasive weeds from the treatment areas.

Indirect Effects

The short term loss of vegetation could result in a loss of Animal Unit Months (AUMs). The timeframe for this project is approximately 10 years which would be treating about 4,700 acres per year.

Resting treated areas from livestock grazing could lead to a loss of grazing opportunities for livestock permittees, through reducing the season of use or authorized numbers of livestock. If grazing opportunities are lost permittees will have to find other feed (AUMs) for their livestock during the rest period. Generally finding feed to replace lost AUMs on the forest is more expensive because the current grazing fee charged by the forest is $1.35/AUM. If permittees have to feed hay the cost of an AUM could be about $90 (1 AUM equals 900 lbs. of forage and hay is $200/ton, then (900/2000) x $200 = $90/AUM). Impacts to the permittees would be minimized through the use of herding and temporary electric fences so that treatment areas can be rested while non-treatment areas can continue to be grazed. Continued livestock grazing in the non-treatment areas is subject to the Fishlake National Forest forage utilization standards and guidelines. Annual monitoring and enforcement of these standards and guidelines would continue.

Cumulative Effects

A list of the past, present and reasonably foreseeable actions that are relevant to range management on Monroe Mountain is included in Appendix A. Most of the projects identified in Appendix A are vegetation management and livestock grazing improvement projects. Vegetation management projects usually end up being beneficial for the rangeland resources. The livestock management projects distribute grazing over a larger area to reduce the impact to any particular location. Most of the acres treated on Monroe Mountain have been through the use of fire (prescribed fire & wildfire). Prescribed fire is the treatment which will be used to treat most of the acres included in all the alternatives.

The past treatments in the aspen communities have been relatively small and the aspen regeneration (sprouts) have suffered from the effects of grazing, as animals keyed in on those small treatments which produced more and better forage. Appendix A shows that approximately 49,000 (28% of NFS acres on Monroe Mtn.) acres of vegetation (mixed vegetation types) have been or will be treated from 1969 – 2015 (46 years) a little over 1,000 acres per year. Alternative 4 would treat almost that many acres (47,000) in the aspen ecosystem in a ten year period 4,700 acres per year. Browse thresholds and response options are also proposed to help minimize impacts from overbrowsing of aspen by ungulates.

Alternative 4 is a large scale vegetation project designed to restore the aspen ecosystem on Monroe Mountain. Approximately 67% (47,274/71,000 = 67%) of the historical aspen ecosystem on Monroe Mountain will be treated by this alternative. The thought behind this large scale treatment is that to restore the aspen communities large landscape scale projects are needed so grazing animals won’t overuse any one area and wipe out the aspen regeneration. This should be beneficial to the rangeland resources and provide more forage for grazing animals that are using the Monroe Mountain aspen ecosystem.

This 47,247 acres represents 27% (47,247/175,705 = 27%) of the NFS acres on Monroe Mountain. When added with the past, present and reasonably foreseeable actions the cumulative effect that Alternative 4 would have on the environment is that approximately 55% of the NFS acres on Monroe Mountain would have better forage conditions.

Alternative 5

Alternative 5 is to treat 41,525 acres of Monroe Mountain with a combination of mechanical and prescribed fire treatments. The acres treated by Alternative 5 are slightly higher (1%) than the acres treated under Alternative 2 the difference lies in the amount of mechanical treatment compared to the amount of prescribed fire treatment. This alternative would include 15,072 acres of mechanical and 26,453 acres of prescribed fire treatments. There would be 12.8 miles of temporary road construction under this alternative. About 31 acres would be disturbed for temporary road construction.

Maps of the Alternatives are included in the EIS.

Direct Effects

The direct effects of proposed Alternative 5 treatments on the rangelands of Monroe Mountain are a short term loss of vegetation followed by an increase in early seral vegetation (grasses, forbs, shrubs, and aspen) and vegetative diversity. To control the amount of vegetation lost at one time and allow for recovery of treated areas before more acres are treated, restrictions on the amount of a HUC 6 that can be treated at one time and grazing rest are design features of this alternative (see Design Features).

When vegetation is removed and ground is disturbed for temporary road construction and mechanical treatments there is an increased risk of invasive plant and noxious weed establishment. To reduce the risk of invasive plant and noxious weed establishment equipment would be washed and inspected, prior to entering National Forest System lands, to remove any soil and debris that may contribute to the spread of noxious weeds. Treatment areas would be monitored post implementation. If noxious and/or invasive weeds are detected, the District would take the appropriate actions to control spread and eliminate the noxious and/or invasive weeds from the treatment areas.

Indirect Effects

The short term loss of vegetation could result in a loss of Animal Unit Months (AUMs). The timeframe for this project is approximately 10 years which would be treating about 4,200 acres per year.

Resting treated areas from livestock grazing could lead to a loss of grazing opportunities for livestock permittees, through reducing the season of use or authorized numbers of livestock. If grazing opportunities are lost permittees will have to find other feed (AUMs) for their livestock during the rest period. Generally finding feed to replace lost AUMs on the forest is more expensive because the current grazing fee charged by the forest is $1.35/AUM. If permittees have to feed hay the cost of an AUM could be about $90 (1 AUM equals 900 lbs. of forage and hay is $200/ton, then (900/2000) x $200 = $90/AUM). Impacts to the permittees would be minimized through the use of herding and temporary electric fences so that treatment areas can be rested while non-treatment areas can continue to be grazed. Continued livestock grazing in the non-treatment areas is

subject to the Fishlake National Forest forage utilization standards and guidelines. Annual monitoring and enforcement of these standards and guidelines would continue.

Cumulative Effects

A list of the past, present and reasonably foreseeable actions that are relevant to range management on Monroe Mountain is included in Appendix A. Most of the projects identified in Appendix A are vegetation management and livestock grazing improvement projects. Vegetation management projects usually end up being beneficial for the rangeland resources. The livestock management projects distribute grazing over a larger area to reduce the impact to any particular location. Most of the acres treated on Monroe Mtn. have been through the use of fire (prescribed fire & wildfire). Prescribed fire is the treatment which will be used to treat most of the acres included in all the alternatives.

The past treatments in the aspen communities have been relatively small and the aspen regeneration (sprouts) have suffered from the effects of grazing, as animals keyed in on those small treatments which produced more and better forage. Appendix A shows that approximately 49,000 (28% of NFS acres on Monroe Mtn.) acres of vegetation (mixed vegetation types) have been or will be treated from 1969 – 2015 (46 years) a little over 1,000 acres per year. Alternative 5 would treat almost that many acres (42,000) in the aspen ecosystem in a ten year period 4,200 acres per year. Browse thresholds and response options are also proposed to help minimize impacts from overbrowsing of aspen by ungulates.

Alternative 5 is a large scale vegetation project designed to restore the aspen ecosystem on Monroe Mountain. Approximately 58% (41,525/71,000 = 58%) of the historical aspen ecosystem on Monroe Mountain will be treated by this alternative. The thought behind this large scale treatment is that to restore the aspen communities large landscape scale projects are needed so grazing animals won't overuse any one area and wipe out the aspen regeneration. This should be beneficial to the rangeland resources and provide more forage for grazing animals that are using the Monroe Mountain aspen ecosystem.

This 41,525 acres represents 24% (41,525/175,705 = 24%) of the NFS acres on Monroe Mountain. When added with the past, present and reasonably foreseeable actions the cumulative effect that Alternative 5 would have on the environment is that approximately 52% of the NFS acres on Monroe Mountain would have better forage conditions.

Mitigation Measures/Design Features

Before treatments take place on grazing allotments notify the livestock grazing permittees at least one year in advance of the treatments which would take place on their allotments and hold discussions on how best to rest the treated areas. Ensure the resting of treatment areas, herding, and electric fences are incorporated into Annual Operating Instructions. These actions will help ensure that permittees are in the communication loop and will give them enough time to plan for the resources they need to continue their operations.

Irreversible and Irretrievable Commitments of Resources

Since aspen reproduces by suckering, losing the aspen ecosystem entirely after treatment would be irreversible and irretrievable. Alternatives 2 through 5 are all large scale aspen ecosystem treatments designed to restore aspen ecosystems. Adequate regeneration and

protection of the regeneration from the effects of overgrazing (livestock/wildlife) are keys to the success of this project. The "Thresholds" document in Appendix D outlines the regeneration goals and response options that could be taken to control the effects of overbrowsing on aspen regeneration.

Conclusions

With many demands for forage in the West, including elk, deer, and permitted livestock grazing the decision to take No Action and face losing such prolific producers of forage as aspen are capable of should not be acceptable. A decision to make no changes in management (including no treatments) is still a decision and it carries its own risks and consequences as succession continues to move the vegetation toward late seral vegetation communities. The risks and consequences include (1) continued degradation of the aspen ecosystem, (2) continued loss of forage, and (3) increased risks of large wildfires with associated concerns.

Alternatives 2 through 5 are all large scale aspen ecosystem treatments designed to restore aspen ecosystems. These alternatives would treat approximately 23-27% of the NFS acres on Monroe Mountain. Adequate regeneration and protection of the regeneration from the effects of overgrazing (livestock/wildlife) are keys to the success of this project, to restore aspen ecosystems. Browse thresholds and response options are proposed to help minimize impacts from overbrowsing of aspen by ungulates. Rangeland resources on Monroe Mountain should benefit from any of the treatments. The difference between the alternatives in the amount of disturbance associated with the miles of temporary roads is small and should not affect the results of the project.

There were two issues effecting rangeland resources identified during project scoping. All the action alternatives (Alternatives 2 through 5) include design features to address the issues. **Issue 5** – *Browsing by domestic and wild ungulates on new aspen sprouts post-treatment and/or the continued high levels of aspen browsing in the stable aspen areas may result in complete loss of aspen stands.* The design features built into the action alternatives of this proposed project to address Issue 5 are included below. First, livestock would not be allowed to graze treated areas for at least two growing seasons after treatment. Second, the District is proposing quantifiable aspen browse thresholds and response options that would be implemented if thresholds are exceeded. These browse thresholds and response options are applicable to Alternatives 2-5. Based on implementation of the browse thresholds and response options, an adequate number of new aspen sprouts following treatments are expected to reach 6 feet height and stable aspen stands are expected to begin showing improvement; thus moving towards accomplishing the desired conditions outlined for this project.

Issue 6 – *Project activities may result in livestock permittees not having a place to graze their livestock while vegetation is reestablishing on Monroe Mountain (2 or more growing seasons).* The acres which are proposed for treatment in Alternatives 2 through 5 of this project are spread across 10 different grazing allotments. Impacts to the permittees would be minimized through the use of herding and temporary electric fences

so that treatment areas and/or stable aspen stands can be rested while non-treatment areas can continue to be grazed. The permittees would also be notified at least one year in advance of treatments being done on their allotments so that they can plan accordingly. Based on this summary, the District anticipates that permittees will have a place to graze their livestock while treatment areas or stable aspen stands are being temporarily rested.

There are two monitoring options being considered to complement the established and already on going monitoring of aspen stands on Monroe Mountain. These monitoring options are expected to give better understanding of wildlife use of aspen in the absence of livestock grazing. Monitoring option 2 would be the best option for range management because this option would rest 3,637 fewer acres than monitoring option 1. Monitoring option 2 would also spread the rested acres for monitoring across five allotments instead of one allotment. Compared to resting the Dairies pasture (monitoring option 1), the exclosures would be less disruptive to the rotation grazing system in place on the mountain, and would also likely generate more representative data, given their locations in diverse aspen communities and they will be subject to varying wild ungulate usage.

The difference in the effects of Alternatives 2 through 5 on the rangeland resources of Monroe Mountain are minor and are a function of the acres which will be treated under each alternative. Alternative 4 would be the best alternative for range management on Monroe Mountain because more acres, 27% of NFS land on Monroe Mountain, would be treated. This alternative has the potential to produce the biggest increase in forage resources for grazing animals.

After this analysis was completed an additional Northern goshawk nest with its associated territory was found near Indian Peak. Approximately 310 acres of the territory overlap this aspen project. These 310 acres occur mostly in stable aspen and make up less than 1% of the project area. If these 310 acres are not treated there would be little impact to rangeland resources on Monroe Mountain.

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Figures

Figure 2: Aspen Ecosystem on Monroe Mountain

Figure 3: Aspen Ecosystem on Monroe Mountain

Figure 4: Unsuccessful treatment on Monroe Mountain. There is no aspen regeneration left because it was grazed off.

Appendix A

Monroe Mountain Aspen Ecosystems Restoration Project

The past, present and reasonable foreseeable future actions include: (Some of these actions were summarized from Table 7 below)

- Approximately 1,962 acres of brushsaw fuels reduction work on Monroe Mountain.
- Approximately 6,194 acres of Dixie Harrow work on Monroe Mountain.
- Approximately 5,774 acres of mechanical harvest on Monroe Mountain.
- Approximately 19,774 acres of prescribed fire on Monroe Mountain.
- Approximately 12,895 acres being burned by wildfire on Monroe Mountain.
- Approximately 2,077 acres of tree planting on Monroe Mountain.
- Personal use Christmas tree sales on Monroe Mountain.
- Personal use fuelwood gathering on Monroe Mountain.
- Private land development including new homes on Monroe Mountain.
- Fuels reduction work on private lands
- Recreational use – primarily hiking, horseback riding, mountain biking, OHV use, cross-country skiing, hunting, fishing, and snowmobile use on Monroe Mountain.
- Swift Springs Water Development Project
- Monroe Mountain Livestock Management Improvement Project
- Livestock grazing.
- Livestock management adjustments under the purview of Forest Service administrative authorities found in 36 CFR 222.4.
- Ongoing maintenance of existing range infrastructure; fences, troughs, waterlines, etc.
- Ongoing maintenance of roads and trails.

Table 7: Past, Present and Reasonably Foreseeable Future Vegetation Related Actions on Monroe Mountain

Past, Present and Reasonably Foreseeable Future Actions on Monroe Mountain			
Name	**Type of Action**	**Year**	**Acres**
Blue Peak	Brushsaw	2003	766
Dukee Fuels	Brushsaw	2004	617
Thompson Basin	Brushsaw	2007	579
085 Road	Dixie Harrow	2000	22
Bagley North	Dixie Harrow	1997	47
Bell Rock	Dixie Harrow	1996	138
Big Flat	Dixie Harrow	2003	133
Blue Peak	Dixie Harrow	2003	766
Box Creek	Dixie Harrow	1995	29
Box Creek	Dixie Harrow	2003	104
Box Creek Retreat 1	Dixie Harrow	2008	156
Brindley Flat	Dixie Harrow	2006	40
Burnt Flat	Dixie Harrow	1995	96
Burnt Flat	Dixie Harrow	1998	316
Dry Creek	Dixie Harrow	2004	93
Durkee Springs	Dixie Harrow	2004	466
Forshea Mountain	Dixie Harrow	1999	65
Hells Hole	Dixie Harrow	2004	132
Indian Flat	Dixie Harrow	2003	14
Indian Flat	Dixie Harrow	2004	89
Indian Peak	Dixie Harrow	2006	95
Koosharem	Dixie Harrow	2003	76
Little Table	Dixie Harrow	1997	126
Rueben Burn	Dixie Harrow	2004	155
Six Patch	Dixie Harrow	1995	440
Six Patch	Dixie Harrow	2003	265
Six Patch/Rock Springs	Dixie Harrow	1995	109
Squaw Springs	Dixie Harrow	1995	440
Thurber Fork	Dixie Harrow	1998	570
Thurber Fork Retreat 1	Dixie Harrow	2009	461
Willis Spring	Dixie Harrow	2005	176
Twin Peaks	Dixie Harrow	2012	578
Big Flat Aspen 4,5 &6	Harvest	1983	4
Dry Creek –State	Harvest	1999	151
Annabella Aspen II	Harvest	2005	104

Doe Flat	Harvest	1992	28
Forshea	Harvest	1998	111
Indian Ranch	Harvest	1969	47
Langdon Mountain	Harvest	1969	17
Research Unit	Harvest	1998	12
South Monument Asp.	Harvest	1987	17
State Section 16	Harvest	1998	147
White Ledge	Harvest	1997	36
White Ledge B	Harvest	1998	71
Annabella	Harvest	2001	234
Annabella Aspen 3	Harvest	2005	22
Buck Hollow	Harvest	1994	24
Clover Flat	Harvest	1989	186
Cove Mtn. Salvage II	Harvest	1996	29
Cove Mtn. Salvage 1	Harvest	1993	9
Cove Mountain	Harvest	2014	1,774
Dry Lake	Harvest	1993	46
Langdon	Harvest	1991	151
Lone Pine	Harvest	1984	78
Lower Langdon	Harvest	1984	82
Mill #10	Harvest	2003	162
Mill #11	Harvest	2001	68
Mill #11a	Harvest	2003	68
Mill #8 Salvage	Harvest	1999	10
Mill #9 Salvage	Harvest	2000	52
Mill Creek	Harvest	2000	274
Monroe Peak	Harvest	1980	14
Monument Peak Salv.	Harvest	1998	60
Monument Peak Salv.II	Harvest	1999	131
North Clover	Harvest	2011	191
Pole Canyon	Harvest	1982	19
White Pine	Harvest	2000	49
White Pine 2	Harvest	2002	61
Wooten Spring	Harvest	1989	103
Mill 12	Harvest	2004	62
Box Creek Phase 1	Harvest	2012	386
Box Creek Phase 2	Harvest	2013	284
Monument Peak	Harvest	2014	400

Monument Peak	Prescribed Fire	2015	3,120
Box Creek	Prescribed Fire	2012	650
Box Creek	Prescribed Fire	2015	2,658
Twin Peaks	Prescribed Fire	2014	5,169
Kinney Spring	Prescribed Fire	1996	794
Greenwich Creek	Prescribed Fire	1996	83
Burnt Flat	Prescribed Fire	1983	359
Box Creek	Prescribed Fire	1997	509
Little Table	Prescribed Fire	1997	485
Bean Hill	Prescribed Fire	1986	123
Shaffers	Prescribed Fire	1997	334
Jackie Canyon	Prescribed Fire	1997	267
Rubens	Prescribed Fire	2005	948
Deer Spring	Prescribed Fire	1989	41
Buck Hollow	Prescribed Fire	1989	18
Tuft Draw	Prescribed Fire	1989	622
Deer Spring	Prescribed Fire	1988	195
Pine Canyon	Prescribed Fire	1996	434
Tibadore Pond	Prescribed Fire	1988	669
Tibadore Pond	Prescribed Fire	1989	387
Kingston Trough	Prescribed Fire	1980	255
Forshea	Prescribed Fire	1993	1,313
Thompson Basin	Prescribed Fire	2009	180
Thompson Basin	Prescribed Fire	2008	163
Annabella	Wildfire	2006	573
Bald Knoll	Wildfire	2003	68
Flat	Wildfire	1997	5,505
Hell Hole	Wildfire	1975	896
Killian Spring	Wildfire	1990	407
Monroe Canyon	Wildfire	1996	196
Monroe Mtn.	Wildfire	1979	8
Monroe Mtn.	Wildfire	1979	67
Oldroyd	Wildfire	2000	1,329
Thompson Basin	Wildfire	1996	103
Marysvale Peak	Wildfire	2005	759
Blackbird Mine	Wildfire	2006	1,463
Box Creek	Wildfire	2012	1,520

Appendix C

Appendix C is a detached excel file: Appendix_C_Range_Analysis_12_11_2014.xlsx

Appendix D

Browsing Thresholds and Adaptive Management Pursuant to Aspen Restoration on Monroe Mountain

15 January 2014

Goals:

- Establish thresholds of maximum percent browse for a given initial (post-treatment) or sustained (untreated 'stable' aspen) density of recruits that are expected to result in adequate recruitment to perpetuate the aspen stand.

- Establish timely adaptive management responses that will take place if thresholds are not met.

- Offer these recommendations fully recognizing that livestock and wildlife management decisions are made within well-established policy structures in USDA-Forest Service and Utah Division of Wildlife Resources, respectively.

Needed:

Detection methods that document shoot density, height progression, and browsing intensity, as they may vary independently

1) **Aspen-mixed conifer post-treatment (prescribed fire and/or mechanical) areas**
    a. Characteristic sprouting: a dense stand of similar-aged (cohort) aspen sprouts, although some stands may exhibit relatively weak sprouting initially due to depleted root systems, genetic variation, shading by conifers, or other factors.
    b. A proposed quantitative threshold: Use the chart and figure below, adapted from estimation of the maximum browsed aspen allowed that would assure the conservative outcome of at least 400-600 recruits[3]/acre (i.e. 1,000-1,500 recruits/hectare; Mueggler 1989, Campbell and Bartos 2001) (Attachment A and B).
        i. Assumptions for the probability table and figure
            1. Once a shoot is browsed (majority of top 6" [150 mm] of leaders,) the probability of it recruiting into the overstory is extremely low.

[3] A recruit is defined as an aspen shoot that has successfully reached full canopy height.

2. A conservative minimum of 1,000 saplings[4]/acre (2,500 saplings /ha) is needed to regenerate a fully stocked aspen stand.
3. Unbrowsed shoots will reach a relatively safe height (approximately 6' or 1.8 m) in 4-6 years.
4. Shoots occur as a single pulse or cohort (same or similar age) of regeneration (no secondary regeneration).
5. There is no mortality to other causes.[5]
6. The level of browsing as defined by the percent of total shoots browsed is constant (from year to year and across spatial variation in shoot density).
7. Browsers show no preference between browsed and un-browsed shoots.

ii. The assumptions will not hold in the field but the table and figure provide an initial basis for deriving appropriate thresholds that predict success or failure for aspen recruitment after treatments (mechanical or fire) that result in a range of initial densities.

iii. Application of the table or figure will require a method to select the appropriate number of years (i.e. 4-6) for shoots to attain 'safe' heights. This can be based on site productivity, weather conditions, cumulative experience, etc.

2) Table 1. Suggested annual browse thresholds.

Years after which 1,000 aspen saplings (≥6' tall)/acre will be present	5,000 initial sprouts/ acre	10,000 initial sprouts/ acre	20,000 initial sprouts/ acre	30,000 initial sprouts/ acre	40,000 initial sprouts/ acre
	percent browse				
4	32	43	52	57	60
5	27	36	45	49	52
6	23	31	39	43	45

[4] A sapling is an aspen shoot = 6-12' (1.8-3.7 m) height
[5] It is true that at high densities (e.g. 20,000 shoots per acre), reductions in stem density through natural thinning will be substantial. This thinning will continue in the sapling stage but this is accounted for as the stand can thin from 1,000 to 400-600 stems per acre as the stand matures.

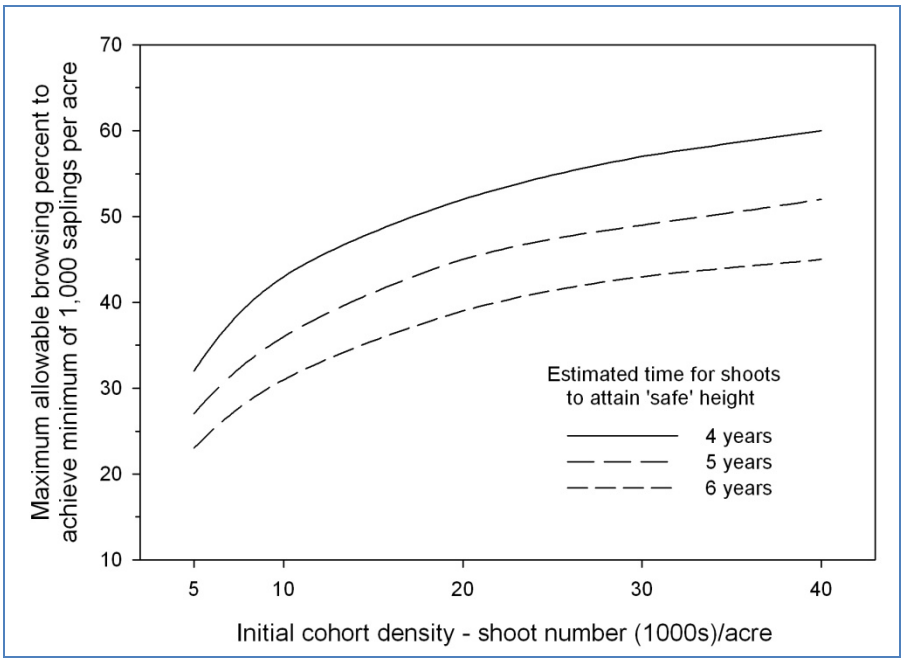


Figure 1. Projected maximum browse pressure in relation to initial aspen shoot density and time (years) needed for shoots to reach a safe height.

c. Suggested browse threshold detection
    i. Use two perpendicular belt transects (e.g., 6’ x 100’ or 2m x 30m) per plot, and include pellet counts for insight into use by types of ungulates.
    ii. A minimum of one plot per 300 acres (120 ha) treated, but a greater number of plots when needed to assess percent browse.
    iii. The plots should reflect the variability of the treatment area. Care should be taken to adequately represent areas of known higher use and/or vulnerability, e.g., <30% slope, <30 pre-treatment aspen stems/acre among the conifer.
    iv. Browse thresholds for a specific treatment are violated (exceeded) when:
        1. Across all plots, average plot browse percentage exceeds the maximum allowable browse threshold calculated from plot shoot density ; or
        2. At least 40% of the individual plots associated with the treatment exceed the percent browse threshold.[6]
    v. The above monitoring scheme will be adapted as necessary on the basis of experience using this scheme.
d. Browse threshold benchmarks for post-treatment aspen-mixed conifer

[6] Both elements of threshold exceedance are important to avoid outliers having determinative influence.

i. Browse = apical meristem damaged or removed on a majority of leaders within 6 vertical inches of the tallest leader.
ii. More than 20% of sprouts are browsed each year in stands with less than 5,000 initial post-treatment sprouts/acre.
iii. More than 27% of sprouts are browsed each year in plots with 5,000-10,000 initial post-treatment sprouts/acre
iv. More than 36% of sprouts are browsed each year in plots with 10,000-20,000 initial post-treatment sprouts per acre.
v. More than 45% of sprouts are browsed each year in plots with more than 20,000 initial post-treatment sprouts per acre.
vi. The above percent browse thresholds are comparable to those recommended by Olmstead (1979; 30%), Jones et al. (2005; 20%) and White and Feller (2001) while allowing for a greater range in sprout number. These values should be adapted as necessary on the basis of observed success in stand recruitment.

e. Adaptive management
i. Scale and timing of aspen restoration treatments: Recognizing that the scale and timing of treatments are likely to affect the level of impact that both wild and domestic grazers have on aspen response to treatments, consider designing treatments that would occur at the largest practical scale (neighborhood of 5,000 acres annually), while still being sensitive to other resource concerns (i.e. aquatics) for any given year. Adaptive management responses and their probability of success are expected to be highly correlated with the location, timing, and scale of treatments.
ii. Prior to treatments, recommend to the UDWR, RAC and the Utah Wildlife Board a pre-approved antlerless hunt that could be implemented, if deemed necessary, immediately following treatments in order to reduce browse pressure adequately to facilitate greater aspen recruitment. This recommendation would be subject to the Wildlife Board and RAC approval process. If approved and following treatments, the UDWR, in coordination with the USDA Forest Service, would initiate implementation of the antlerless hunt.
iii. Post-treatment period with no livestock use: If browse thresholds are exceeded during the period of rest from livestock use (typically 2 years post-treatment),
the USDA Forest Service undertakes one or more of the following adaptive management responses in order to achieve balanced livestock and wildlife use, while avoiding exceeding browse thresholds:

a. Recommend to the UDWR, RAC and the Utah Wildlife Board a reduction of wild ungulate browsing pressure

using antlerless hunts as needed at levels expected to result in sufficient reduction in browse to avoid surpassing browse thresholds. This recommendation would be subject to the Wildlife Board and RAC approval process.

b. Co-ordinate with the UDWR to hire/contract adequate number of seasonal employees and/or coordinate the use of volunteers (i.e. Dedicated Hunter Program) to spend time in treatment areas hazing wildlife at levels expected to result in sufficient reduction in browse to avoid surpassing browse thresholds.
c. Treatment areas be fenced for protection.
d. Restrict livestock use until aspen recovery objectives are met.

iv. Post-treatment period after return of livestock to treatment area(s): If percent browse threshold is exceeded in a treatment area(s) grazed by both wild ungulates and livestock (typically after 2 years post-treatment), the USDA Forest Service undertakes one or more of the following adaptive management responses in order to achieve balanced livestock and wildlife use, while avoiding exceeding browse thresholds:

a. Recommend to the UDWR, RAC and the Utah Wildlife Board a reduction of wild ungulate browsing pressure using antlerless hunts as needed at levels expected to result in sufficient reduction in browse to avoid surpassing browse thresholds for combined livestock and wildlife use. This recommendation would be subject to the Wildlife Board and RAC approval process.
b. Co-ordinate with the UDWR to hire/contract adequate number of seasonal employees and/or coordinate the use of volunteers (i.e. Dedicated Hunter Program) to spend time in treatment areas hazing wildlife at levels expected to result in sufficient reduction in browse to avoid surpassing browse thresholds.
c. Fence treatment areas.
d. Improve time, timing and intensity of livestock grazing.
e. Recommend to the UDWR utilize the Grass Bank Program on state Wildlife Management Areas to help offset temporary loss of livestock opportunities.

v. The above mentioned adaptive management responses are not intended to be all inclusive. Additional or alternative adaptive

management responses that are proposed, and which have been shown to be effective, should also be considered.

vi. After overstory aspen trees are removed or killed (i.e., mechanical or burn treatment), healthy roots systems typically are able to sustain vigorous shoot growth for a limited time (2-3 years,) providing a brief opportunity to modify management when browse pressure exceeds threshold levels. Therefore, the above mentioned potential adaptive management responses have been identified for consideration as timely management responses as each treatment phase is implemented.

vii. Although management changes that reduce wild or domestic ungulate numbers may be necessary to restore healthy aspen communities on Monroe Mountain, such changes will be viewed as temporary and will not be interpreted as support for permanent or long-term reductions in stocking levels or population objectives. The Forest Service should be actively engaged in the UDWR's elk management plan revision process in order to promote understanding and consideration of resource conditions on objectives.

viii. If adaptive management responses are needed, the number and type of responses are anticipated to vary depending on location and timing of treatments. Considering the location, size, and timing of treatments, adaptive management responses and the probability of success are expected to vary. Decision authorities for the adaptive management responses also vary. For these reasons, continued and close communication between USDA Forest Service, UDWR, RAC, Utah Wildlife Board and all other interested stake holders is critical. The adaptive management responses are intended to avoid surpassing browse thresholds and to achieve a 1,000 saplings/acre.

3) Stable aspen stand response to changed management of ungulates and of fire and mechanical treatments in aspen-mixed conifer

a. <u>Long-term monitoring plots</u>: Sixty long-term monitoring plots will be established to represent the range of conditions thought to occur in stable aspen stands on Monroe Mountain. Aspen stands will be classified as stable when all of the following criteria are met.

i. Mature conifer stem counts per unit of area (acre) < 20% of total mature tree stem count (surrogate for BA [basal area] or cover)

ii. Total conifer stems (all sizes) < 40/acre (100/ha)

iii. Judgment will be used when required. For example, apparent intermixing of stable and seral conditions across uniform topography may require moving the plot to where stable conditions prevail. In addition, the age/size structure of conifer populations might be used supplementally to infer stand stability.

Data will be collected on overstory condition, aspen regeneration and recruitment (including browse use), fecal pellets and cow pies and understory for these plots starting in 2013. These data will provide a baseline dataset from which to detect change in subsequent years. Data for aspen shoot density, height, and percent browse will continue to be collected on an annual basis. Overstory and understory data will be collected at longer intervals (3-5 years).

b. Stable aspen stand type classification: Although it is well recognized that in many areas stable aspen is not recruiting, it should be assumed that some plots will be located in stands that are appropriately described as self-replacing. Self-replacing stands may be classified into three basic conceptual types with intermediate conditions expected. These stand types are: 1) stands of dense, even-aged stems that have successfully recruited following recent (10-30+ yrs.) disturbance (e.g. fire or mechanical) to heights that they are now safe from ungulate browse pressure and generally exhibit little or no new regeneration; 2) stands with depleted overstories but with vigorous regeneration and ample stems in the sapling to sub-canopy size classes; or 3) multi-aged stands with stratified canopies (long time since last disturbance). It is essential that we be able to characterize all types of self-replacing, stable aspen stands using reasonable metrics to in turn be able to quantify the variables that will be used in their classification.

    i. **Stable Aspen stand type 1 (SA1)** will have a minimum of 1,000 live stems/ acre (2,470 stems/ha). This is approximately double the density of a fully stocked aspen stand (Mueggler 1989, Guidelines for Aspen Restoration 2010). Subsequently, additional natural thinning is expected. Aspen stands with densities greater than 1,000 live stems/acre are common when vigorous suckering follows disturbance (e.g., fire) in healthy aspen stands and browse impacts remain low. Consequently, tree density is high enough that the absence of active shoot generation in SA1 stands should not be considered a disqualifier for self-replacing status.

    ii. **Stable Aspen stand type 2 (SA2)** is what might be expected when stands with depleted overstories exhibit sufficient recruitment that full recovery is expected as stems mature. In general, recruitment synchrony for self-replacing SA2 stands is intermediate between that of the disturbance-initiated SA1 stands and that of the more continuous stable aspen type 3 (SA3) stands described below. The upper density limit for live canopy trees is arbitrarily set at 200/acre for the SA2 stand type, or less than half that of a fully stocked aspen stand. SA2 stands are further sub-divided into four levels based upon the combined

density of sapling and sub-canopy trees[7] relative to the density of live canopy trees. The levels are defined as follows: **full self-replacing (SA2-F)** when the combined density of saplings and sub-canopy trees is ≥ 200% of the density of live canopy trees; **transitional self-replacing (SA2-T)** when the combined density of sapling and sub-canopy trees is ≥ 100% but < 200% of the live canopy-tree density; **marginal self-replacing (SA2-M)** when the combined density of sapling and sub-canopy trees is ≥ 50% but < 100% of the live canopy-tree density; and **non-self-replacing (SA2-N)** when the combined density of sapling and sub-canopy trees is < 50% of the live canopy-tree density.

Table 2. Threshold benchmarks for Full, Transitional, and Marginal self-replacing levels of Class 2 stable aspen (SA2).

Density of live canopy trees	Minimum sapling + sub-canopy tree density for SA2-F level	Minimum sapling + sub-canopy tree density for SA2-T level	Minimum sapling + sub-canopy tree density for SA2-M level
		(trees/acre)	
200	400	200	100
150	300	150	75
100	200	100	50
50	100	50	25
25	50	25	13

iii. All self-replacing, stable aspen stands not classified as type SA1 or SA2 will by default be classified as **stand type 3 (SA3)**; multi-aged stands with densities that are greater than 200 and less than 1000 live trees/acre. Stratified canopies of continuous or pulsed recruitment and a basal level of new shoot production are descriptive of SA3 stands. In reality SA2 and SA3 stand types represent different segments on a single continuum of overstory condition; however, the corresponding recruitment effort may differ substantially between the two types as a function of overstory live-tree density and corresponding differences in

[7] Sub-canopy trees are >12' (3.65 m) in height with crowns clearly below the dominant canopy structure which will vary in height for mature stands with microsite conditions and genotype.

apical dominance. Specifically, as canopy tree density increases for SA2, a corresponding 2-fold increase in recruitment-size stems is required to qualify for the fully self-replacing status. However for SA3 stands, sapling/sub-canopy tree density is expected to decrease with increasing canopy density (Figure 2). Thus at the low end of the SA3 spectrum (200 live canopy trees/acre), a minimum of 400 saplings/sub-canopy trees per acre are required for full self-replacing (SA3-F) status while at the high end (999 live canopy trees/acre) none are required for the same. More specifically, SA3 stands will be assigned to the **SA3-F (full self-replacing)** level based upon the following equation where (a) = density of live canopy trees and (b) = combined density of saplings and sub-canopy trees.

$$b \geq a\,(-0.5) + 500$$

Stands will be assigned to the **SA3-T (transitional self-replacing)** level if the sapling + sub-canopy density is at least ½ of the minimum threshold for F-SR status as indicated by the equation:

$$a\,(-0.5) + 500 > b \geq a\,(-0.25) + 250$$

Stands will be assigned to the **M-SR (marginal self-replacing)** level if sapling + sub-canopy density is at least ¼ of the minimum threshold for F-SR status as indicated by the equation:

$$a\,(-0.25) + 250 > b \geq a\,(-0.125) + 125$$

SA3 stands are assigned to the **N-SR (non-self-replacing)** level when recruiting stem densities are below the M-SR minimum threshold:

$$b \geq a\,(-0.125) + 125$$

Table 3. Threshold benchmarks for Full, Transitional, and Marginal self-replacing levels of Class 3 stable aspen (SA3).

Density of live canopy trees	**Minimum sapling + sub-canopy tree density for SA3-F level**	**Minimum sapling + sub-canopy tree density for SA3-T level**	**Minimum sapling + sub-canopy tree density for SA3-M level**
		(trees/acre)	
200	400	200	100
400	300	150	75

600	200	100	50
800	100	50	25
1000	0	0	0

c. Stable aspen improvement thresholds: Using 2013 (and possibly 2014) monitoring data, each of the 60 stable aspen plots will be classified into the appropriate class and level based upon live canopy tree and recruitment (saplings + sub-canopy trees) densities as described above. Although monitoring will continue on all plots, those plots initially classified as SA1 or SA2/SA3 level F (fully self-replacing), will not be used to determine treatment-related improvement in stable aspen because it is assumed that these plots are already fully self-replacing.

Improvement for the subset of plots initially classified in levels T (transitional), M (marginal), and N (non-self-replacing) will be recognized and documented when plots move upward from one level to another (N to M, M to T, T to F). Similarly, degradation will be acknowledged if plots drop a level.

i. A minimum benchmark of success in restoring stable aspen on Monroe Mountain will be that average improvement for all eligible plots (SA2 and SA3 levels T, M, and N) must be equal to one full level increase as a benefit of the project. Thus, for every plot that fails to move up a level, another will have to move up two levels. Plot degradation (drop in levels) will also be factored in.

ii. It is not acceptable to have to wait 10-15 years until the entire Monroe Mountain project is completed to determine the degree to which it has been successful. A process must be adopted to incrementally assess whether management actions are leading to the desired outcome and, if not, additional management actions on the mountain will be warranted.

iii. Aspen response (including stable aspen) should be proportional to the area treated (as a percent of the total area planned for treatment) across the duration of the project. It may not be possible to accurately predict how browse relief will be distributed spatially. Therefore, stable aspen improvement should be interpreted at the broadest spatial scale (all 60 plots). For example, one scenario might allow that 10% of the area planned for treatment, be treated. Assuming in the same scenario that 50 of the 60 stable aspen plots are classified as being eligible for improvement (as defined above) then an expectation for reclassification to at least one level higher might be expected for a minimum of 5 (10%)

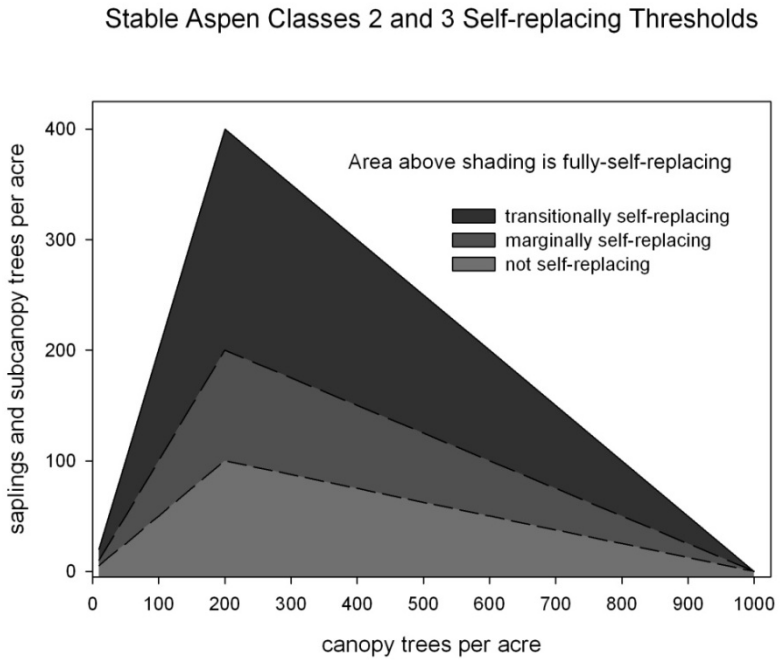
of the 50 eligible plots, with no plots being downgraded in response to this first year of treatment. It is anticipated that level changes may be detectable within 3 years of treatment.

d. Adaptive management: A failure to detect sufficient improvement after an appropriate lag time (allowing some flexibility for unknowns such as extreme weather events) will trigger a recommendation for an appropriate adaptive management response(s) (selecting from the adaptive management responses listed above) to temporarily reduce browse pressure by domestic and/or wild ungulates sufficient to allow for stable aspen recovery. These recommendations will not be interpreted as endorsement of permanent changes in livestock or wildlife management. As additional area is treated, a proportionate increase will be expected in the number of plots that improve sufficiently to warrant reclassification to a higher level. A lag period of approximately 3 years will continue to be employed for each treatment. Hypothetically, this could result in a recommendation to reduce browse pressure after treatment of seral aspen stands even when aspen recovery within the treatment area is satisfactory but where there is no corresponding improvement in stable aspen monitoring plots. The opposite is also possible, that is we could have improvement in stable aspen but unsatisfactory results in the treated area. Either way, under these conditions management actions designed to reduce browse pressure would be desirable.

e. Boundaries described herein between stable aspen classes and levels of recruitment, though somewhat artificial, are based upon expert opinion and best science available. These boundaries are subject to modification if site-specific data from stable aspen plots and/or exclosures provide clear rationale for doing so. The lag period (3 years) between treatment and time of expected recruitment enhancement may also be adjusted with experience. In such cases, proposed changes and supporting rationale will be documented and subject to review prior to implementation. For this reason, continued and close communication between USDA Forest Service, UDWR, RAC, Utah Wildlife Board and all other interested stake holders is critical.

f. Stable aspen classes and recruitment levels are based directly upon the densities of stems that reach relatively safe heights and will not initially take into account the browse intensity values that will clearly influence those densities. Patterns in annual browse data will be analyzed over time with the objective of determining how they might be incorporated to improve assessments of stable aspen condition and trajectory on Monroe Mountain.

Figure 2.



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Monroe Mountain Aspen Ecosystems Restoration Project - Range Analysis - Appendix C

			Alternative 1	Alternative 2						Alternative 3						Alternative 4						Alternative 5					
Allotment Name	Pasture Name	Total Pasture Acres	Acres Being Treated	Mechanical & Slash Burning (Acres)	Mechanical & Slash Burning Percent of Pasture Being Treated	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire Mixed Burn Severities Factoring 60% of Acres Get Treated	Prescribed Fire Mixed Burn Severities Percent of Pasture Being Treated	All Treatments Combined Percent of Pasture Being Treated	Mechanical & Slash Burning (Acres)	Mechanical & Slash Burning Percent of Pasture Being Treated	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire Mixed Burn Severities Factoring 60% of Acres Get Treated	Prescribed Fire Mixed Burn Severities Percent of Pasture Being Treated	All Treatments Combined Percent of Pasture Being Treated	Mechanical & Slash Burning (Acres)	Mechanical & Slash Burning Percent of Pasture Being Treated	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire Mixed Burn Severities Factoring 60% of Acres Get Treated	Prescribed Fire Mixed Burn Severities Percent of Pasture Being Treated	All Treatments Combined Percent of Pasture Being Treated	Mechanical & Slash Burning (Acres)	Mechanical & Slash Burning Percent of Pasture Being Treated	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire Mixed Burn Severities Factoring 60% of Acres Get Treated	Prescribed Fire Mixed Burn Severities Percent of Pasture Being Treated	All Treatments Combined Percent of Pasture Being Treated
Dry Lake	Buck Hollow	2,652	0	-	0%	301	180	7%	**7%**	-	0%	301	180	7%	**7%**	-	0%	301	180	7%	**7%**	-	0%	301	180	7%	**7%**
	Dyches Draw	1,209	0	20	2%	763	458	38%	**40%**	25	2%	784	470	39%	**41%**	25	2%	784	470	39%	**41%**	229	19%	555	333	28%	**46%**
	Little Pole	1,386	0	-	0%	37	22	2%	**2%**	-	0%	37	22	2%	**2%**	-	0%	37	22	2%	**2%**	-	0%	37	22	2%	**2%**
	Pine Canyon	1,288	0	-	0%	38	23	2%	**2%**	-	0%	38	23	2%	**2%**	-	0%	38	23	2%	**2%**	-	0%	38	23	2%	**2%**
	Tuft Draw	1,847	0	14	1%	984	591	32%	**33%**	40	2%	998	599	32%	**35%**	40	2%	998	599	32%	**35%**	133	7%	866	519	28%	**35%**
Forshea	Tibadore	8,202	0	42	1%	973	584	7%	**8%**	56	1%	1,014	608	7%	**8%**	56	1%	1,014	609	7%	**8%**	115	1%	899	539	7%	**8%**
Glenwood	Bell Rock	1,146	0	-	0%	21	13	1%	**1%**	-	0%	21	13	1%	**1%**	-	0%	21	13	1%	**1%**	-	0%	21	13	1%	**1%**
	Big Lake	2,105	0	603	29%	310	186	9%	**37%**	752	36%	282	169	8%	**44%**	820	39%	219	131	6%	**45%**	871	41%	40	24	1%	**43%**
	Circle	3,562	0	279	8%	1,568	941	26%	**34%**	530	15%	1,433	860	24%	**39%**	1,236	35%	865	519	15%	**49%**	415	12%	1,433	860	24%	**36%**
	Davis Hollow	1,770	0	123	7%	68	41	2%	**9%**	211	12%	19	11	1%	**13%**	220	12%	20	12	1%	**13%**	171	10%	19	11	1%	**10%**
	Section 5	2,066	0	534	26%	382	229	11%	**37%**	1,261	61%	201	120	6%	**67%**	1,775	86%	30	18	1%	**87%**	845	41%	68	41	2%	**43%**
Hunts Lake	Hunts Lake	7,413	0	240	3%	3,078	1,847	25%	**28%**	735	10%	2,844	1,706	23%	**33%**	1,322	18%	2,441	1,465	20%	**38%**	809	11%	2,770	1,662	22%	**33%**
Koosharem	Box Creek	7,908	0	24	0%	229	137	2%	**2%**	24	0%	229	137	2%	**2%**	24	0%	229	137	2%	**2%**	24	0%	229	137	2%	**2%**
	Burnt Flat	4,539	0	1,686	37%	218	131	3%	**40%**	1,687	37%	217	130	3%	**40%**	1,687	37%	217	130	3%	**40%**	1,687	37%	217	130	3%	**40%**
	Dairies	4,212	0	18	0%	489	293	7%	**7%**	18	0%	489	293	7%	**7%**	18	0%	489	293	7%	**7%**	18	0%	489	293	7%	**7%**
	Greenwich-Squaw Spring	4,654	0	1,585	34%	370	222	5%	**39%**	1,658	36%	379	227	5%	**41%**	1,768	38%	376	225	5%	**43%**	1,575	34%	379	227	5%	**39%**
	Indian Ranch	1,062	0	20	2%	60	36	3%	**5%**	23	2%	61	37	3%	**6%**	75	7%	39	23	2%	**9%**	19	2%	61	37	3%	**5%**
	Koosharem Canyon	11,340	0	57	1%	240	144	1%	**2%**	54	0%	243	146	1%	**2%**	54	0%	243	146	1%	**2%**	54	0%	243	146	1%	**2%**
	Monroe Creek	3,900	0	656	17%	1,468	881	23%	**39%**	1,302	33%	1,373	824	21%	**55%**	2,468	63%	488	293	8%	**71%**	1,679	43%	436	261	7%	**50%**
	Rim Seep	2,184	0	295	13%	8	5	0%	**14%**	295	13%	8	5	0%	**14%**	295	13%	8	5	0%	**14%**	295	13%	8	5	0%	**14%**
Manning Creek	Big Flat	1,255	0	58	5%	638	383	31%	**35%**	219	17%	657	394	31%	**49%**	219	17%	657	394	31%	**49%**	165	13%	530	318	25%	**38%**
	Big Table	1,359	0	43	3%	372	223	16%	**20%**	302	22%	413	248	18%	**40%**	572	42%	413	248	18%	**60%**	143	11%	270	162	12%	**22%**
	Little Table	1,768	0	-	0%	49	29	2%	**2%**		0%	49	29	2%	**2%**	-	0%	49	29	2%	**2%**	-	0%	49	29	2%	**2%**
	Manning Creek	1,659	0	18	1%	609	365	22%	**23%**	19	1%	627	376	23%	**24%**	19	1%	627	376	23%	**24%**	53	3%	574	344	21%	**24%**
	Manning Meadows	1,758	0	53	3%	516	310	18%	**21%**	313	18%	412	247	14%	**32%**	800	46%	58	35	2%	**47%**	289	16%	312	187	11%	**27%**
	Smith Canyon	2,551	0	-	0%	4	2	0%	**0%**		0%	4	2	0%	**0%**	-	0%	4	2	0%	**0%**	-	0%	4	2	0%	**0%**
	Windy Ridge	3,800	0	60	2%	1,067	640	17%	**18%**	94	2%	1,122	673	18%	**20%**	94	2%	1,122	673	18%	**20%**	476	13%	651	390	10%	**23%**
Marysvale	Marysvale Peak	9,589	0	40	0%	3,714	2,228	23%	**24%**	226	2%	3,649	2,189	23%	**25%**	437	5%	3,475	2,085	22%	**26%**	447	5%	3,312	1,987	21%	**25%**
Monument-Glenwood	Monument-Glenwood	11,129	0	568	5%	5,347	3,208	29%	**34%**	1,896	17%	4,178	2,507	23%	**40%**	3,262	29%	2,991	1,794	16%	**45%**	2,211	20%	3,703	2,222	20%	**40%**
Rock Springs	Bean Hill	3,346	0	516	15%	777	466	14%	**29%**	606	18%	826	496	15%	**33%**	668	20%	826	496	15%	**35%**	641	19%	649	389	12%	**31%**
	Spring	2,864	0	10	0%	424	254	9%	**9%**	42	1%	432	259	9%	**11%**	42	1%	432	259	9%	**11%**	3	0%	429	257	9%	**9%**
	Wills Resevoir	2,663	0	404	15%	432	259	10%	**25%**	753	28%	502	301	11%	**40%**	1,022	38%	502	301	11%	**50%**	798	30%	36	21	1%	**31%**
Scrub Flat	Scrub Flat	8,723	0	155	2%	4,213	2,528	29%	**31%**	421	5%	4,227	2,536	29%	**34%**	681	8%	4,136	2,482	28%	**36%**	825	9%	3,541	2,124	24%	**34%**
Kingston	East	1,449	0	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**
	Middle	1,573	0	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**
	Pole Canyon	2,283	0	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**
	South	1,777	0	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**
	West	3,660	0	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**	-	0%	-	-	0%	**0%**
None	None	38,055	0	64	0%	3,223	1,934	5%	**5%**	81	0%	3,287	1,972	5%	**5%**	134	0%	3,286	1,972	5%	**6%**	81	0%	3,287	1,972	5%	**5%**
Total		**175,706**	**0**	**8,183**	**5%**	**32,991**	**19,795**	**11%**	**16%**	**13,644**	**8%**	**31,355**	**18,813**	**11%**	**18%**	**19,834**	**11%**	**27,435**	**16,461**	**9%**	**21%**	**15,069**	**9%**	**26,453**	**15,872**	**9%**	**18%**

Appendix M – Monroe Mountain Aspen Ecosystems Restoration Project Recreation Specialist Report (Christensen 2015b)

Prepared by:

Dave A. Christensen
Fishlake Forest Recreation Specialist

For:

Richfield Ranger District
Fishlake National Forest

June 7, 2015

Executive Summary

The purpose of this project is to restore aspen ecosystems on the Monroe Mountain by achieving the desired conditions outlined in the Fishlake National Forest's Land and Resource Management Plan. The area affected by the proposal includes Monroe Mountain, located in south-central Utah, south of Richfield, west of Koosharem, and east of Marysvale, encompasses approximately 175,706 acres of National Forest lands administered by the Fishlake National Forest, Richfield Ranger District, and approximately 11,805 acres of private inholdings. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire because of an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. Restoring aspen communities on Monroe Mountain will result in multiple benefits.

This report considers potential effects to recreation resources as a result of the no action and four action alternatives of the Monroe Mountain Aspen Ecosystems Restoration Project. Mechanical treatments would affect 5% to 11% of the project area. Prescribed fire would affect 15% to 19% of the project area. Stumps and burn piles would be noticeable as well as a charred landscape in the treated areas. Treatments would be completed in a mosaic pattern and would over time improve plant size, age and species diversity. Fire breaks and control lines would be feathered to appear natural. Stumps would be cut mostly flush with the ground. Tracked vehicles would be used for mechanical treatments and temporary roads would be reclaimed. The effects would quickly lessen as vegetation grows and would be the same or better than current conditions within three to five years.

The four action alternatives (including mechanical options 1 & 2) would disrupt recreation use during implementation, yet would return to normal after completion. The annual Rocky Mountain ATV Jamboree is held the third week of September. Hundreds of participants ride the Monroe Mountain and would be affected by closures and smoke if project activities take place during that week. Hunting during the late summer and fall months would be affected by closures and smoke during implementation. Trails may need clearing plus signs and blazes replaced or cairns installed after project implementation.

Based upon my findings, I conclude the action alternatives would move conditions closer to desired conditions in all measures evaluated. All of the action alternatives comply with the Forest Plan in that forest resource uses or activities should meet recreation objectives. Burning and mechanical treatments will enhance aspen ecosystems and over time maintain or improve recreation resources.

No action would result in a much slower movement towards desired conditions and desired conditions would not be achieved in the foreseeable future. Recreation resources would remain unchanged.

Introduction

Monroe Mountain, located in south-central Utah, south of Richfield, west of Koosharem, and east of Marysvale, encompasses approximately 175,706 acres of National Forest lands administered by the Fishlake National Forest, Richfield Ranger District, and approximately 11,805 acres of private inholdings. Of these 175,706 acres, quaking aspen (*Populus tremuloides*) historically occurred on approximately 71,000 acres on Monroe Mountain. Soil survey information was used to estimate the historic occurrence of aspen. It is widely recognized that aspen ecosystems are capable of supporting one of the largest arrays of plant and animal species due to its high productivity and structural diversity. However, it is also widely recognized that aspen ecosystems have been in decline throughout the Intermountain West during the twentieth century.

On Monroe Mountain, unsustainable aspen ecosystem conditions include, but are not limited to, (1) conifer encroachment due to reduced fire, and (2) lack of recruitment due to domestic and wild browsing by cattle, sheep, elk, and deer. Absence of fire and overbrowsing has been identified by the District as the primary underlying causes for aspen ecosystems on Monroe Mountain being at risk. Aspen of 5 to 15 feet in height ("recruitment") are uncommon on Monroe Mountain, despite continued sprouting of aspen ("regeneration"). Due to high cost and continual maintenance, fencing is not a long-term sustainable response option for protecting aspen sprouts from overbrowsing, and does not address underlying causes of the lack of recruitment.

Aspen is a keystone species and historically was a landscape dominant on Monroe Mountain. Aspen ecosystems support the highest level of biodiversity for interior western forests and the productivity of aspen ecosystem understories (grass, forbs, and shrubs) is higher than all other forest types. Individual aspen trees arise almost exclusively from root suckers and are relatively short-lived (i.e. 100 to 200 years). Aspen is shade intolerant and sprouts heavily following disturbance, such as fire, and benefits from disturbance especially where conifer currently shades and competes with aspen. Mechanical treatments can also be an effective disturbance tool for aspen restoration.

Regulatory Framework

The Fishlake National Forest Land and Resource Plan (LRMP 1986) in Forest Direction Goals for Recreation states the following (Page IV-3):

- Provide motorized recreation opportunities.
- Bring off-road vehicle (ORV) use into harmony with land capability.
- Provide for non-motorized recreation opportunities in selected areas.
- Manage the land and activities on it, including visitor use, to achieve desired physical and social recreation settings.
- Provide additional sites and facilities on the Forest.
- Provide trailhead (motorized and on-motorized use) with facilities for winter and summer use.
- Provide and manage opportunities for winter recreation uses.
- Inform the public about physical, historic and resource management activities of the Fishlake National Forest.
- Provide a trail system for public resource needs.

- Encourage private enterprise to provide needed recreation services not traditionally supplied by the Forest Service.

Resource Issues and Purpose and Need

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions described in the EIS. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire because of an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. Restoring aspen communities on Monroe Mountain will result in multiple benefits, which include but are not limited to:

- Improving and increasing the amount of habitat for wildlife species dependent upon aspen ecosystems (i.e., mule deer, elk, and Northern goshawk);
- Improving and increasing the amount of habitat and forage for domestic ungulates (i.e., cattle and sheep);
- Improving native species diversity;
- Reducing hazardous fuel accumulations;
- Reducing the risk for large-scale, intense wildland fires. This results in lower risk to the safety of the public and firefighters. This also results in lower risk to sensitive wildlife species (i.e. Northern goshawk, Western Boreal toad *(Bufo boreas*), and Bonneville cutthroat trout (*Oncorhynchus clarki utah*)); and,
- Increasing the probability that future naturally caused fires can be managed (if possible, not suppressed) and allowed to play the greatest feasible natural role in the aspen ecosystems on Monroe Mountain (Utah Fire Plan 2001).

The interdisciplinary team reviewed the scoping comments from public individuals, interest groups, local governments, and other agencies, to develop a list of issues to address. The issues were separated into two groups: key and non-key issues. Key issues were defined as those directly or indirectly caused by implementing the proposed action. Non-key issues were identified as those: (1) Addressed through Land and Resource Management Plan (LRMP) or implementation of LRMP standards and guidelines and best management practices; (2) Addressed through implementation of project-specific mitigation measures/design features; (3) Addressed during processes or analyses routinely conducted by an interdisciplinary team; (4) Addressed through spatial location of activities during alternative design; (5) Beyond the scope of the project; or (6) general comment. The Council on Environmental Quality (CEQ) NEPA regulations explain these delineations in Sec. 1501.7, "…identify, and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-key issues and reasons regarding their categorization as non-significant is in the project record. Following are the key issues identified by the public and used to focus the analysis or drive alternative development.

Key Issues:

- Impacts to wilderness attributes and roadless area characteristics resulting from mechanical treatments within inventoried roadless areas and draft unroaded-undeveloped areas may result in these areas not being eligible for wilderness designation.

- Prescribed fire activities may impact adjacent private property.
- Project activities may result in Northern goshawks being displaced.
- Project activities may result in Bonneville cutthroat trout and Boreal toad habitat being severely degraded.
- Browsing by domestic and wild ungulates on new aspen sprouts post-treatment and/or the continued high levels of aspen browsing in the stable aspen areas may result in complete loss of aspen stands.
- Project activities may result in livestock permittees not having a place to graze their livestock while vegetation is reestablishing on Monroe Mountain (2 or more growing seasons).
- Project activities may result in adverse impacts old growth characteristics.

Overview of the Proposed Action

The action proposed by the District to meet the purpose and need is to conduct a combination of prescribed fire and/or mechanical thinning treatments in stable and seral aspen stands, and spruce/fir and mixed conifer stands to promote the regeneration and recruitment of aspen communities. Some stands currently dominated by spruce/fir and mixed conifer may have been dominated by aspen at some point in the past. Aspen occurs in varying percentages in spruce/fir, mixed conifer, and seral aspen dominated stands. Treating spruce/fir, mixed conifer, and aspen stands would reduce competition for resources, and encourage aspen to regenerate.

The proposed action is similar for all of the alternatives. What vary within the alternatives are the acreages of mechanical thinning verses the acreages of prescribed fire that would be treated depending on the issues, and the mileage of temporary roads proposed for each alternative. The treatment options proposed for the project area are: (1) areas would be mechanically thinned with the associated slash piled and burned, and (2) areas would receive prescribed fire treatments (see chapter 2 of the EIS for detailed descriptions of these treatment options and each alternative).

Addressing the reduced occurrence of wildland fire due to an increase in wildland fire suppression on Monroe Mountain is critical to the long-term restoration of aspen ecosystems. The average fire return intervals for each of the vegetation cover types occurring on Monroe Mountain can be found in chapter 1 of the EIS. This table also shows that the maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen, spruce/fir, and mixed conifer is 47,274 acres (alternative 4). However, the management guidelines for Northern goshawk require leaving 40 percent interlocking crowns in foraging areas. To be compliant with the guidelines, prescribed burning would only occur when 60 percent of the prescribed fire area is expected to burn. This would leave 40 percent of the area with interlocking crowns intact. As for the areas proposed for mechanical treatments, by removing just conifer, thinning to a Basal Area of 90, and/or removing conifer trees up to 8 inch DBH, using group, and singletree selection, desiring uneven-aged management, and proposing minimal mechanical treatments in the stable aspen stands, 40 percent of the area with interlocking crowns would also remain intact in the mechanical treatment areas. Therefore, the maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen, spruce/fir, and mixed conifer (assuming only 60 percent of the prescribed fire treatment areas are burned) is 36,300 acres (alternative 4). The approximate duration of this project is 10 years; therefore, approximately 18,150 acres would be mechanically treated and/or prescribed burned every 5 years. This number is well within the Forest Service recommended range of area to treat

within a 5-year period of 5,000 to 24,000 acres (see chapter 2 of the EIS for a detailed description of the proposed action and alternatives).

Mechanical thinning and prescribed fire treatments are proposed within five Inventoried Roadless Areas (IRAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore) and within five draft Unroaded-Undeveloped Areas (UUAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore). No roads would be constructed within IRAs. Temporary roads would be constructed in treatment areas located outside of the IRAs (for all alternatives) including within draft UUAs (see alternatives 4 and 5). The mileage for these temporary roads varies depending on the alternative (see chapter 2 of the EIS for specific road locations, mileage, and specifications). In addition, temporary fencing would be installed around Manning Meadows Reservoir and Barney Lake (see chapter 2 of the EIS for fencing locations, mileage, and specifications).

No active treatments are proposed within the sagebrush cover-type where scattered aspen trees and stands occur in portions of the sagebrush communities. These areas are expected to improve through passive restoration (i.e., by trying to allow naturally ignited fires to burn, and changing grazing and browsing management). See chapter 2 of the EIS for a detailed description of the District's proposal to address overbrowsing of aspen.

Affected Environment & Direct/Indirect Effects

Recreation/Trails/Recreation Opportunity Spectrum (ROS):

The Monroe Mountain is valuable for multiple recreation uses. Roads and trails provide access to private lands and cabins, reservoirs and streams, dispersed camping, hunting, fishing, viewing scenery, driving for pleasure, hiking, horseback riding, off highway vehicle use, and various other recreation opportunities.

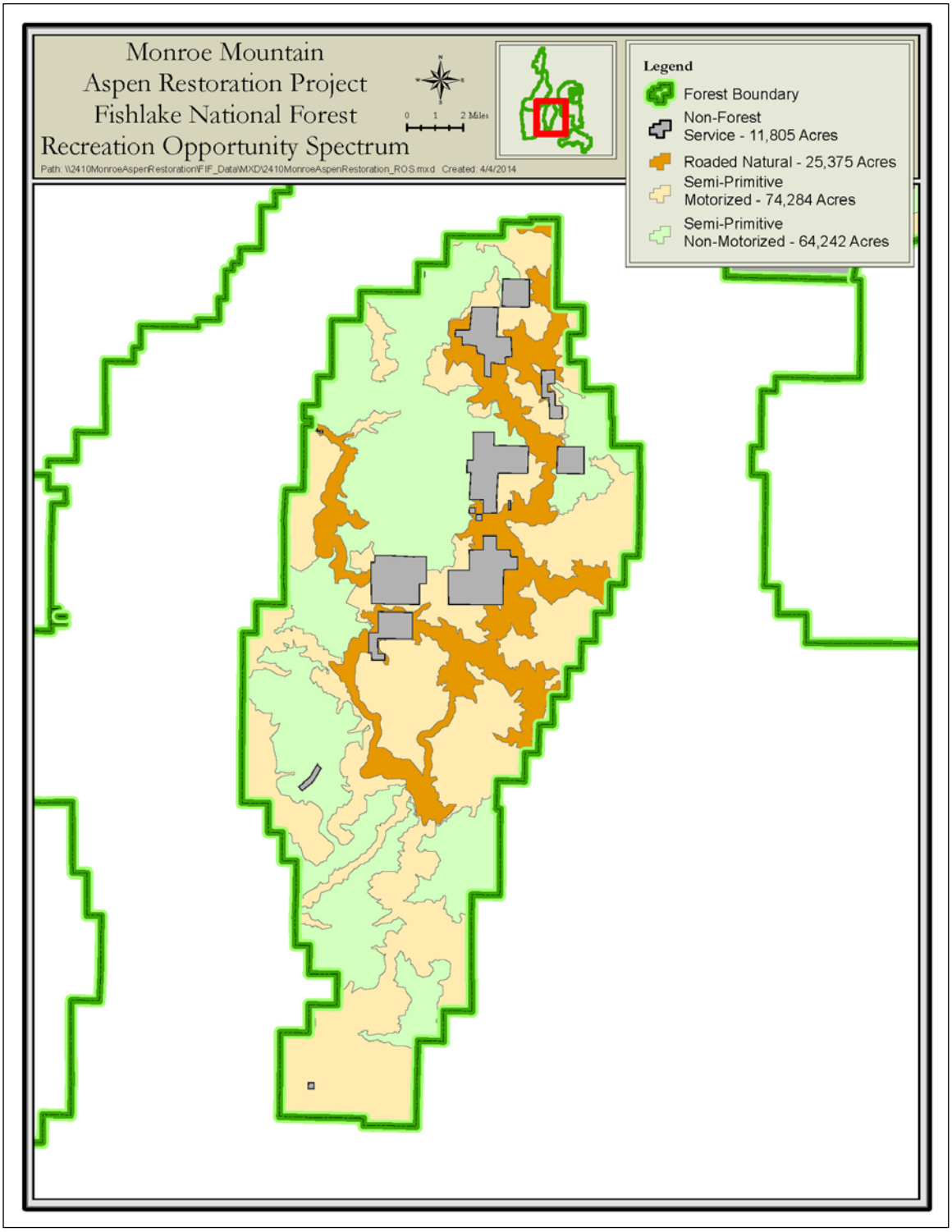
The no action alternative would not change current recreation opportunities or ROS.

The four action alternatives (including mechanical options 1 & 2) could disrupt recreation use during implementation, yet would return to normal after completion. The annual Rocky Mountain ATV Jamboree is held the third week of September. Hundreds of participants ride the Monroe Mountain and would be affected by closures and smoke if project activities take place during that week. Hunting during the late summer and fall months would be affected by closures and smoke during implementation. Trails may need clearing plus signs and blazes replaced or cairns installed after implementation.

Recreation Opportunity Spectrum (ROS): The Monroe Mountain is currently mapped as Roaded Natural 14%, Semi-Primitive Motorized 42%, Semi-Primitive Non-Motorized 37%, and Private Land 7%. The proposed project would not change the current draft ROS designations.

Map 1 shows the current draft ROS location and designations.

Map 1: Recreation Opportunity Spectrum (ROS) Monroe Mountain Designations



Cumulative Effects for All Alternatives

Past, present and reasonable foreseeable actions (See EIS for a list of actions) on the Monroe Mountain were reviewed to determine the cumulative effects to recreation resources. Impacts from natural events, human activities, and forest management activities have created the current recreation opportunities and draft ROS designations. The action alternatives and reasonably foreseeable actions would not permanently lower the current recreation resources and draft ROS designations.

Desired Condition

The desired condition as stated in the Forest Plan is that current recreation resource uses such as roads and trails, dispersed camping, hunting, fishing, viewing scenery, driving for pleasure, hiking, horseback riding, and off highway vehicle use should continue and possibly be enhanced. Therefore, due to implementation of this project recreation resources and draft ROS designations on the Monroe Mountain would be maintained. Burning and mechanical treatments would enhance aspen ecosystems and over time maintain or possibly improve recreation resources.

Conclusions

Proposed activities of mechanical treatment and prescribed fire would not permanently lower recreation opportunities on the Monroe Mountain, yet they could temporarily disrupt them during implementation. This report considers potential effects to recreation resources as a result of the no action and four action alternatives of the Monroe Mountain Aspen Ecosystems Restoration Project. Mechanical treatments would affect 5% to 11% of the project area. Prescribed fire would affect 15% to 19% of the project area. Stumps and burn piles would be noticeable as well as a charred landscape in the treated areas. Treatments would be completed in a mosaic pattern and would over time improve plant size, age and species diversity. Fire breaks and control lines would be feathered to appear natural. Stumps would be cut mostly flush with the ground. Tracked vehicles would be used for mechanical treatments and temporary roads would be reclaimed. The effects would quickly lessen as vegetation grows and would be the same or better than current conditions within three to five years.

The four action alternatives (including mechanical options 1 & 2) would disrupt recreation use during implementation, yet would return to normal after completion. The annual Rocky Mountain ATV Jamboree is held the third week of September. Hundreds of participants ride the Monroe Mountain and would be affected by closures and smoke if project activities take place during that week. Hunting during the late summer and fall months would be affected by closures and smoke during implementation. Trails may need clearing plus signs and blazes replaced or cairns installed after project implementation.

Based upon my findings, I conclude the action alternatives would move conditions closer to desired conditions in all measures evaluated. All of the action alternatives comply with the Forest Plan in that forest resource uses or activities should meet recreation objectives. Burning and mechanical treatments will enhance aspen ecosystems and over time maintain or improve recreation resources.

No action would result in a much slower movement towards desired conditions and desired conditions would not be achieved in the foreseeable future. Recreation resources would remain unchanged.

Compliance with the Forest Plan and Other Regulatory Direction

As described in chapter 1 of the EIS, the desired conditions and the purpose and need for this project are consistent with the Forest's goals, the objectives found in chapter IV of the LRMP, and the Utah Fire Amendment (USFS 2001). The District has also compared the action alternatives with the general direction and the standards and guidelines listed in the LRMP to determine compliance, and found that the action alternatives are compliant with the LRMP. This review, along with supporting rationale is found in the project record.

Literature cited

USDA, Forest Service, 1986, Land and Resource Management Plan for the Fishlake National Forest, Richfield, Utah

USDA, Forest Service, 1986, ROS Book, Washington DC

Appendix N – Vegetation and Climate Change Specialist Report (Holsclaw 2015)

Prepared by:

Terrance C. Holsclaw
Forester

For:

Richfield Ranger District
Fishlake National Forest

June 5, 2015

Executive Summary

The vegetation portion of this report directly and indirectly addresses two issues identified during scoping. They are, Issue 3- project *activities may result in Northern goshawks being displaced* and Issue 7- *project activities may result in adverse impacts to old growth characteristics*. This report directly addresses Issue 7 and provides the District Wildlife Biologist information that can assist in addressing Issue 3 related to Northern goshawks. Cover types are discussed and analyzed throughout the document. The three dominant cover types within the project area are aspen, mixed conifer, and spruce/fir. This report addresses the effects of options 1 and 2 for alternatives 2 through 5 when compared to alternative 1 (no action) within each cover type. Other items of concern addressed are fire effects, economics and climate change.

Environmental indicators were developed based on the issues. The vegetation portion of this report analyzes the structural component for Issue 3, commonly referred to as Vegetative Structural Stages (VSS). The vegetation portion also analyzes impacts to old growth.

Vegetative Structural Stages for all options and action alternatives resulted in trends toward the desired conditions for VSS. All options and action alternatives exceeded the desired conditions for old growth.

Introduction

See chapter 1 of the Monroe Mountain Aspen Ecosystems Restoration Project Environmental Impact Statement (EIS).

Regulatory Framework

Refer to EIS.

Methodology for Analysis

The primary source of information for the analysis in this report is derived from common stand exam (CSE) data. Data was collected during the 2013 field season. The project area was divided into thirds providing a northern, central and southern section. Stands were chosen by cover type within each zone ensuring that we had a sample that covered the entire project area. The goal was to collect data on 10 percent of the stands and 10 percent of the acres by cover type across the project area. The cover types targeted were: 1) aspen (stable and seral), 2) spruce/fir, and 3) mixed conifer. Data was collected using random plot sampling and a common stand exam recommendation of 1 plot per 10 acres with a minimum of 3 plots for those stands less than 30 acres (NRIS 2013). It is the professional opinion of the District Forester that this sampling is representative of the above cover types and is sufficient for analyzing the entire project area.

Data derived from CSE was used in the Forest Vegetation Simulator (FVS) model. This is a growth and yield model able to calculate the growth and yield of stands through time. The FVS model is also capable of modeling different management alternatives and silvicultural systems and project them through time.

Many years of research have gone into the development of the FVS model and it is very good at calculating growth and yield. The model uses the common stand exam data to project growth and

yield; however, (with the exception of species that sucker (mainly aspen and oaks)) it cannot predict the amount or input regeneration through time. Because the model behaves in this way, trees that are removed due to harvest, fire, and/or density mortality, etc., are not replaced. When projected through time, it will eventually run out of trees and outputs can then become erroneous and unreliable. With that said, assumptions were made concerning regeneration. The assumptions are based on experience related to regeneration density and survival rates, the Fishlake Land and Resource Management Plan (LRMP), and input from the Interdisciplinary Team. The assumptions are based on cover types to maintain consistency with this report and the LRMP.

Aspen Cover Type- minimum average of 5,000 suckers (aspen trees less than 6 feet in height) per acre. This number is outlined as the desired condition for this project. The LRMP outlines a minimum value of 300 seedlings per acre with a desired of 600 seedlings per acre (pg. IV-32).

Spruce/fir Cover Type- Natural regeneration (stocking) of 155 seedlings per acre (pg. IV-32 of LRMP).

Mixed Conifer- Natural regeneration (stocking) of 215 seedlings per acre (pg. IV-32 of LRMP).

Photos taken during CSE data collection were also used in this analysis to illustrate stands as examples of composition, structure, etc. These photos are included in the project record.

Geographic Information System (GIS) information was also used as part of the analysis. This use would be in the form of maps. These maps are included in the project record.

Resource Issues and Purpose and Need

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions as described in the EIS. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire because of an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. Restoring aspen communities on Monroe Mountain will result in multiple benefits, which include but are not limited to:

1. Improving and increasing the amount of habitat for wildlife species dependent upon aspen ecosystems (i.e., mule deer, elk, and Northern goshawk);
2. Improving and increasing the amount of habitat and forage for domestic ungulates (i.e., cattle and sheep);
3. Improving native species diversity;
4. Reducing hazardous fuel accumulations;
5. Reducing the risk for large-scale, intense wildland fires. This results in lower risk to the safety of the public and firefighters. This also results in lower risk to sensitive wildlife species (i.e. Northern goshawk, Western Boreal toad *(Bufo boreas*), and Bonneville cutthroat trout (*Oncorhynchus clarki utah*)); and,
6. Increasing the probability that future naturally caused fires can be managed (if possible, not suppressed) and allowed to play the greatest feasible natural role in the aspen ecosystems on Monroe Mountain (Utah Fire Plan 2001).

Timeframes and Spatial Boundaries

See timeframes and spatial boundaries in the EIS.

Environmental Indicators

There are two environmental indicators being looked at for comparison in this specialist report. They are: 1) vegetative structural stages (VSS), and 2) old growth. The following will explain why each is an indicator to be measured.

1. Vegetative Structural Stages- VSS is used to determine the effects on stand structure. Most of the project area overlaps to one degree or the other and must be analyzed according to the LRMP. The measure of VSS are 1, 10 percent; VSS 2, 10 percent; VSS 3, 20 percent; VSS 4, 20 percent; VSS 5, 20 percent; and VSS 6, 20 percent. The measure of VSS can be found in the LRMP
2. Old growth- This is being analyzed to address an issue from scoping. The LRMP also states on page IV-11, General Direction, Diversity on National Forests that in forested areas of a unit, 5 percent or more should be in Old Growth.

Overview of the Proposed Action

The action proposed by the District to meet the purpose and need is to conduct a combination of prescribed fire and/or mechanical thinning treatments in stable and seral aspen stands, and spruce/fir and mixed conifer stands to promote the regeneration and recruitment of aspen communities. Some stands currently dominated by spruce/fir and mixed conifer may have been dominated by aspen at some point in the past. Aspen occurs in varying percentages in spruce/fir, mixed conifer, and seral aspen dominated stands (see chapter 1 of the EIS). Treating spruce/fir, mixed conifer, and aspen stands would reduce competition for resources, and encourage aspen to regenerate.

The proposed action is similar for all of the alternatives. What vary within the alternatives are the acreages of mechanical thinning verses the acreages of prescribed fire that would be treated depending on the issues, and the mileage of temporary roads proposed for each alternative. The treatment options proposed for the project area are: (1) areas would be mechanically thinned with the associated slash piled and burned, and (2) areas would receive prescribed fire treatments. Please see chapter 2 of the EIS for detailed descriptions of these treatment options and each alternative.

Design Features

See designed features outlined in the EIS.

Monitoring

See monitoring plan in the EIS.

Affected Environment

Before a discussion in this section can occur, a few definitions are in order. Throughout this document, forest cover types will be discussed. The definition for this term comes from the *Forest Cover Types of the United States and Canada* (Eyre 1980). All other definitions come from *The Dictionary of Forestry* (Helms 1998).

- Cover types- a category of forest defined by its vegetation (particularly its composition) and or locality (environmental) factors; a descriptive classification of forestland based on present occupancy of an area by tree species. Forest types are named after predominant tree species. Predominance was determined by basal area.
- Succession-the gradual supplanting of one community of plants by another.
- Climax- an ecological community that represents the culminating stage of a natural forest succession for its locality, i.e., for its environment.
- Seral- a temporal and intermediate stage in the process of succession.
- Niche- the specific spot occupied by an individual organism.
- Uneven-aged stand- a stand with trees of three or more distinct age classes, either intimately mixed, or in small groups.
- Even-aged stand- a stand of trees composed of a single age-class in which the range of tree ages is approximately 20 percent of rotation.
- Stand Structure- the horizontal and vertical distribution components of a forest stand including the height, diameter, crown layers, - stems of trees, shrubs, herbaceous understory, snags, and down woody debris.

There are three primary cover types affected by this project. They are 1) aspen, 2) spruce/fir, and 3) mixed conifer. The “Other” cover type, in Figure 1 below, designates areas where sagebrush, woodlands (primarily pinyon and juniper, Gambel oak, and mahogany), grasses and rocks are the primary cover types (in terms of acres). The “Other” also covers areas where ponderosa pine and white fir exist. Although this “Other” cover type exist within the project area, most aspen reside in the first three cover types. It is also known that ponderosa pine exist in the project area; however, it was not detected within any of the surveys. Aspen restoration is the primary focus of this project. Factors influencing these cover types are insect and disease, slope, aspect, environmental factors such as temperature, drought, frost, etc., fire, ungulate grazing and management.

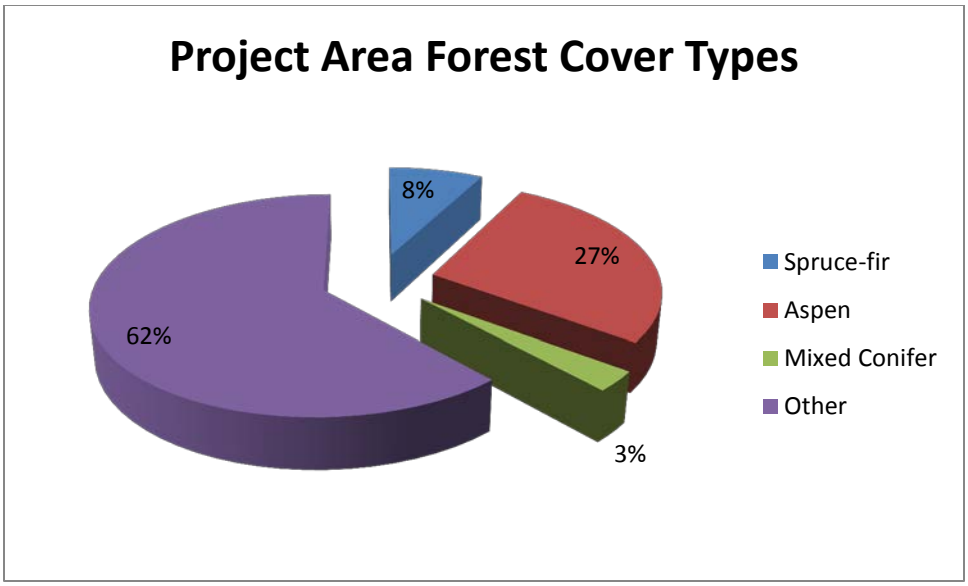


Figure 1- Cover types within the project area.

Aspen Cover Type

The aspen cover type comprises 48,138 acres or 27 percent of the total acres for the project area (see Figure 1). Aspen is considered to exist in either a seral or stable state. A seral state has conifer encroachment. The degree of conifer encroachment is primarily dependent upon where it is at in its successional stage. On the other hand, stable aspen have few if any conifers. Aspen exists typically in even-aged stands (unusually over 40 years of age) in the Utah region, indicating their origin from burns. Two-storied stands are also common (Campbell 1995). Whether aspen is seral or stable, current structure within the project area is uneven-aged. Uneven-aged structure is characterized by a range of tree sizes occurring throughout a stand (Tappeiner et al. 2007). This structure is graphed in Figure 2 (trees per acre over diameter at breast height (DBH)) and has an inverse-J shape (common for uneven-aged stands). As Campbell (1995) states, this structure is most likely occurring due to fire exclusion where there is an uneven-aged understory and the overstory decays leaving an uneven-aged stand. It is likely this cover type is in the later seral stage.

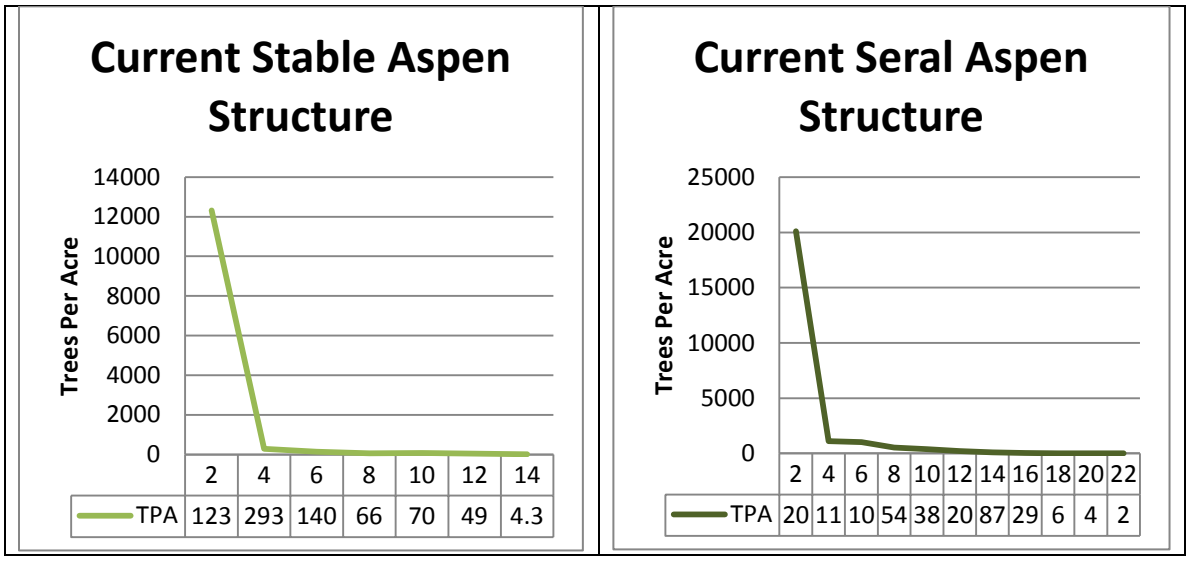


Figure 2- Current structure of stable and seral aspen within project area.

There are more stands of seral aspen within the project area than there are stable stands. While aspen comprises most of the vegetation within the project area, they are being over taken by conifers. Without disturbance, this is a natural successional pathway where conifers eventually take over the stand and become the climax for those sites. Seral stands within the project area are composed of four species. They are aspen (AS), Engelmann spruce (ES), Douglas fir (DF) and subalpine fir (SF). All the aspen stands combined show understory composition comprised of 67 percent AF; 29 percent AS; and 4 percent ES. Overstory composition is comprised of 50 percent SF; 49 percent AS; 1 percent ES; and less than 1 percent DF (shows 0 (zero) percent because of rounding). See Figure 3. For clarification, the cutoff for understory and overstory trees was 0 to 7.9 inch DBH and 8 inch and above DBH respectively.

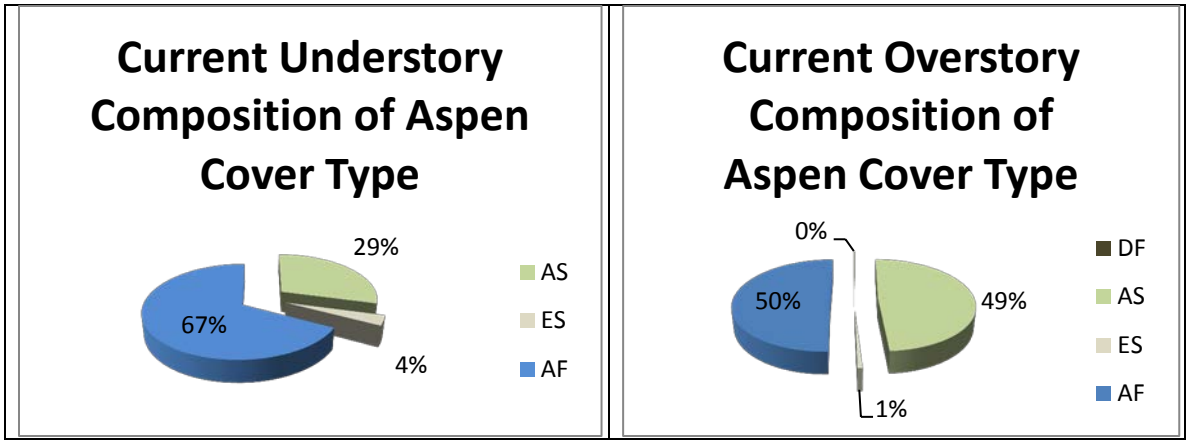


Figure 3- Seral aspen composition in percent for project area.

Conditions on Monroe Mountain are different today than they were before Euro-American settlement (150 years ago). Differences include changes in human uses, disturbance (fire) regimes, climatic conditions, and species and density of herbivores. Within aspen, historical fire regimes are mixed severity. Fire was likely a major component in the structuring of the landscape prior to humans arriving on the scene (Bartos and Campbell 1998). Historically, fire was likely the primary disturbance that promoted sprouting, reduced conifer cover, and changed structure on the landscape. Since fire has been largely absent or suppressed on much of the

mountain, conifers have encroached and in some cases, overtaken aspen and become dominant on a given site. Although aspen is the cover type, there are some differences in how seral and stable stands behave when confronted by disturbance. Those differences are outlined below as they relate to current conditions.

Conifer encroachment, as stated previously, occurs naturally due to conifers shade tolerance. This phenomenon occurs in seral stands and typically not stable. Fires tend to check conifer encroachment in seral stands and reset them to young even-aged stands. Fires also resulted in less conifer cover, more aspen cover and a greater diversity of understory plants. With the exception of riparian areas, aspen communities are considered the most biologically diverse ecosystems in the Intermountain West (Campbell and Bartos 2001). Fire suppression has resulted in more conifer cover and less historical aspen and less understory plant diversity on Monroe Mountain. This has decreased the forage base and put more pressure on other forage, such as aspen regeneration. Figure 4 is an example of a seral aspen stand on Monroe Mountain. Conifer species associated with this stand are subalpine fir with minor components of Engelmann spruce, ponderosa pine, Douglas fir and white fir.

Figure 4- Examples of current condition within seral aspen stands on Monroe Mountain.

Quaking aspen fuel types have relatively low flammability, and stand-replacing crown fires do not carry well through the canopies of aspen-dominated forests (Margolis, et al 2007). In addition to their high moisture content and herbaceous understory, aspen stands act as fire breaks (Morelli 2009). Crown fires often become surface fires when they run into aspen stands. Fires have been observed to change direction or extinguish when coming in contact with aspen stands. Consequently, aspen stands are often used as live fuel breaks. This is most likely to occur where stands are more pure or are not far along in the successional stage. Consequently, fire has played a larger role in the development of seral than in stable aspen stands. That is not to say that some stable stands have not been affected by fire, it is just that they have not been the primary driver in their development. Most fires in stable stands are carried by fine fuels because conifers are generally lacking. Stable aspen stands tend to be self-replacing with multiple layers. Disturbances such as frost, drought, and insect and disease can initiate regeneration through a period of time that creates this multi-layered appearance. Generally, the multi-layered appearances within stable aspen stands are lacking.

An increase in conifer encroachment within seral stands has resulted in reductions in grasses, forbs, and shrubs and thus has resulted in a change in the grazing pattern. More focus by domestic and wild ungulates has been placed where more forage is available, such as stable aspen

stands. It is the professional opinion of the District Forester that the lack of available forage in the seral stands is caused by a lack of disturbance. The results of this can be seen in the left photo in Figure 5, where grasses are the primary understory species with little regeneration and recruitment. The right photo is an example of what a multi-storied stable stand should look like.

Figure 5- Examples of current conditions within stable aspen stands on Monroe Mountain.

Spruce/fir

The spruce/fir cover type is comprised of 13,667 or 8 percent of the total acres for the project (Figure 1). The spruce/fir type is widespread in the central and southern Rocky Mountains. The spruce/fir type also occurs in the high mountains of Utah and eastern Nevada (Alexander 1987). This type is dominated by Engelmann spruce or subalpine fir. In the central and southern Rocky Mountains, Engelmann spruce and subalpine fir occurs as either co-dominants or in nearly pure stands of one or the other. Elsewhere in the Rocky Mountains and associated ranges, subalpine fir is the major climax species (Alexander 1987). Aspen and other conifers such as Douglas fir, white fir and blue spruce may also be present. In the case of Monroe Mountain, the cover type (for those stands surveyed) identified subalpine fir as the dominant species in the type. Figures 6 and 7 show current conditions in the spruce/fir type.

Figure 6- Example of current conditions for spruce/fir type on Monroe Mountain.

Understory is dominated by subalpine fir with aspen coming in second and minor components of Engelmann spruce and Douglas fir. Overstory composition contained approximately 58 percent spruce/fir and 41 percent aspen with less than 1 percent Douglas fir (rounding shows 0 (zero) percent.

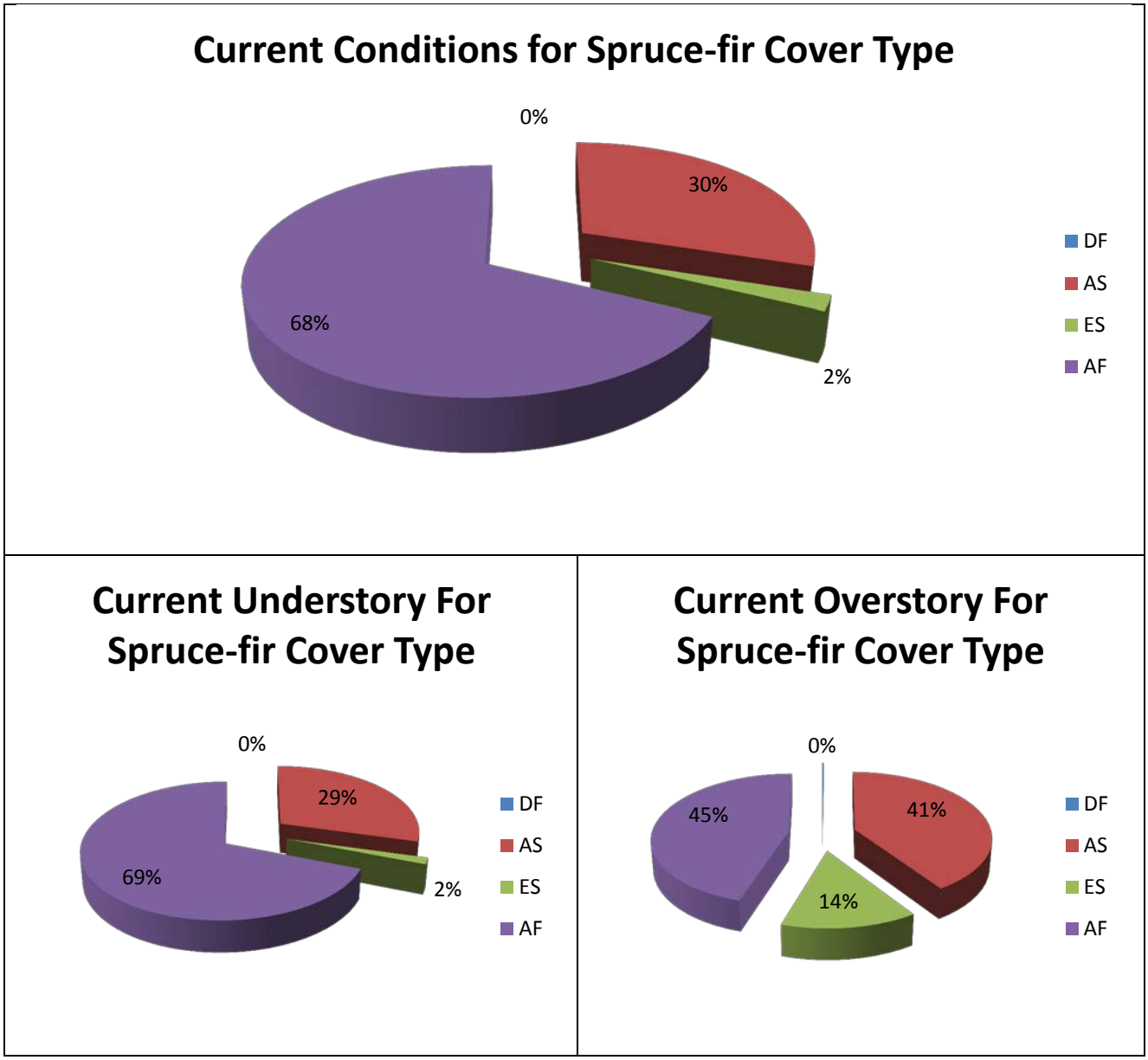


Figure 7- Current conditions for the spruce/fir cover type on Monroe Mountain.

The spruce/fir cover type occupies an elevational band between 9,400 and 10,800 feet on Monroe Mountain. Climatic factors generally define the distribution of the spruce/fir type. Spruce/fir are restricted to high elevations because of their low tolerance to high temperatures and deficient moisture at lower elevations (Alexander 1987). High elevations allow for cooler temperatures and more available moisture. Because they typically occupy higher elevations they are exposed to more wind. The Spruce/fir cover type at the lower end of the elevation band typically inhabits low areas, drainages and North facing slopes. These areas tend to contain or receive more moisture.

Disturbances occurring within this type are windthrow, insect and disease, avalanches, and fire. The primary insects affecting this type are the spruce beetle *(Dendroctonus rufipennis)* and Western spruce budworm *(Choristoneura occidentalis)*. The primary disease affecting spruce/fir types are armillaria root rot. Windthrow is typically a precursor to spruce beetle outbreak. Average fire frequency in this type is between 50 and 80 years. Most stands on Monroe Mountain have this frequency because they contain some element of aspen. Those stands that have no aspen are more likely to have a fire frequency of 200 to 400 years (Hood and Miller 2007).

In recent years there has been an outbreak of spruce beetle on the North end of Monroe Mountain. The outbreak began in the early 2000s and has declined since 2012. New outbreaks within the project area are occurring around Koosharem Guard Station (near Indian Peaks) and appear to be heading south. There are also pockets of infestation near Barney Lake. The aerial insect and disease detection survey (2013) identified spruce beetle outbreaks near and around Barney Lake and Manning Meadows Reservoir (middle of project) and Monroe Peak, with the largest populations centered just East of Monroe Peak. Site visitation in June 2014 near Barney Lake and Manning Meadows Reservoir revealed an epidemic of spruce beetle larger than what was shown in 2013. How far this epidemic will progress is unknown at this time. What is known is that spruce beetle prefers larger mature spruce trees. Mortality of this size of spruce is common from an outbreak.

In addition to the spruce beetle epidemic, Western spruce budworm has also been identified on the 2013 survey. The budworm usually goes after both Engelmann and blue spruce but will also attack Douglas fir and subalpine fir. Western spruce budworm affects trees of all size and age classes. The budworm eats the needles and buds of the current year's growth. They don't usually kill the overstory trees; (although they can when other stressors such as drought are in play); however, they can be a precursor to the beetle (either spruce beetle or Douglas fir beetle). Western spruce bud worm in the overstory canopy usually affect volume growth and can inhibit cone production. Cone crops on Thousand Lake Mountain were affected by an outbreak in 2011 and 2012. Cone production resumed in 2013 but was sparse in comparison to pre-outbreak. In the understory, spruce budworm can be lethal to seedlings.

Disturbance by the spruce beetle and Western spruce budworm are currently affecting all size classes within most stands of the spruce/fir cover type. Current structure is and likely will continue to affect this cover type given these infestations. Current structure is classified as uneven-aged as indicated by the inverse J curve in Figure 8 (trees per acre over DBH).

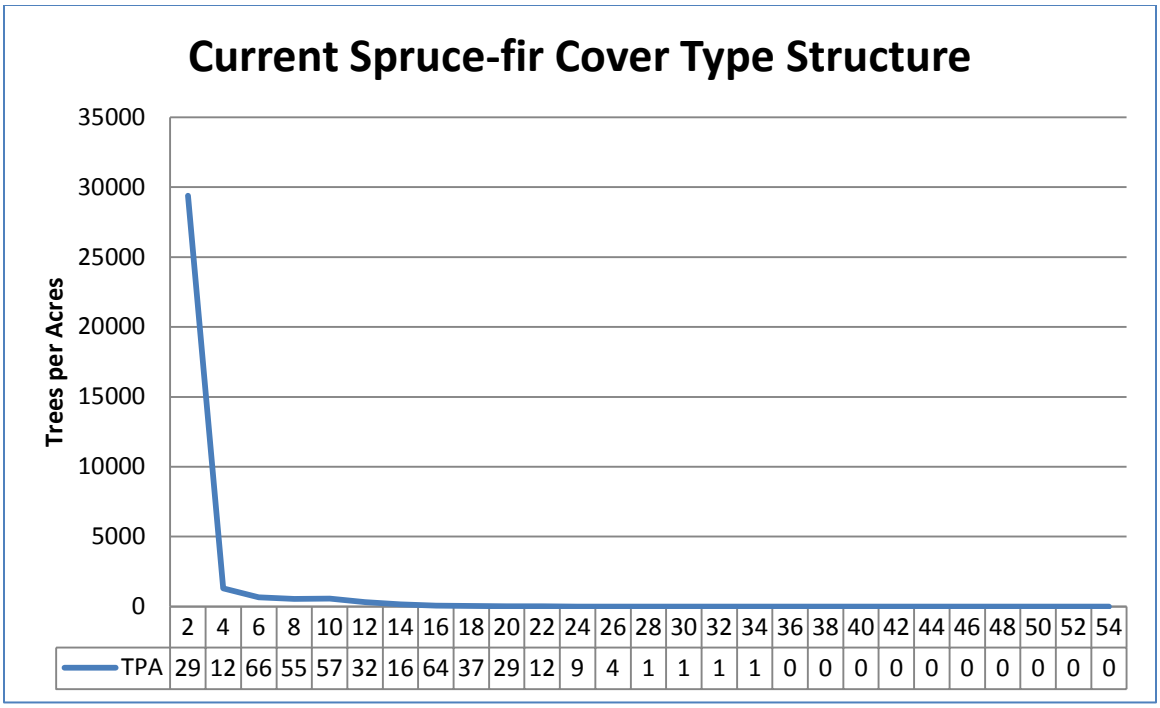


Figure 8- Current structure for spruce/fir on Monroe Mountain.

Mixed Conifer

What does it mean to be classified as mixed conifer? That's a question commonly asked. To find the explanation to that question the District Forester turned to Clinton's (2009) Properly Functioning Condition (PFC) descriptions. In this document he describes mixed conifer types as, true firs as the climax vegetation but seral species are also represented. Unlike ponderosa pine and Douglas fir types, the mixed conifer type is usually not replaced by more shade tolerant species when natural disturbance patterns are maintained. Generally, a true fir species and two or more other conifer species are always evident in the stand, but vary in abundance. Aspen may also occur in the mixed conifer component. The understory is typically diverse consisting of grass, forbs, and shrubs. As canopy densities increase, understory species decline. See Figures 9 and 10 for current conditions of mixed conifer cover type on Monroe Mountain.

Figure 9- Examples of current mixed conifer type on Monroe Mountain.

True firs are of the family *Abies*. They typically have erect cones primarily at the top of trees. The primary true firs on Monroe Mountain are subalpine fir and white fir. Douglas fir (*Pseudotsuga menziesii*) is not considered a true fir. There are 5,210 acres of mixed conifer within the project area. Figure 7 shows the current conditions for this cover type on Monroe Mountain. Overall, the mixed conifer type is split 50/50 between conifers and aspen. Aspen comprises just over half of the understory and conifer dominates in the overstory with 62 percent of the cover (Figure 10).

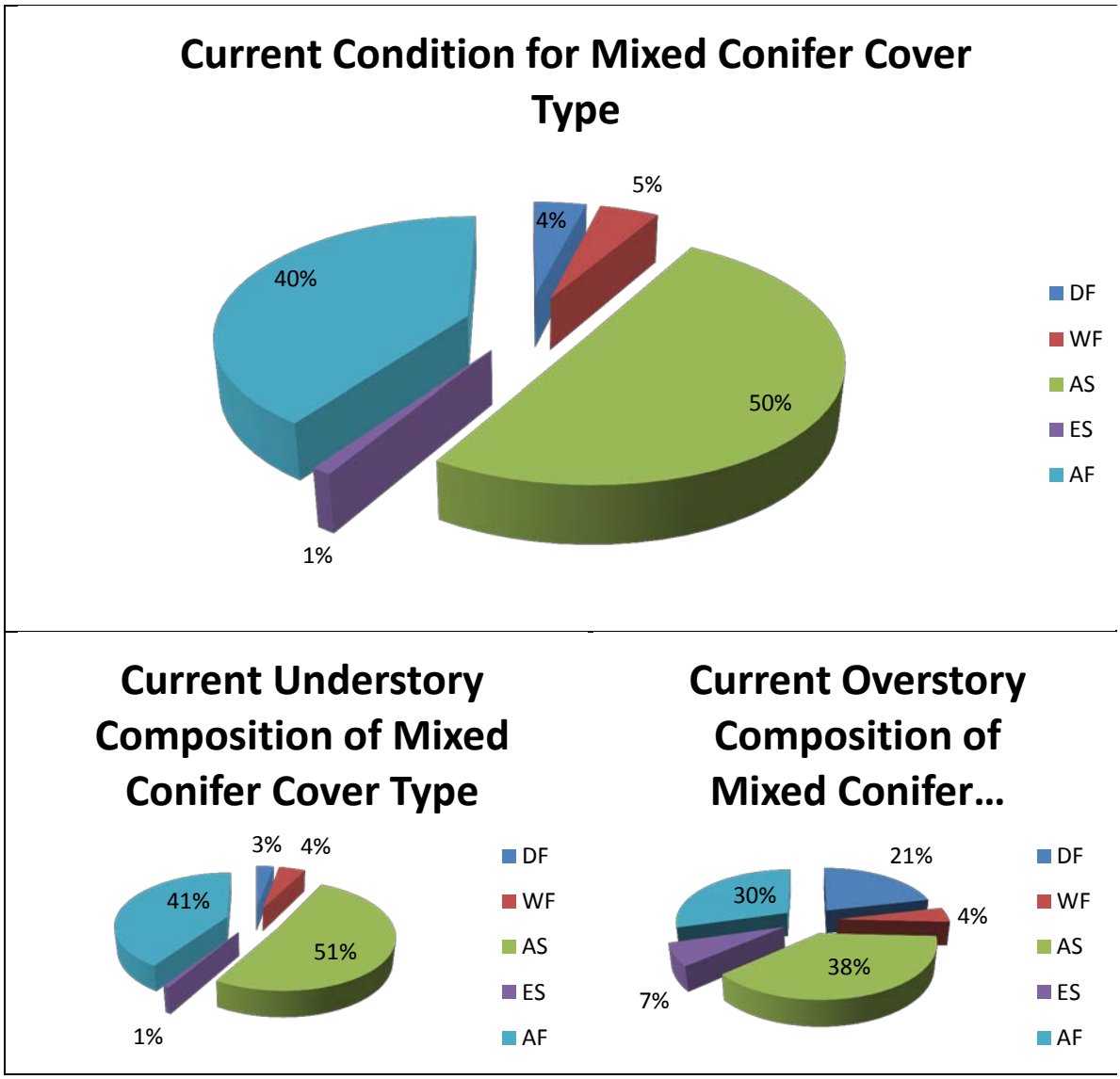


Figure 10- Current condition for mixed conifer cover type.

Uneven-aged stand structures are typical for mixed conifer cover types (Clinton 2009). Figure 11 shows that this cover type is indeed uneven-aged.

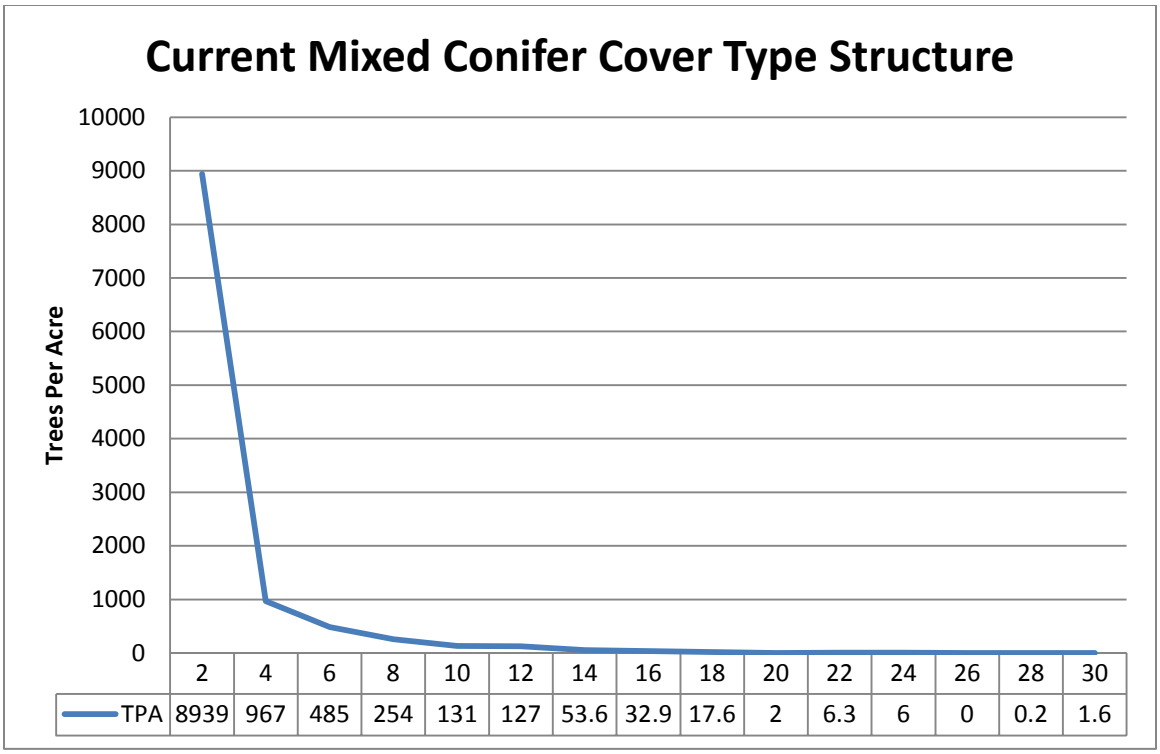


Figure 11- Depiction of structure for the Mixed Conifer Cover Type.

Mixed conifer stands share some of the same disturbances as the other cover types. Fire, insect and disease, and environmental factors such as frost, sun scald etc. Although shared, they have affected these types somewhat differently. Because mixed conifer stands are comprised of different species their percentage composition can also change. As an example, spruce and Douglas fir beetle tend to be host specific; therefore, mixed conifer stands that may have one or both of these species may be affected by these beetles changing composition from one that has a high percentage of these species to a stand that has more of those species unaffected by these beetles (e.g., subalpine fir). Conversely, mixed conifer stands can be more resilient to this type of disturbance because it maintains a mixed state while changing the percentages of conifer types over time.

Fire disturbances also have different effects on mixed conifer stands. Mixed conifer stands with a higher percentage of ponderosa pine and Douglas fir in the overstory tend to be more fire hardy than those with more of the true fires (subalpine fir and white fir). These species can remain more dominant given normal fire regimes because of their hardiness. Overstory aspen within mixed conifer are also more susceptible to fires because of the conifer component and thin bark. All understory species are susceptible to fire.

The diverse stand structure of pre-settlement mixed conifer forests contributed to a variety of understory conditions ranging from dry, open, grassy understories to moist, closed canopy understories with a diverse mixture of plant life forms (Hood and Miller 2007). Some of the mixed conifer stands in the project area look like those seen in Figure 9. The photo to the right shows areas of grasses whereas the photo to the left shows few trees in the understory. Lack of disturbance as described in the previous two paragraphs is the likely cause of understory diversity in some of these stands.

Vegetative Structural Stages

Vegetative Structural Stage describes the conditions of forest structure based primarily on the needs of the Northern goshawk. For a landscape as a whole the tree structure is broken into six classes. They are VSS 1, VSS 2, VSS 3, VSS 4, VSS 5, and VSS 6, which correlate to DBH classes of 0 (zero) to1 inch, 1 to 5 inch, 5 to 12 inch, 12 to 18 inch, 18 to 24 inch and 24 inch plus, respectively for each class. Table 1 outlines the current conditions (as a percentage of stand density index (SDI)) as they relate to these classes.

Table 1- Current VSS conditions for the cover types.

		VSS 1: Grass-Forb/Shrub (DBH: 0-1")			VSS 2: Seedling-Sapling (DBH: 1-5")			VSS 3: Young Forest (DBH: 5-12")		
		Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
Current Condition	Seral	0.0%	17.9%	13.1%	4.6%	46.8%	14.7%	37.0%	81.8%	57.5%
	Stable	19.8%	24.2%	22.3%	5.9%	35.6%	23.2%	40.2%	63.4%	49.9%
	Aspen Cover Type	0.0%	24.2%	13.7%	4.6%	46.8%	15.2%	37.0%	81.8%	57.0%
	Mixed Conifer Cover Type	7.6%	17.3%	13.0%	4.9%	36.7%	19.7%	24.1%	52.4%	42.2%
	Spruce/Fir Cover Type	4.3%	20.3%	13.4%	6.8%	25.6%	15.8%	22.8%	62.7%	41.2%

		VSS 4: Mid-Aged Forest (DBH: 12-18")			VSS 5: Mature Forest (DBH: 18-24")			VSS 6: Old Forest (DBH: 24" +)		
		Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
Current Condition	Seral	0.0%	31.5%	13.1%	0.0%	4.7%	1.2%	0.0%	4.1%	0.4%
	Stable	0.0%	11.0%	4.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Aspen Cover Type	0.0%	31.5%	12.6%	0.0%	4.7%	1.1%	0.0%	4.1%	0.4%
	Mixed Conifer Cover Type	5.6%	43.0%	19.3%	1.5%	6.3%	4.3%	0.0%	4.5%	1.5%
	Spruce/Fir Cover Type	3.7%	31.2%	21.0%	0.0%	14.4%	6.2%	0.0%	12.8%	2.3%

Table 1 is a range of Stand Density Index (SDI) values by cover type for each VSS class. The VSS table in the appendix denotes SDI percentages by stand for each cover type. Ninety six percent of the stands in the aspen cover type are dominated by VSS 3, and 4 percent are dominated by VSS 2. The spruce/fir cover type has 82 percent of its stands dominated by VSS 3 with 18 percent dominated by VSS 4. Within the mixed conifer cover type 86 percent of the stands are dominated by VSS 3 and 14 percent by VSS 4.

Old Growth

Old growth is analyzed by cover type as written by Hamilton (1983) in *Characteristics of Old Growth in the Intermountain Region*. In addition, the Intermountain Regional office issued a memo in 2007 to further clarify the measures needed to establish what the minimum old growth standard is. In this memo it is stated, "The minimum criteria to define old-growth forest in the Intermountain Region are: Diameter at Breast Height (**DBH**), Trees Per Acre (**TPA**), and Age (**AGE**)." Old growth is getting its own heading because the (LRMP states in the General Direction section on page IV-II, 1(c), "in a forested unit 5 percent or more should be in old

growth". A forested unit is being defined as the entire forested area within the project boundary. This includes all the cover types. Table 2 outlines what the current conditions are as it relates to old growth.

Points of clarification: In each cover type, Hamilton (1983) offers an area of application. He describes where these attributes need to be applied. Under the aspen cover type he explains that the old growth aspen definition applies to the stable and grazing disclimax stands. The seral stands may contain what may qualify as old growth, but its maintenance would require a treatment to remove the competing conifers. In Table 2 seral aspen stands are included within the calculations because the proposed action, in part, is removing conifers as a "maintenance action and to promote aspen regeneration". Therefore, it is the professional opinion of the District Forester that the analysis meets the requirements as outlined by Hamilton.

Hamilton does not have a cover type listed as mixed conifer; therefore, the District Forester chose to use the Douglas fir cover type. It was chosen because Hamilton's description of dry or colder, lower productivity sites fit with the composition of most of the mixed conifer stands in the project area. Hamilton's best description is, "Douglas fir often the seral dominant as well as the climax dominant. Engelmann spruce or subalpine fir also are climax habitat types series". Some of the surveyed stands contained white fir. Although Hamilton does not address those in his description, they are a common associate at lower, drier elevations.

Table 2- Current percentage of forested acres of old growth in areas proposed for treatments.

Cover Type	Acres	Acres in Old Growth	Percentage of Old Growth
Aspen	35,985	13,314	37%
Mixed Conifer	4,280	0	0%
Spruce/fir	8,065	807	10%
Forested Acres	**48,330**	**14,121**	**29%**

Most of the old growth currently exists within the aspen cover type followed by spruce/fir. Mixed conifer contains elements of old growth but didn't fully meet the definition mainly because it did not have enough trees per acre greater than or equal to 15 inches diameter at breast height (dbh) and none of the mixed conifer stands had trees old enough to meet the greater than or equal to 200 years old.

There has been an outbreak of spruce beetles on Monroe Mountain. Little if any was picked up in the common stand exam in the form of measured dead trees. The outbreak consisted mainly in the Indian peaks area as of 2013. The outbreak has moved south and it has reached the Manning Meadows Reservoir and Barney Lake areas. Site visitations in 2014 revealed massive loss of overstory and likely mature trees. This epidemic will likely decrease the old growth within the spruce/fir cover type. In addition to the spruce beetle, a spruce budworm outbreak is occurring. Spruce budworm is a defoliator insect attacking the new needles. There preferred species is Douglas fir and subalpine fir. They will go after spruce but that is not the preferred. The spruce budworm does not usually kill the larger trees (although they can kill the smaller ones) but stresses them making them more susceptible to other things such as the Douglas fir beetle. Halloin (2003) confirms the last statement in his research stating, **"**Smaller trees tend to suffer more from the effects of defoliation, and larger trees tend to suffer more mortality from subsequent bark beetle attack."

Desired Condition

See description in the EIS.

Environmental Consequences

Alternative 1 - No Action

Direct Effects

Aspen Cover Type

Succession will continue causing further decline in the aspen cover type (particularly in seral stands) with likely conversions to spruce/fir and mixed conifer cover types. With the decline in aspen cover, understory grass and forb production will also decline both in numbers and variety. Bartos (2007) adequately explains this in *Aspen*. He says, "When aspen lands convert to conifer dominated landscapes, substantially less water is available for streamflow, undergrowth biomass production is greatly reduced, and there is a marked decline in the diversity of plants and animals." Stable stands have few, if any conifer, and without regeneration the multiple layers usually present within these stands will slowly decline with eventual die-off of the stand. At die-off, most of the stands will likely revert to grasses and/or shrubs.

Mixed Conifer and Spruce/fir Cover Types

Mixed conifer and spruce/fir cover types are being discussed and the effects of this alternative for the following reasons. The goal is to improve aspen, and one of the tools being considered is prescribed fire. Some areas being considered for prescribed fire border areas of these cover types. To be able to safely and effectively implement prescribed fire while minimizing impacts from prescribed fire to private property, the District is proposing mechanical treatments in these two cover types, especially adjacent to private property. Aspen also occurs in the mixed conifer and spruce/fir cover types. Doing treatments within these two cover types is expected to benefit aspen.

Fire Effects

Increases in conifer cover may lead to increases in fire severity and size. In addition to their high moisture content and herbaceous understory, aspen stands act as fire breaks (Morelli 2009). Aspen stands often change fire behavior by halting its advance, knocking crown fires to the ground, or changing its direction. The further along in succession aspen stands progress, the amount and size of conifers increase thus increasing the probability of larger fires. Morelli (2009) and Bigler et al. (2005) point out aspen stands have been found to be 200 times less likely to burn than spruce/fir stands.

Vegetative Structural Stages

As time progresses, VSS percentages shift towards the larger VSS classes with excesses in VSS 2, 3, and 4 (Table 3). A more readily apparent shift into VSS 5 and 6 occur within all cover types. By year 100, mixed conifer is nearly in line with the desired followed closely by spruce/fir, and lastly aspen. In the aspen cover type, the likely driver of the push towards VSS 5 and 6 is the conifer component within the seral stands. The current age of aspen stands range from 45 to 178 years old with an average of 97 years old for the cover type. Aspen are not a long-lived species and it is likely that at year 50, some of the older aspen will begin to die off

with even more occurring at year 100. To summarize the VSS, none of the cover types ever fully meets the desired condition. Some get close but it may take another 20 years for the mixed conifer and the spruce/fir to reach the desired condition. It is unlikely that aspen will ever fully reach the desired condition because they are short-lived. It is uncommon for the species to grow to the VSS 5 and 6 sizes in the quantities desired, and it is likely that conifers will take over as the dominant cover type because succession will continue to move forward under this alternative.

In addition, the current spruce beetle outbreak is likely to affect trees within VSS 4, 5, and 6 classes because the sizes related to those classes are preferred by the beetle. Vegetative Structural Stage 4, 5, and 6 may also be affected in Douglas fir if an outbreak of Douglas fir beetle were to occur.

Table 3- VSS by cover type for Alternative 1.

Alternative 1						
VSS Class						
	1	**2**	**3**	**4**	**5**	**6**
Aspen						
Desired	**10**	**10**	**20**	**20**	**20**	**20**
Current	13.60%	15.50%	56.78%	12.62%	1.11%	0.39%
year 50	1.02%	32.32%	37.66%	23.60%	4.83%	0.58%
year 100	2.12%	1.56%	33.51%	36.81%	21.17%	4.83%
Mixed Conifer						
Current	12.97%	19.69%	42.24%	19.32%	4.25%	1.52%
year 50	68.00%	33.56%	33.37%	23.41%	6.58%	2.40%
year 100	19.00%	10.29%	42.91%	29.39%	12.89%	4.34%
Spruce/fir						
Current	13.39%	15.85%	41.24%	21.00%	6.19%	2.34%
year 50	6.40%	21.83%	29.84%	28.58%	9.54%	3.81%
year 100	4.20%	15.76%	25.42%	32.56%	15.01%	7.07%

Old Growth

This report has already covered the old growth as it relates to the current condition; it currently meets the desired condition (Table 4). The percentage of old growth increases with this alternative as time progress. As with the VSS, the old growth for the aspen cover type is somewhat misleading in some stands in year 50 and 100 because it is likely that some of those stands will convert to mixed conifer and/or spruce/fir or die because of old age. Some mixed conifer qualifies as old growth 100 years from now.

In addition, current spruce beetle outbreak is likely to affect trees the larger trees in the spruce/fir and mixed conifer cover types because larger older trees are preferred by the beetle. Larger, older Douglas fir trees are susceptible to Douglas fir beetle and maybe affected if an outbreak of Douglas fir beetle were to occur.

Table 4- Old growth for Alternative 1.

Current			
Cover Type	Acres	Acres in Old Growth	Percentage of Old Growth
Aspen	35,985	13,314	37%
Mixed Conifer	4,280	0	0%
Spruce/fir	8,065	807	10%
Forested Acres	**48,330**	**14,121**	**29%**
Desired			**5%**
Year 50- No Action			
Cover Type	Acres	Acres in Old Growth	Percentage of Old Growth
Aspen	35,985	24,830	69%
Mixed Conifer	4,280	0	0%
Spruce/fir	8,065	2,984	37%
Forested Acres	**48,330**	**27,814**	**58%**
Desired			**5%**
Year 100- No Action			
Cover Type	Acres	Acres in Old Growth	Percentage of Old Growth
Aspen	35,985	32,746	91%
Mixed Conifer	4,280	1,712	40%
Spruce/fir	8,065	3,629	45%
Forested Acres	**48,330**	**38,088**	**79%**
Desired			**5%**

Indirect Effects

Economics

The implementation cost for this alternative is placed in the indirect effects section because when wildfires would occur cannot be predicted. Costs associated with this alternative are based off average wildfire costs on Monroe Mountain since 1990. Since 1990, the average cost to suppress wildfires on Monroe Mountain has been approximately $4,200 an acre. At $4,200 an acre, if 48,330 acres of aspen, mixed conifer, and spruce/fir on Monroe Mountain were to burn from wildfire, the total cost would be approximately $178 million. A breakdown of this cost can be viewed in appendix B.

Cumulative Effects

With approximately 48,138 acres of aspen across in the project area, doing nothing may result in a large-scale conversion of this cover type to mixed conifer, spruce/fir, or sagebrush. How much or how long it takes is unknown because as the Utah Forest Restoration Working Group (2010) explains at the landscape scale, aspen declines are variable, depending on site characteristics, fire and succession, extreme climatic events, biotic agents, and human influence. Continued lack of

action within the cover type may lead to long term aspen decline or loss. Bartos and Campbell (1998) describe that as, "Loss, or potential loss, of aspen on these lands can be attributed primarily to a combination of successional processes, reduction (or elimination) of fire, and long-term overuse by ungulates. Existing conditions indicate that most aspen stands will eventually be replaced by conifers, sagebrush, or possibly other shrub communities."

Alternative 2

Direct Effects

Aspen Cover Type

Mechanical option 1 is to remove all conifers. Treatment under option 1 within the aspen cover type would result in removal of conifer. The effects of this treatment would result in a more pure stand of aspen (at least for a time). In effect, this would create a two-aged stand of aspen (see Figure 11). The expected regeneration result would meet the minimum stocking rate of 300 suckers per acre as established in the LRMP on page IV-32 and the desired condition of 5,000 aspen suckers per acre. If overbrowsing of new aspen suckers occurs (browse thresholds are described in chapters 1 and 2 of the EIS) the District would implement a suite of response options (also described in chapters 1 and 2 of the EIS) to minimize impacts from overbrowsing of new aspen suckers. These thresholds and response options are expected to ensure minimum stocking rates and desired conditions for aspen regeneration are achieved.

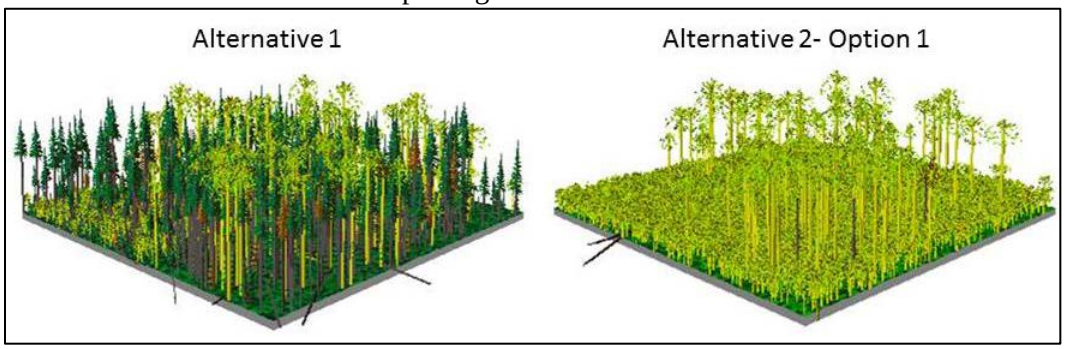


Figure 12- Comparison of aspen between Alternative 1 and Alternative 2 Mechanical Treatment Option 1.

Mechanical option 2 is to remove all conifers 8 inches DBH and below within Inventoried Roadless Areas (IRAs) and draft Unroaded-Undeveloped Areas (UUAs). All conifers would be removed outside of the IRAs and draft UUAs.

The results from this treatment leave all the overstory trees. Removing the smaller trees will not likely have much of an impact (particularly in the long-term) on succession, although it would be better than alternative 1, as seen in Figure 12. Conifer encroachment has not been halted but has been reduced as compared to alternative 1. The conifers in the overstory are the ones that produce the seed to begin the next generation of conifers. It has often been thought that seral stands are nurseries for conifers. Conifers are more shade tolerant than aspen and are more adept at surviving under and overstory where light levels are less. Therefore, although this treatment may provide some regeneration of aspen, the effects would likely be short-lived and aspen survival rates would be low given the remaining overstory of conifer. Understory diversity would also be affected as Campbell (1995) describes, "As conifers gain dominance less light penetrates to the forest floor, and undergrowth shrubs and herbs decrease in both variety and abundance."

Both aspen regeneration and understory diversity would be better than alternative 1 but the effects would be short-lived.

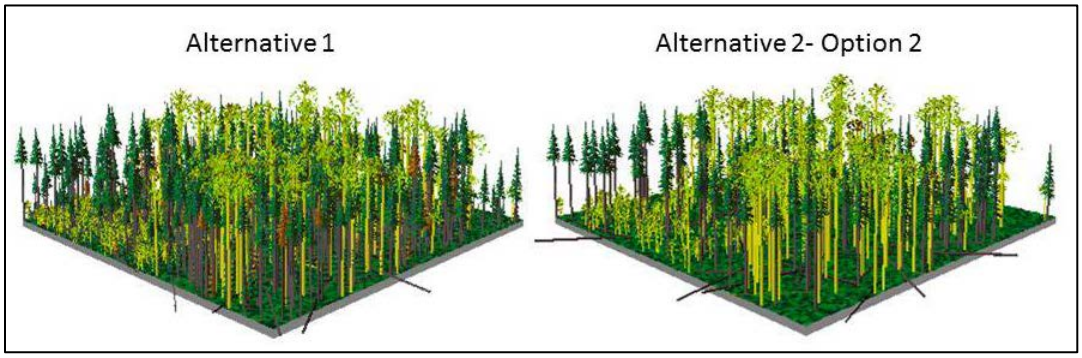


Figure 13**- Comparison of aspen between Alternative 1 and Alternative 2 Option 2.**

Mixed Conifer and Spruce/fir Cover Types

Mechanical option 1 is to use group and single-tree selection to remove conifer to a BA of less than or equal to 90 square feet per acre within all mechanical treatment areas.

Treatments under option 1 using group and singletree selection are designed to create or maintain an uneven-aged stand of trees. The goal of the 90 BA is to open the canopy and provide space for trees to grow and regenerate. Creating openings within the canopy would also break up the canopy fuels and minimize the potential of surface and/or crown fires. Opening the canopy is also expected to benefit the existing aspen that occurs in the mixed conifer and spruce/fir cover types.

Table 5- Basal area (in square feet per acre) comparison between Alternative 1 and Alternative 2 Options 1 and 2.

Basal Area			
Cover Type	**Alt 1**	**Alt 2 Option 1**	**Alt 2 Option 2**
Mixed Conifer	123	91	76
Spruce/fir	144	88	109

Spruce beetles are at epidemic levels in some areas of the project. The less than or equal to 90 square feet per acre will also help minimize the impacts associated with this insect. To reach low hazard status, sites should be thinned to a basal area of less than or equal to 100 square feet per acre, average diameter should be reduced to less than 10 inches and spruce species composition to less than 50 percent (Costello and Howell 2006). Alternative 2, option 1 provides better resiliency than alternative 1 because spruce/fir stand basal area would be lower (see Table 5). Stand structure, in both cover types, (as an uneven-aged stand) for alternative 2, option 1 compared to alternative 1 is the same as described in the affected environment for both cover types (see Figure 14, 15, 16 and 17). Employing uneven-aged structure will help with resiliency to spruce beetle. Untreated stands on the Fishlake in the past have seen a total loss of all overstory trees (Cove area on Monroe Mountain, UM and Niotche in the seven Mile area). Some areas where treatments have occurred prior to infestation have lost some of the larger trees in the overstory but have structure remaining and replacement trees for the future.

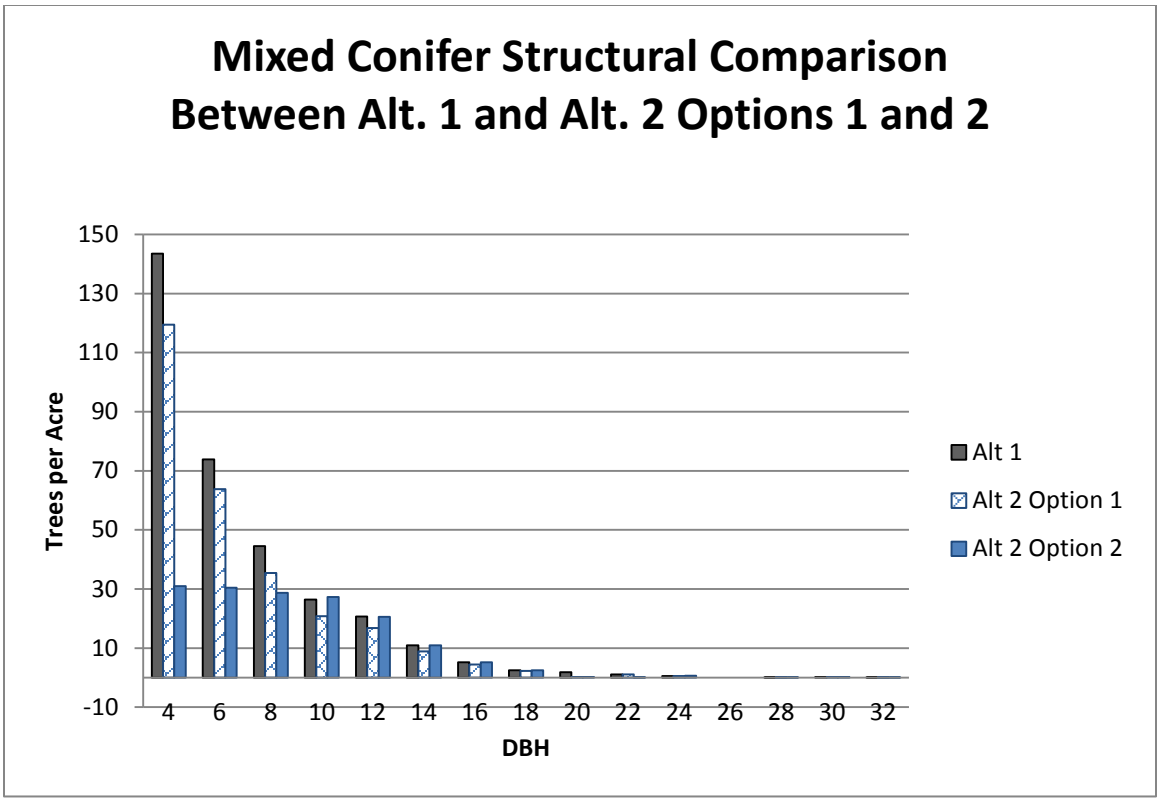


Figure 14- Structural comparison for mixed conifer cover type between Alternative 1 and Alternative 2 Options 1 and 2.

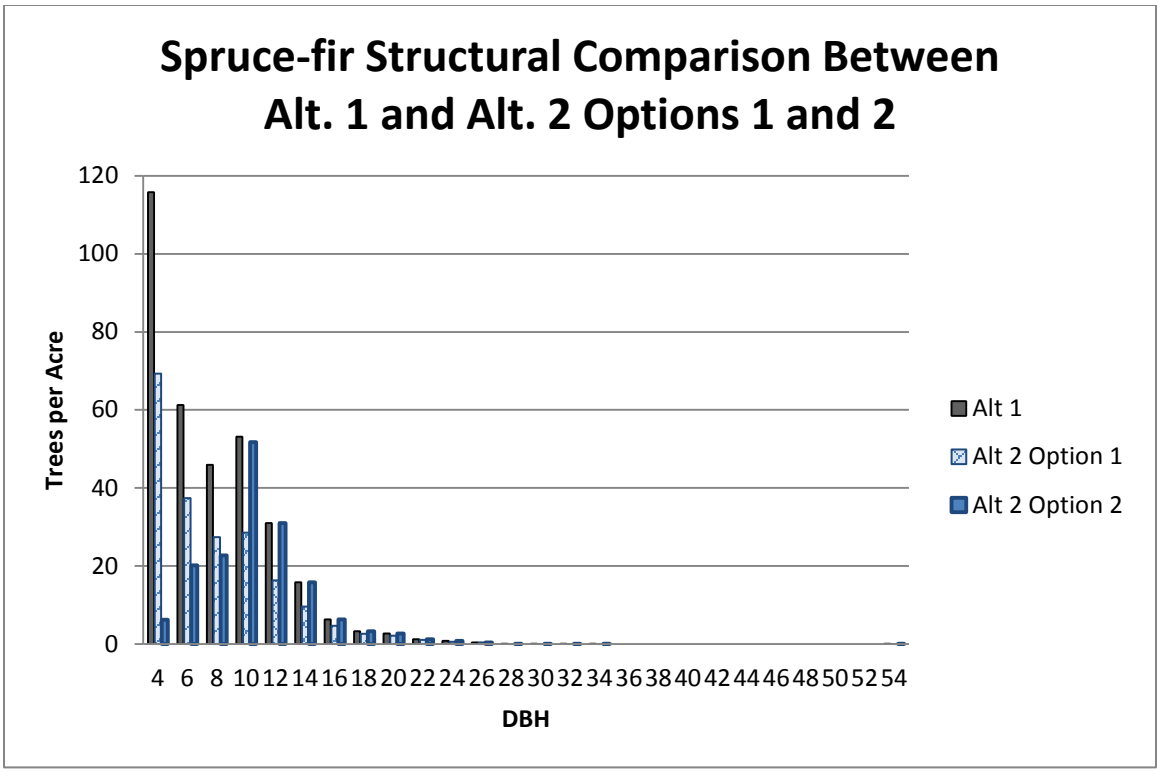


Figure 15- Structural comparison for spruce/fir cover type between Alternative 1 and Alternative 2 Options 1 and 2.

Spruce budworm has shown up on the aerial detection survey (2013) in various areas on Monroe Mountain. This pest is usually the precursor to the Douglas fir beetle. The Douglas fir beetle attacks the tree while it is stressed from the spruce budworm. In options 1 or 2, this could have an effect depending on when the treatment occurs and when the mortality happens. It is the professional opinion of the District Forester that it is likely to occur within the next 5 years regardless of treatment. It will have an effect on the older larger Douglas fir trees within the mixed conifer type and would affect the mature structural elements within this cover type. It will have some effect on old growth potential (in alternative 1 old growth for this cover type does not show until 100 years from now) by extending the time frame out even further (perhaps as long as 200 years).

In areas where the stand(s) are heavily infested and/or already dead, sanitation and salvage will be employed to remove the trees. Removal of the infested trees will assist in removing some of the larvae resulting in a lower beetle population. Sanitation and salvage is an intermediate treatment designed to remove dead or dying trees. The LRMP outlines stocking levels after a final harvest. It is assumed that some areas impacted by the beetle may need planting because of known outbreaks on Monroe Mountain in conjunction with the knowledge gained from other outbreaks on the Forest. If this happens, it would be considered a final harvest and in need of restocking, as outlined on page IV-32 of the LRMP, if stocking is less than 150 to 200 seedlings per acre (minimums depend on site productivity).

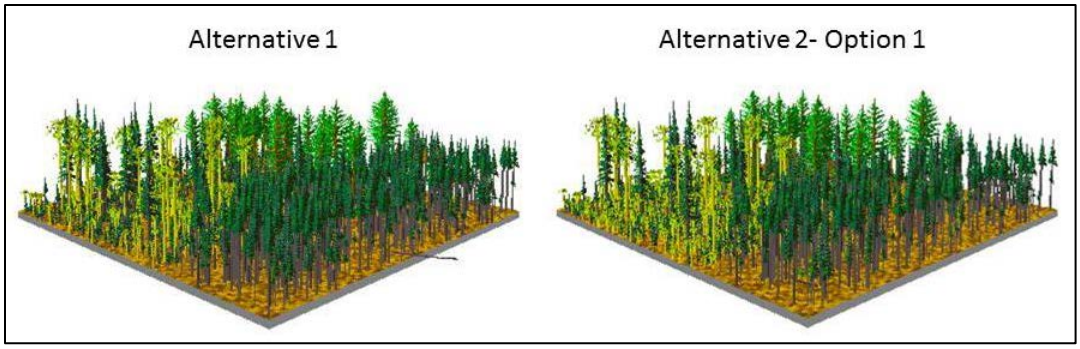


Figure 16- Comparison of mixed conifer between Alternative 1 vs. Alternative 2 Option 1.

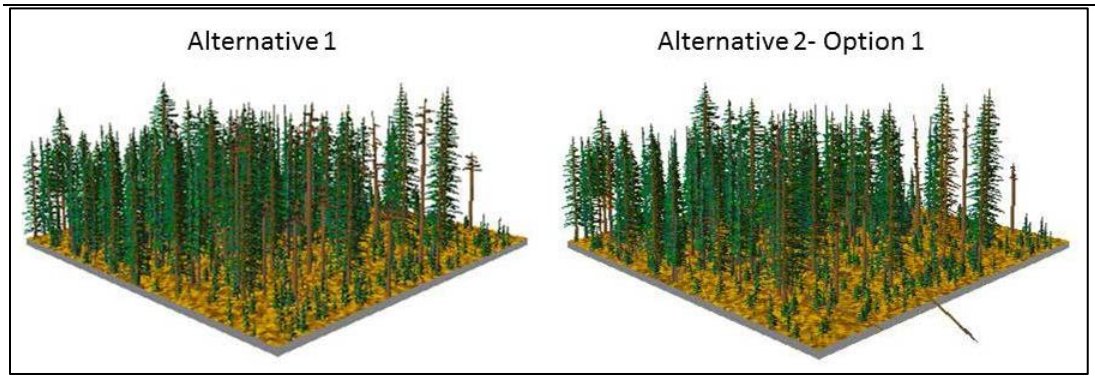


Figure 17- Comparison of spruce/fir between Alternative 1 and Alternative 2 Option 1.

Mechanical option 2 is to remove all conifer 8 inches and below within IRAs and in draft UUAs. Outside of the IRAs and draft UUAs, conifers would be removed using singletree and group selection to a BA of less than or equal to 90 square feet per acre.

Treatments under this option remove all conifers less than or equal to 8 inches DBH. By removing the smaller trees, densities would be lowered short-term as compared to alternative 1; however, the larger overstory trees remain increasing the probability of spruce beetle infestation. Infestations occurring after treatment may lead to a loss of all spruce and conversion to a different cover type. If option 2 is chosen within spruce/fir cover type, the risk is high for total loss of the cover type given the current epidemic. If the larger overstory trees were lost to beetle infestation, no smaller understory trees (less than 8 inch DBH) would exist to eventually replace the larger dead trees. Trees would need to be replanted. It would take several years for newly planted trees to reach 8 inches DBH, and greater.

The elimination of the smaller trees will lower basal area in comparison to alternative 1 (Table 5); however, the effects will be short-lived because the cone bearing trees remain and they will immediately start re-establishing themselves.

Overall, cover type structure will change from an uneven-aged one to a more even aged structure as compared to alternative 1. Stands that are of this structure type are more susceptible to beetles and are less resilient to the effects of fire. Figures 14, 15, 18 and 19 illustrate the differences in option 2 to alternative 1.

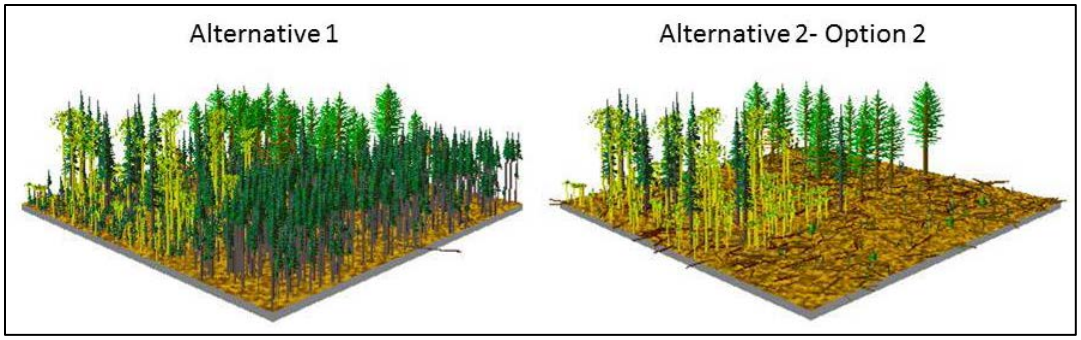


Figure 18- Comparison of mixed conifer between Alternative 1 and Alternative 2 Option 2.

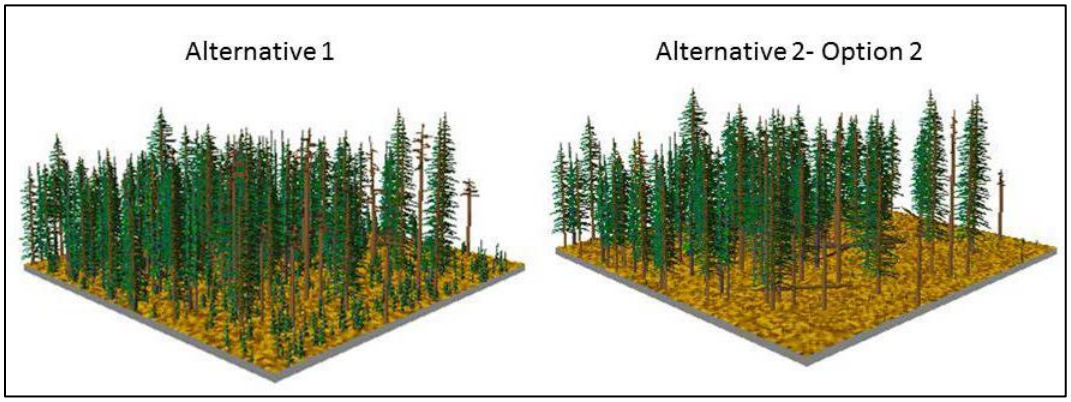


Figure 19- Comparison of Spruce/fir between Alternative 1 and Alternative 2 Option 2.

Old Growth

Table 6 compares forested old growth between alternative 2, options 1 and 2, with alternative 1.

Table 6- Old growth comparison between Alternative 1 and Alternative 2.

Old Growth									
	Mech Treatment (total Acres)	Mechanical Acres in Old Growth Option 1 and 2	60% of Acres Burned	Acres in Old Growth- 60% of Acres Burned	Current Forested Acres	Current Acres in Old Growth	Total Acres of Old Growth Affected by Treatments	Difference	Percentage of Old Growth Remaining After Treatment
Alt 1	0	0	0	0	48330	14121	0	0	29%
Alt 2	8,186	92	19,795	5,479	48,330	14,121	5,571	8,550	18%

Alternative 2 shows an 11 percent decline in forested old growth for option 1 and 2 versus alternative 1. Implementation of alternative 2, options 1 and 2 result in LRMP related old growth standards being achieved.

Fire Effects

Burning will take place within all the cover types. As seral aspen stands are burned, existing aspen trees will die. Within the aspen cover type, following prescribed fire treatments, it is expected that several thousand aspen suckers per acre would regenerate. Previous fires on the Fishlake NF have resulted in thousands of aspen suckers per acre. The expected regeneration result would meet the minimum stocking rate of 300 suckers per acre as established in the LRMP on page IV-32 and the desired condition of 5,000 aspen suckers per acre. If overbrowsing of new

aspen suckers occurs (browse thresholds are described in chapters 1 and 2 of the EIS) the District would implement a suite of response options (also described in chapters 1 and 2 of the EIS) to minimize impacts from overbrowsing of new aspen suckers. These thresholds and response options are expected to ensure minimum stocking rates and desired conditions for aspen are achieved.

Mixed conifer and spruce/fir cover types may be severely damaged by a fire. With the exception of Douglas fir, most of the species associated with these cover types, are not fire hardy and are easily damaged or killed by fire (Hood and Miller 2007, and Evans 2011). Where fire occurs, almost all the understory will be burned (regardless of species). Most of the trees would be burned in the spruce/fir cover type. Engelmann spruce, subalpine fir and other subalpine vegetation evolved with limited adaptations to fire and few trees survive (Jenkins et al. 2014). Larger Douglas fir in the mixed conifer type would likely survive while most of the other species would be burned in the mixed conifer cover type. Jenkins et al. (2014) writes about a beetle out break on the Markagunt Plateau, Utah that killed 93 percent of the spruce overstory. They state that given the magnitude of overstory Engelmann spruce loss and the paucity of Engelmann spruce regeneration, 300 to 400 years may elapse before Engelmann spruce dominated forests are restored. Fires would have a more devastating effect than spruce beetle because more than just the spruce would be affected. Where fires affect the spruce/fir type there exist an increased potential for a cover type conversion from spruce/fir to grasses and shrubs lasting many years. There is also a potential for a type conversion from a mixed conifer to a Douglas fir type. Because of the removal of other conifer within the mixed conifer type by a fire, bare mineral soil would be exposed. This is an ideal site for seedling germination for the remaining Douglas fir. Mixed conifer stands containing aspen would see an increase in aspen suckering with scattered Douglas fir. To help minimize impacts to spruce/fir and mixed conifer from prescribed fire, as described in the EIS, within the spruce/fir and mixed conifer dominated stands that have little to no aspen presence (less than 15 aspen recruits per acre), prescribed burning would occur when low to moderate fire severities would be expected. In addition, no fire ignitions that would likely result in moderate to high fire severities in Douglas fir dominated areas would occur. Low severity fire in the Douglas fir dominated stands would be allowed. After prescribed fire treatments, if needed to meet LRMP standards, spruce/fir and mixed conifer would be replanted.

Vegetative Structural Stage

The structural characteristics for VSS are common for all alternatives; therefore, they are being addressed in the, “Effects Common to all Alternatives” section. The only distinguishing characteristic that is different is the number of acres affected within each alternative.

Economics

The cost to implement alternative 2, option 1 is approximately $7.1 million and the cost to implement alternative 2, option 2 is approximately $7.2 million. Compared to alternative 1 ($178 million) the cost to implement alternative 2, options 1 or 2 is considerably less than alternative 1. See appendix B for a breakdown of the costs.

Indirect Effects

A long-term concern for the aspen is the health of the aspen overstory. Walters et al. (1982) and Solarik et al. (2012) discuss results related to partial harvest of aspen. Waters et al focuses more on regeneration and concludes that more trees harvested and/or the lower the basal area after treatment the more sprouts there were. He also concludes that their minimum (6,000 sprouts per acre) was achieved on partial harvest but grazing impacts wiped them out on some of the plots within the study. Solarik et al talks some about regeneration but the primary focus is the

overstory. In his research, he indicates that there is an increase in aspen mortality after harvest activities. Sunscald is a concern related to management alternatives where aspen overstory retention is the goal. Sunscald is thought to be a mortality factor; however, both research papers conclude that although sunscald was a factor and caused some mortality it was not the primary cause. Cankers and wind damage (or a combination of both) was the primary cause of death with sunscald being the entry point for the canker. Ironically, in Solarik et al., the more BA removed the higher the death rate of overstory aspen. Conversely, Waters et al., requires more BA removed to increase reproduction. Solarik et al points out that higher mortality rates occurred 5 years after treatment and increased higher still 10 years later. Since mechanical treatments in any alternative and options have aspen overstory retention within the aspen cover type it is likely that an unknown number of aspen overstory trees will die. Areas on Monroe Mountain where aspen was retained at low basal area are showing symptoms of sunscald and may be lost.

Cumulative Effects

Cumulative effects area (CEA) is Monroe Mountain (see appendix A for a map of the CEA). Total CEA acres are 175,706 surrounding 11,805 acres of private property. Monroe Mountain lies near the center of the Fishlake National Forest. The southern part of Monroe Mountain falls outside the project boundary but is included as part of the cumulative affects area because there is likely to be activity that may affect this project. There are no known aspen related activities associated with Bureau of Land Management (BLM) lands that surround the mountain; therefore, that area was not considered for inclusion.

Table 8 below outlines the cumulative effects for alternative 2. Harvest and prescribed burn are the past activities associated with alternative 2. Wildfire acres, although not a management activity, are included because they have had an effect on vegetation and have occurred throughout the CEA in the past. Past activities have affected 19 percent of the total acreage within the cumulative effects boundary. Alternative 2 will impact an additional 16 percent of the area. In addition, future activities scheduled for 2015 include 5,778 acres of prescribed fire. Activities past, present and future will affect 38 percent of the cumulative effects area (Table 7).

Table 7- Alternative 2 cumulative effects.

Alternative 2							
Activity	**Past Activity Acres**	**% of CEA Impacted (Acres)**	**Alt 2 Acres**	**% of CEA Impacted**	**Foreseeable Future Acres**	**Total Activity Acres**	**% CEA Impacted**
Harvest	5,774	3%	8,186	5%	0	13,960	8%
Prescribed Burn	13,998	8%	19,795	11%	5,778	39,571	23%
Wildfire	12,894	7%	0	0%	0	12,894	7%
Total	**32,666**	**19%**	**27,981**	**16%**	**5,778**	**66,425**	**38%**

Past activities come from every decade since the 1960s (Table 8). Past activities from 1960 to 1990 will have little cumulative bearing on cover type vegetation because those areas are largely recovered from past activities and are in various stages of development. Therefore the discussion will center on those activities from 2000 to the present. Past activities in the 2000 decade totals 4 percent with a 5 percent increase in the 2010 decade.

Table 8- Past and foreseeable future activities by decade.

	2000's	2010's	Total- by Activity
Harvest Acres	1,156	3,035	4,191
Prescribed Burn Acres	1,291	11,597	12,888
Wildfire Acres	4,192	1,520	5,712
Total	6,639	16,152	22,791
Percentage by Decade	4%	9%	13%

Aspen Cover Type

Harvest and/or fire with past activities have removed most conifers within the type. Even-aged management has been the goal, removing all trees and regenerating aspen. Within this cover type, it has been largely successful, when fenced and protected from ungulate browsing. When considering the thresholds and response options, fire treatments for this alternative are expected to be successful in meeting LRMP standards and meeting the desired conditions for this project.

Option 1 mechanical treatments will result in two-aged stands with no conifer. Option 1 will also move the successional stage back and, for a time, create a pure stand of aspen. Option 2 treatments will not show a whole lot of change in reference to overstory composition and structure. Leaving the conifer in the overstory will result in succession progressing. Past treatments, particularly those from the 1990 to 2010 decades, in conjunction with option 1 mechanical treatments and prescribed fire, would decrease the number of mid to late-seral aspen acres because these stands would be in an earlier successional stage, the treatment would last longer across a larger area. Table 10 shows that the aspen cover type will have a 39 percent affect across the CEA. The past treatments in concert with the proposed treatments (regardless of option 1 or option 2 treatments) should provide a good mosaic of age classes and still maintain biological diversity.

Mixed Conifer/Spruce/fir

Past activities combined with proposed activities would have the following effects. Thin barked trees such as Engelmann spruce and sub-alpine are all less fire hardy and are killed more readily than Douglas fir (Hood and Miller 2007). This would tend to skew composition weighted more heavily to Douglas fir and white fir. Regardless of species, fire is lethal to the smaller trees. If there is a crown fire, all trees would likely die.

Option 1 combined with past activities would create a mosaic of stands with uneven-aged stands dominating from the mechanical treatment while the fire treatment areas would remove trees from all age classes and/or may eliminate some stands. Overall, cumulative effects would reflect a landscape with uneven-aged structure in a mosaic pattern. Fifty percent of mixed conifer acres and 30 percent of spruce/fir acres would be affected across the CEA (Table 9). Option 2 combined with past activities would result in stands with (at least temporarily) less smaller trees and changing the structure to one that is skewed to the larger classes.

Table 9- CEA affects by cover type.

	Alternative 2				
	Current Acres of Cover Type in CEA	Mechanical Treatment Option1 and 2	Prescribed Fire Treatment	60% Burned	Total Acres affected in CEA
Aspen	31,129	3146	15159	9095	12241
Percentage		10%		29%	39%
Mixed Conifer	5,220	97	4183	2510	2607
Percentage		2%		48%	50%
Spruce/fir	14,392	918	5658	3395	4313
Percentage		6%		24%	30%

Old Growth

Old growth will decline by 11 percent via past and present actions and decline 1% additional through foreseeable future actions, totaling 12% for past present and foreseeable future actions (Table 10).

Table 10- CEA effects on old growth for Alternative 2.

Cumulative Effects- Old Growth							
	Present Forested Acres	Present Acres in Old Growth	Alt. 2 Acres of Old Growth Affected	Past, Present and Foreseeable Future Actions Affecting Old Growth	Total Acres Affecting Old Growth (Past, Present and Foreseeable Future)	Percent of Old Growth remaining after Alt. 2	Percentage of Old Growth remaining after all past, present, and reasonably foreseeable actions are completed
Alt 1	48,330	14,121	0	0	0	0	29%
Alt 2	48,330	14,121	5,571	135	5,706	18%	17%

Alternative 3

Direct Effects

Aspen Cover Type

Mechanical option 1 is to remove all conifers. Treatment under option 1 within the aspen cover type will result in total removal of conifer. The effects of this treatment would result in a more pure stand of aspen (at least for a time). In effect, this would create a two-aged stand of aspen (see Figure 20). The expected regeneration result would meet the minimum stocking rate of 300 suckers per acre as established in the LRMP on page IV-32 and the desired condition of 5,000 aspen suckers per acre. It is believed minimum stocking levels will be achieved as outlined in the

LRMP; however, grazing may affect the regeneration and cause the numbers to fall below LRMP standards. Stands of aspen will be monitored for this outcome and would be addressed through the browse thresholds and response options outlined in the EIS.

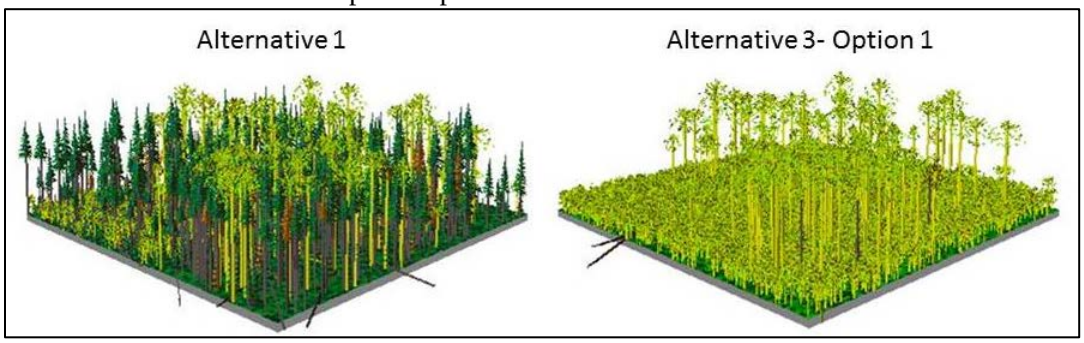


Figure 20- Comparison of aspen between alternative 1 and alternative 3 option 1.

Mechanical option 2 is to remove all conifers 8 inches diameter at breast height and below within inventoried roadless areas and draft unroaded and undeveloped areas. All conifers would be removed outside of these areas.

The results from this treatment leave all the overstory. Removing the smaller trees will not likely have much of an impact (particularly in the long term) on succession, although it would be better than alternative 1, as seen in Figure 21. Conifer encroachment has not been halted but has been reduced as compared to alternative 1. The conifers in the overstory are the ones that produce the seed to begin the next generation of conifers. It has often been thought that seral stands are nurseries for conifers. Conifers are more shade tolerant than aspen and are more adept at surviving under and overstory where light levels are less. So, although this treatment may provide some regeneration of aspen, the effects would likely be short-lived and survival rates would be low given the remaining overstory. Understory diversity would also be affected as Campbell (1995) describes, “As conifers gain dominance less light penetrates to the forest floor, and undergrowth shrubs and herbs decrease in both variety and abundance.” Both aspen regeneration and understory diversity would be better than alternative 1 but the effects would be short-lived.

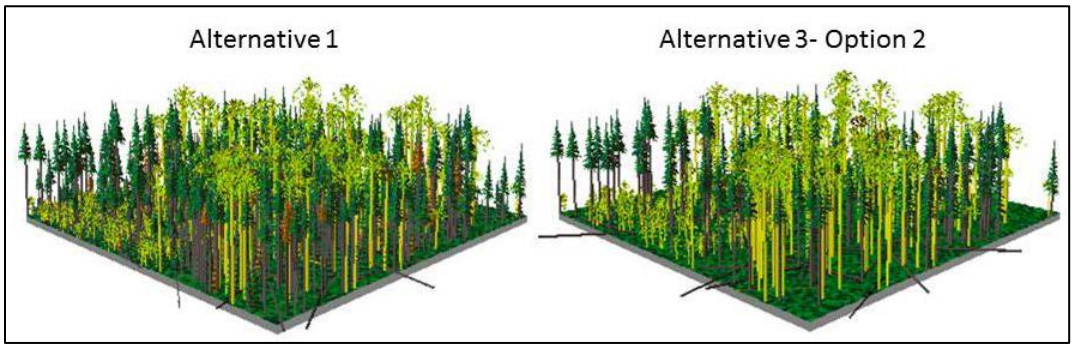


Figure 21- Comparison of aspen between alternative 1 and alternative 3 option 2.

Mixed Conifer and Spruce/fir Cover Types

Mechanical option 1 is to use group and tree selection to remove conifer to a basal area (BA) of less than or equal to 90 square feet per acre within all mechanical treatment areas.

Treatments under option 1 using group and single tree selection are designed to create or maintain and uneven-aged stand of trees. The goal of the 90 BA is to open the canopy and provide space

for trees to grow and regenerate. Creating openings within the canopy would also break up the canopy fuels and minimize the potential of surface and/or crown fires.

Table 11- Basal area (in square feet per acre) comparison between alternative 1 and alternative 3 options 1and 2.

Basal Area			
Cover Type	**Alt 1**	**Alt 3 Option 1**	**Alt 3 Option 2**
Mixed Conifer	123	91	76
Spruce/fir	144	88	109

Spruce beetles are at epidemic levels in some areas of the project, the less than or equal to 90 square feet per acre will also help minimize the impacts associated with this insect. To reach low hazard status, sites should be thinned to a basal area of less than or equal to 100 square feet per acre, average diameter should be reduced to less than 10 inches and spruce species composition to less than 50 percent (Costello and Howell 2006). Alternative 3, option 1 provides better resiliency than alternative 1 because spruce/fir stand BA would be lower (see table 11). Stand structure, in both cover types, (as an uneven-aged stand) for alternative 3, option 1compared to alternative 1 is the same as described in the affected environment for both cover types (see Figures 22, 23, 24 and 25). Employing uneven- aged structure will also help with resiliency to spruce beetle and the irregular forest structure and compositions, both within and among stands, tend to produce wildfire resilient forests (Graham et al. 2009) more so than in alternative 1. Untreated stands on the Fishlake in the past have seen a total loss of all overstory trees (Cove area on Monroe Mountain, UM and Niotche in the seven Mile area). Some areas where treatments have occurred prior to infestation have lost some of the larger trees in the overstory but have structure remaining and replacement trees for the future.

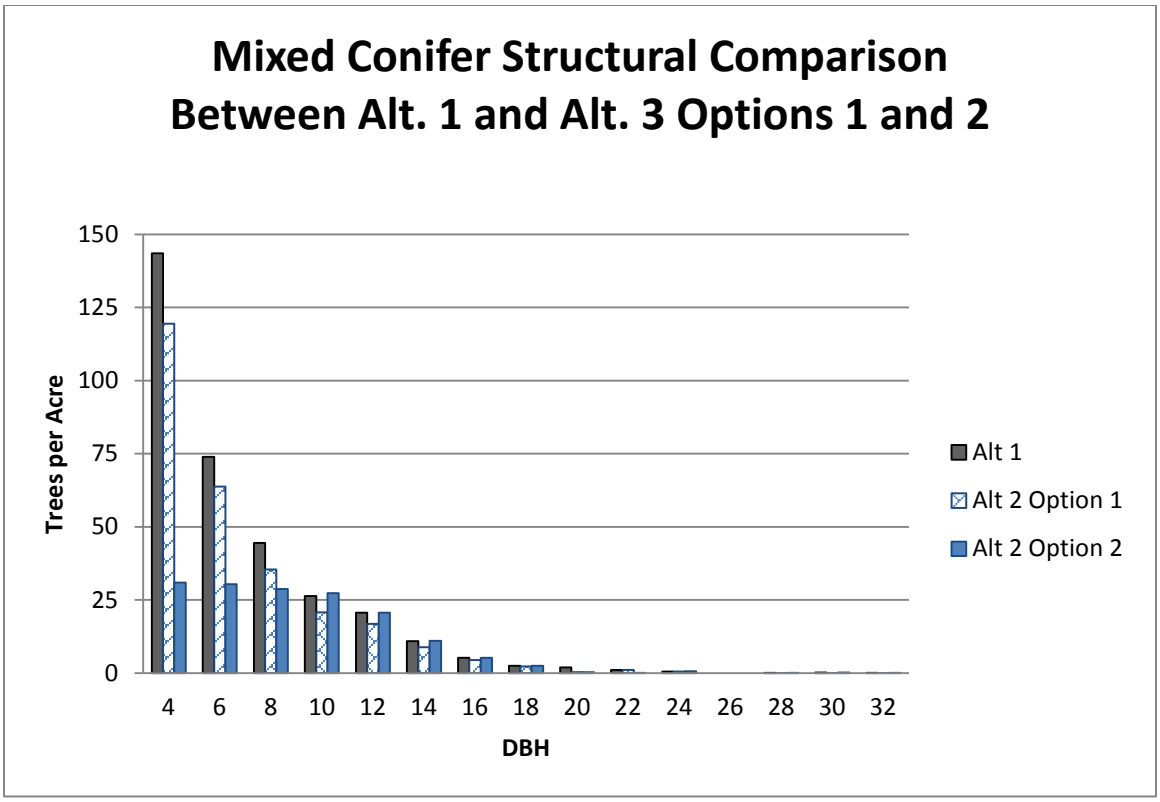


Figure 22- Structural comparison for mixed conifer cover type between Alternative 1 and Alternative 3 Options 1 and 2.

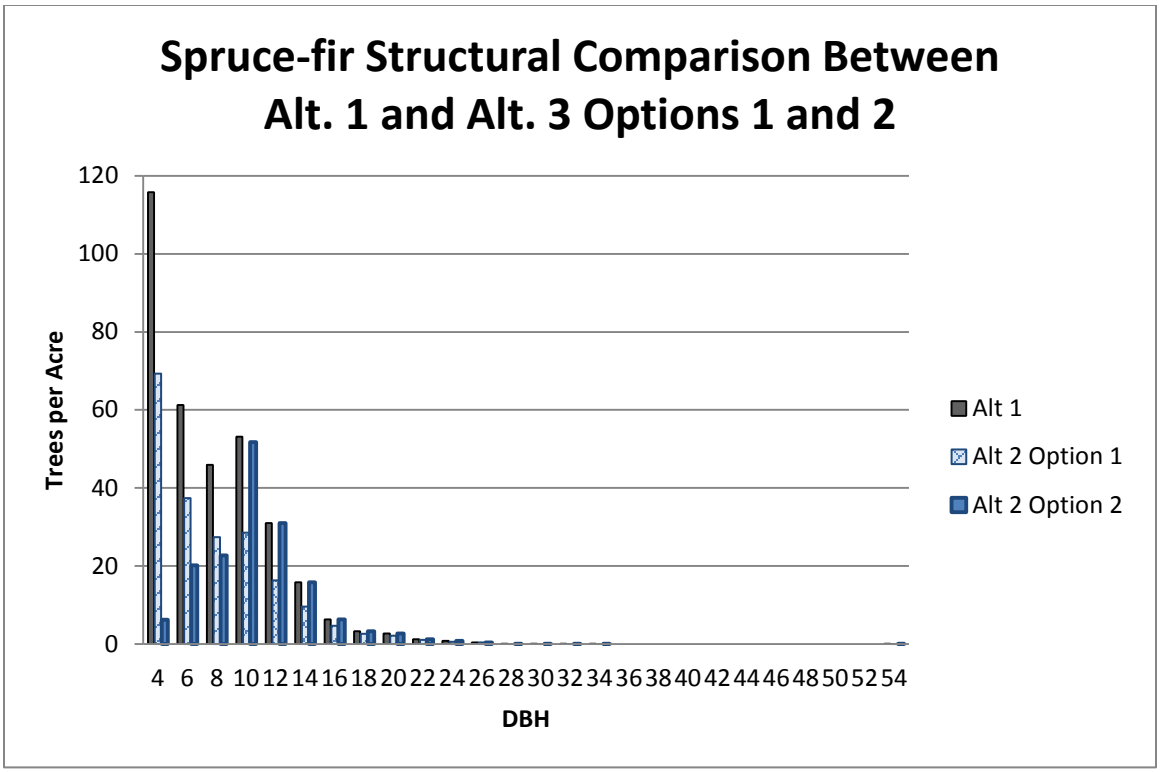


Figure 23- Structural comparison for spruce/fir cover type between alternative 1 and alternative 3 options 1 and 2.

Spruce budworm has shown up on the aerial detection survey (2013). This pest is usually the precursor to the Douglas fir beetle. The Douglas fir beetle attacks the tree while it is stressed from the spruce budworm. In option 1 or 2 this could have an effect depending on when the treatment occurs and when the mortality happens. It is the District Forester's professional opinion that it is likely to occur within the next 5 years regardless of treatment. It will have an effect on the older larger Douglas fir trees within the mixed conifer type and would affect the mature structural elements within the type. It will have some effect on old growth potential (in alternative 1 old growth for the type does not show until 100 years from now) by extending the time frame out even further (perhaps as long as 200 years).

In areas where the stand(s) are heavily infested and/or already dead, sanitation and salvage will be employed to remove the trees. Removal of the infested trees will assist in removing some of the larvae resulting in a lower population. Sanitation and salvage is an intermediate treatment designed to remove dead or dying trees. The LRMP outlines stocking levels after a final harvest. It is assumed that some areas impacted by the beetle may need planting because of known outbreaks on Monroe Mountain in conjunction with the knowledge gained from other outbreaks on the Forest. If this happens, it would be considered a final harvest and in need of restocking, as outlined on page IV-32 of the LRMP, if stocking is less than 150 to 200 seedlings per acre (minimums depend on site productivity).

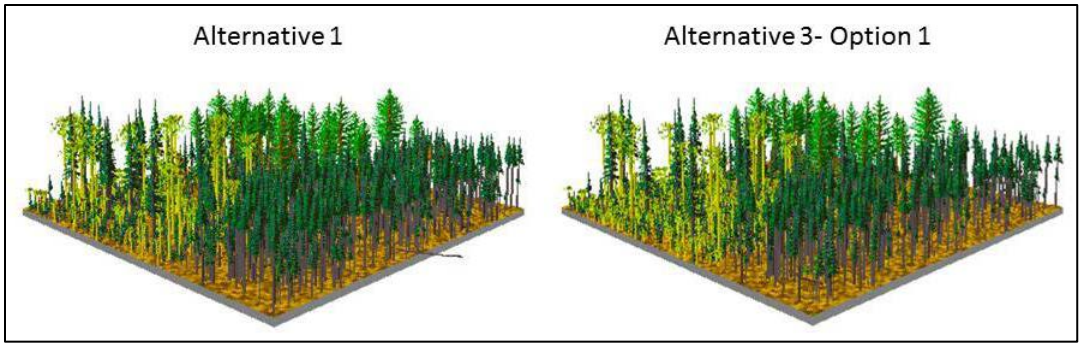


Figure 24- Comparison of mixed conifer between alternative 1 vs. alternative 3 option 1.

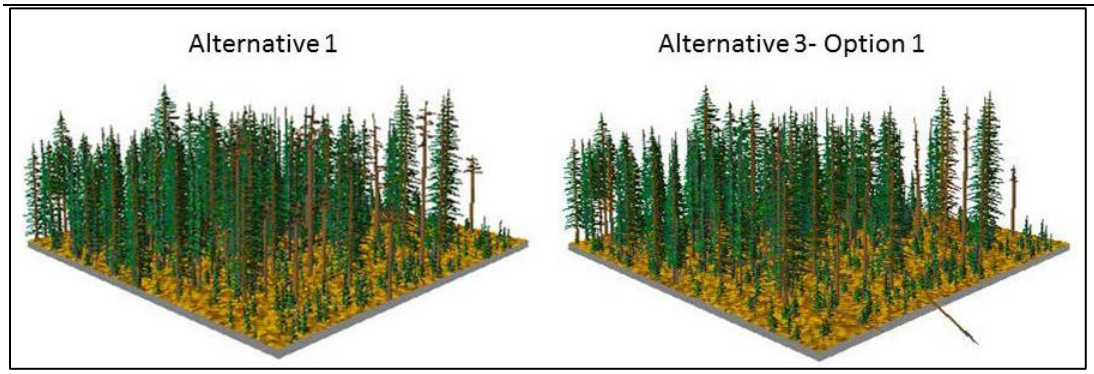


Figure 25- Comparison of spruce/fir between alternative 1 and alternative 3 option 1.

Mechanical option 2 is to remove all conifer 8 inches and below within IRAs and draft UUAs. Outside of those areas will remove conifers using single tree and group selection to a BA of less than or equal to 90 square feet per acre.

Treatments under this option remove all conifers less than or equal to 8 inches DBH. By removing the smaller trees, densities would be lowered short-term as compared to alternative 1; however, the larger overstory trees remain increasing the probability of spruce beetle infestation. Infestations occurring after treatment may lead to a loss of all spruce and conversion to a different cover type. If option 2 is chosen within spruce/fir cover type, the risk is high for total loss of the cover type given the current epidemic.

The elimination of the smaller trees will lower BA in comparison to alternative 1 (Table 11); however, the effects would be short-lived because the cone bearing trees remain and they will immediately start re-establishing themselves.

Overall cover type structure would change from an uneven-aged one to a more even-aged structure as compared to alternative 1. Stands that are of this structure type are more susceptible to beetles and are less resilient to the effects of fire. Figures 22, 23, 26 and 27 illustrate the differences in option 2 to alternative 1.

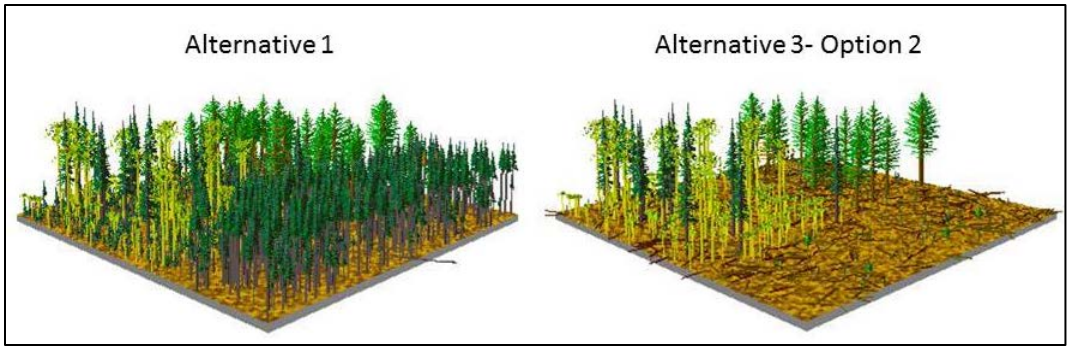


Figure 26- Comparison of mixed conifer between alternative 1 and alternative 3 option 2.

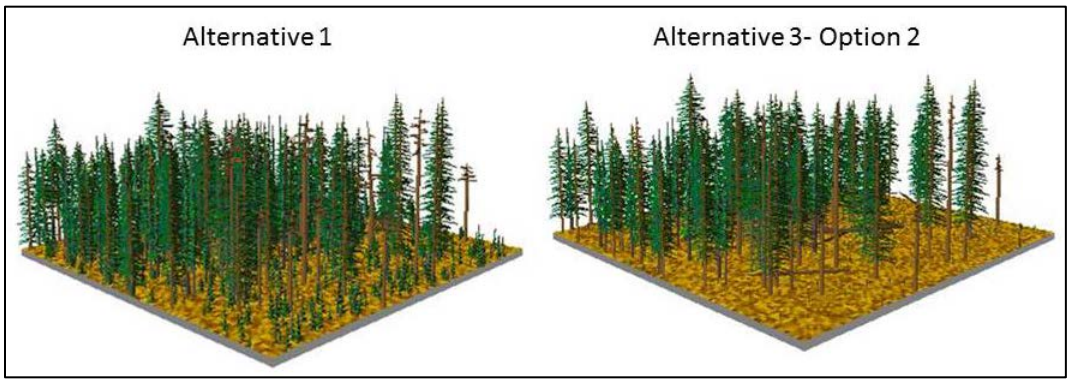


Figure 27- Comparison of Spruce/fir between alternative 1 and alternative 3 option 2.

Old Growth

Table 12 compares forested old growth between alternative 3, options 1 and 2, with alternative 1.

Table 12- Old growth comparison between alternative 1 and alternative 3.

Old Growth									
	Mech Treatment (total Acres)	Mechanical Acres in Old Growth Option 1 and 2	60% of Acres Burned	Acres in Old Growth- 60% of Acres Burned	Current Forested Acres	Current Acres in Old Growth	Total Acres of Old Growth Affected by Treatments	Difference	Percentage of Old Growth Remaining After Treatment
Alt 1	0	0	0	0	48330	14121	0	0	29%
Alt 3	13,648	236	18,814	5,223	48,330	14,121	5,459	8,662	18%

Alternative 3 shows an 11 percent decline in forested old growth for option 1 and 2 versus alternative 1. Implementation of alternative 3, options 1 and 2 result in LRMP related old growth standards being achieved.

Fire Effects

Burning will take place within all the cover types. The aspen cover type should see higher regeneration rate than the mechanically treated (option 1 and 2) areas. The proposed mechanical treatment of conifer removal within aspen stands will regenerate but past mechanical activities also removed the overstory aspen. The results of past mechanical activities, in terms of suckering and sapling response have been similar to the response to fire. With the proposed mechanical treatments, it is expected that the regeneration rate will meet the desired conditions but less than expected as compared to fire treatments due to limited aspen overstory removal. Previous fires

on the Fishlake National Forest have generated thousands of suckers and saplings. One example is the Lost Lake fire of 2012; it generated 2,465 suckers and sapling per acre (Lost Lake fire monitoring report 2014).

Mixed conifer and spruce/fir cover types may be severely damaged by a fire. With the exception of Douglas fir, most of the species associated with these cover types, are not fire hardy and are easily damaged or killed by fire (Hood and Miller 2007 and Evans 2011). Where fire occurs, almost all the understory would be burned (regardless of species). Most of the trees would be burned in the spruce/fir cover type. Engelmann spruce, subalpine fir, and other subalpine vegetation evolved with limited adaptations to fire and few trees survive (Jenkins et al. 2014). Larger Douglas fir in the mixed conifer type would likely survive most of the other species would be burned in the mixed conifer cover type. Jenkins et al. (2014) writes about a beetle out break on the Markagunt Plateau, Utah that killed 93 percent of the spruce overstory. They state that given the magnitude of overstory Engelmann spruce loss and the paucity of Engelmann spruce regeneration, 300 to 400 years may elapse before Engelmann spruce dominated forests are restored. Fires would have a more devastating effect than spruce beetle because more than just the spruce would be affected. Where fires affect the spruce/fir type there exist an increased potential for a cover type conversion from spruce/fir to grasses and shrubs lasting many years. There is also a potential for a type conversion from a mixed conifer to a Douglas fir type. Because of the removal of other conifer within the mixed conifer type by a fire, bare mineral soil would be exposed. This is an ideal site for seedling germination for the remaining Douglas fir. Mixed conifer stands containing aspen would see an increase in suckering with scattered Douglas fir. To help minimize impacts to spruce/fir and mixed conifer from prescribed fire, as described in the EIS, within the spruce/fir and mixed conifer dominated stands that have little to no aspen presence (less than 15 aspen recruits per acre), prescribed burning would occur when low to moderate fire severities would be expected. In addition, no fire ignitions that would likely result in moderate to high fire severities in Douglas fir dominated areas would occur. Low severity fire in the Douglas fir dominated stands would be allowed. After prescribed fire treatments, if needed to meet LRMP standards, spruce/fir and mixed conifer would be replanted.

Vegetative Structural Stage

The structural characteristics for VSS are common for all alternatives; therefore, they are being addressed in the, “Effects Common to all Alternatives” section. The only distinguishing characteristic that is different is the number of acres affected within each alternative.

Economics

The cost to implement alternative 3, option 1 is approximately $8.2 million and the cost to implement alternative 3, option 2 is approximately $9.6 million. Compared to alternative 1 ($178 million) the cost to implement alternative 3, options 1 or 2 is considerably less than alternative 1. See appendix B for a breakdown of the costs.

Indirect Effects

A long-term concern for the aspen is the health of the aspen overstory. Walters et al. (1982) and Solarik et al. (2012) discuss results related to partial harvest of aspen. Waters et al. focuses more on regeneration and concludes that more trees harvested and/or the lower the BA after treatment the more sprouts there were. He also concludes that their minimum (6,000 sprouts per acre) was achieved on partial harvest but grazing impacts wiped them out on some of the plots within the study. Solarik et al talks some about regeneration but the primary focus is the overstory. In his research, he indicates that there is an increase in aspen mortality after harvest activities. Sunscald

is a concern related to management alternatives where aspen overstory retention is the goal. Sunscald is thought to be a mortality factor; however, both research papers conclude that although sunscald was a factor and caused some mortality, it was not the primary cause. Cankers and wind damage (or a combination of both) was the primary cause of death with sunscald being the entry point for the canker. Ironically, in Solarik et al., the more BA removed the higher the death rate of overstory aspen. Conversely, Waters et al., requires more BA removed to increase reproduction. Solarik et al. points out that higher mortality rates occurred 5 years and increased higher yet 10 years later. Since mechanical treatments in any alternative and options have aspen overstory retention within the aspen cover type it is likely that an unknown number of aspen overstory trees will die. Areas on Monroe Mountain where aspen was retained at low basal area are showing symptoms of sunscald and may be lost.

Cumulative Effects

Cumulative effects area (CEA) is Monroe Mountain (see appendix A for a map of the CEA). Total CEA acres are 175,706 surrounding 11,805 acres of private property. Monroe Mountain lies near the center of the Fishlake National Forest. The southern part of Monroe Mountain falls outside the project boundary but is included as part of the cumulative affects area because there is likely to be activity that may affect this project. There are no known activities associated with BLM lands that surround the mountain; therefore, that area was not considered for inclusion.

Table 14 below outlines the cumulative effects for alternative 3. Harvest and prescribed burn are the past activities associated with alternative 3. Wildfire acres, although not a management activity, are included because they have had an effect on vegetation and have occurred throughout the CEA in the past. Past activities have affected 19 percent of the total acreage within the cumulative effects boundary. Alternative 3 will impact an additional 18 percent of the area. In addition, future activities scheduled for 2015 include 5,778 acres of prescribed fire. Activities past, present and future would impact 40 percent of the cumulative effects area (Table 13).

Table 13- Alternative 3 cumulative effects.

Alternative 3							
Activity	**Past Activity Acres**	**% of Past CEA Impacted (Acres)**	**Alt 3 Acres**	**% of CEA Impacted**	**Foreseeable Future Acres**	**Total Activity Acres**	**% CEA Impacted**
Harvest	5,774	3%	13,648	8%	0	19,422	11%
Prescribed Burn	13,998	8%	18,814	11%	5,778	38,590	22%
Wildfire	12,894	7%	0	0%	0	12,894	7%
Total	**32,666**	**19%**	**32,462**	**18%**	**5,778**	**70,906**	**40%**

Past activities come from every decade since the 1960s. Past activities from 1960 to 1990 would have little cumulative bearing on cover type vegetation because those areas are largely recovered from past activities and are in various stages of development. Therefore the discussion will center on those activities from 2000 to the present. Past activities in the 2000 decade totals 4 percent with a 5 percent increase in the 2010 decade Table 14.

Table 14- Past and foreseeable future activities by decade.

	2000's	2010's	Total- by Activity
Harvest Acres	1,156	3,035	4,191
Prescribed Burn Acres	1,291	11,597	12,888
Wildfire Acres	4,192	1,520	5,712
Total	6,639	16,152	22,791
Percentage by Decade	4%	9%	13%

Aspen Cover Type

Harvest and/or fire within past activities have removed most conifers within the type. Even-aged management has been the goal, removing all trees and regenerating aspen. Within the type, it has been largely successful. To that end, fire treatments for this alternative should be as successful as in the past. Option 1 mechanical treatments will result in two-aged stands with no conifer.

Option 1 will also move the successional stage back and, for a time, create a pure stand of aspen. Option 2 treatments will not show a whole lot of change in reference to overstory composition and structure. Leaving the conifer in the overstory will result in succession progressing. Past treatments, particularly those from the 1990 to 2010 decades, in conjunction with option 1 mechanical treatments and prescribed fire, would decrease the number of mid to late-seral aspen acres because these stands would be in an earlier successional stage, the treatment would last longer across a larger area. Table 16 shows that the aspen cover type will have a 48 percent affect across the CEA. The past treatments in concert with the proposed treatments (regardless of option 1 or option 2 treatments) should provide a good mosaic of age classes and still maintain biological diversity.

Mixed Conifer/Spruce/fir

Past activities combined with proposed activities would have the following effects. Thin barked trees such as Engelmann spruce and sub-alpine are all less fire hardy and are killed more readily than Douglas fir (Hood and Miller 2007). This would tend to skew composition weighted more heavily to Douglas fir and white fir. Regardless of species, fire is lethal to the smaller trees. If there is a crown fire, all trees would likely die.

Option 1 combined with past activities would create a mosaic of stands with uneven-aged stands dominating from the mechanical treatment while the fire treatment areas would remove trees from all age classes and/or may eliminate some stands. Over all cumulative effects would reflect a landscape with uneven-aged structure in a mosaic pattern. Fifty percent of mixed conifer acres and 37 percent of spruce/fir acres would be affected across the CEA (table 15). Option 2 combined with past activities would stands with (at least temporarily) less smaller trees and changing the structure one that is skewed to the larger classes.

Table 15- CEA affects by cover type.

	Alternative 3				
	Current Acres of Cover Type in CEA	Mechanical Treatment Option1 and 2	Prescribed Fire Treatment	60% Burned	Total Acres affected in CEA
Aspen	31129	6422	14318	8591	15013
Percentage		21%		28%	48%
Mixed Conifer	5220	91	4190	2514	2605
Percentage		2%		48%	50%
Spruce/fir	14392	2355	4988	2993	5348
Percentage		16%		21%	37%

Old Growth

Old growth will decline by 11 percent via past and present actions and decline an additional 1% through foreseeable future actions, totaling 12% for past present and foreseeable future actions (Table 16).

Table 16- CEA effects on old growth for Alternative 3.

Cumulative Effects- Old Growth							
	Present Forested Acres	Present Acres in Old Growth	Alt. 3 Acres of Old Growth Affected	Past, Present and Foreseeable Future Actions Affecting Old Growth	Total Acres Affecting Old Growth (Past, Present and Foreseeable Future)	Percent of Old Growth remaining after Alt. 2	Percentage of Old Growth remaining after all past, present, and reasonably foreseeable actions are completed
Alt 1	48,330	14,121	0	0	0	0	29%
Alt 3	48,330	14,121	5,459	228	5,687	18%	17%

Alternative 4

Direct Effects

Aspen Cover Type

Mechanical option 1 is to remove all conifers. Treatment under option 1 within the aspen cover type would result in total removal of conifer. The effects of this treatment would result in a more pure stand of aspen (at least for a time). In effect, this would create a two-aged stand of aspen (see Figure 28). The expected regeneration result would meet the minimum stocking rate of 300 suckers per acre as established in the LRMP on page IV-32 and the desired condition of 5,000 aspen suckers per acre. It is believed minimum stocking levels would be achieved as outlined in the LRMP; however, grazing may impact the regeneration and cause the numbers to fall below

LRMP standards. Stands of aspen will be monitored for this outcome and will be addressed through the browse thresholds and response options outlined in the EIS.

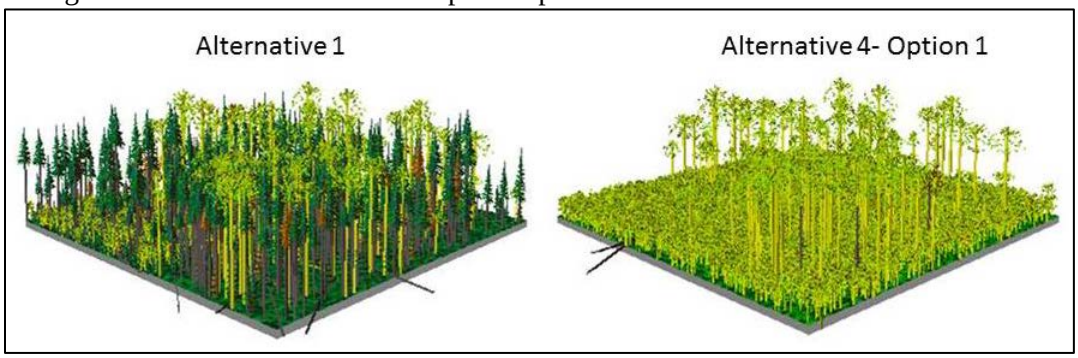


Figure 28- Comparison of aspen between Alternative 1 and Alternative 4 Option1.

Mechanical option 2 is to remove all conifers 8 inches diameter at breast height and below within IRAs and draft UUAs. All conifers will be removed outside of these areas.

The results from this treatment leave all the overstory. Removing the smaller trees would not likely have much of an impact (particularly in the long-term) on succession, although it would be better than alternative 1, as seen in Figure 29. Conifer encroachment has not been halted but has been reduced as compared to alternative 1. The conifers in the overstory are the ones that produce the seed to begin the next generation of conifers. It has often been thought that seral stands are nurseries for conifers. Conifers are more shade tolerant than aspen and are more adept at surviving under and overstory where light levels are less. Therefore, although this treatment may provide some regeneration of aspen, the effects would likely be short-lived and survival rates would be low given the remaining overstory. Understory diversity would also be affected as Campbell (1995) describes, “As conifers gain dominance less light penetrates to the forest floor, and undergrowth shrubs and herbs decrease in both variety and abundance.” Both aspen regeneration and understory diversity would be better than alternative 1 but the effects would be short-lived.

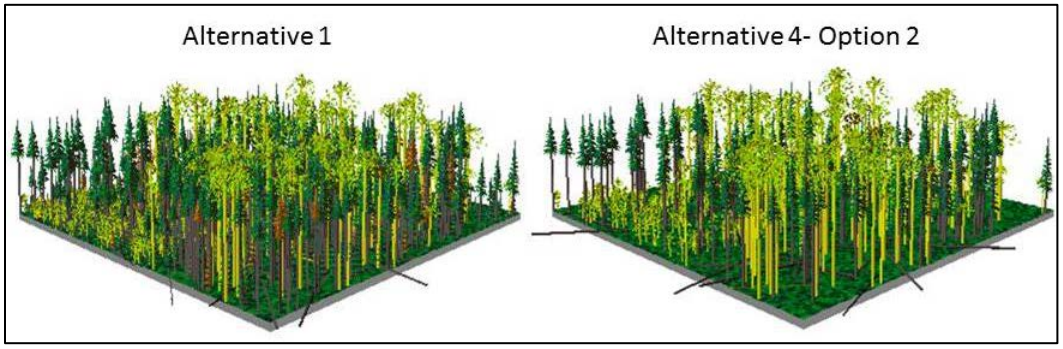


Figure 29- Comparison of aspen between Alternative 1 and Alternative 4 Option 2.

Mixed Conifer and Spruce/fir Cover Types

Mechanical option 1 is to use group and singletree selection to remove conifer to a BA of less than or equal to 90 square feet per acre within all mechanical treatment areas.

Treatments under option 1 using group and single tree selection are designed to create or maintain and uneven-aged stand of trees. The goal of the 90 BA is to open the canopy and provide space for trees to grow and regenerate. Creating openings within the canopy would also break up the canopy fuels and minimize the potential of surface and/or crown fires.

Table 17- Basal area (in square feet per acre) comparison between Alternative 1 and Alternative 4 Options 1and 2.

Basal Area			
Cover Type	**Alt 1**	**Alt 4 Option 1**	**Alt 4 Option 2**
Mixed Conifer	123	91	76
Spruce/fir	144	88	109

Spruce beetles are at epidemic levels in some areas of the project, the less than or equal to 90 square feet per acre will also help minimize the impacts associated with this insect. To reach low hazard status, sites should be thinned to a BA of less than or equal to 100 square feet per acre, average diameter should be reduced to less than 10 inches and spruce species composition to less than 50 percent (Costello and Howell 2006). Alternative 4, option 1 provides better resiliency than alternative 1 because spruce/fir stand BA would be lower (see Table 17). Stand structure, in both cover types, (as an uneven-aged stand) for alternative 4, option 1 compared to alternative 1 is the same as described in the affected environment for both cover types (see Figures 30, 31, 32 and 33). Employing uneven-aged structure would also help with resiliency to spruce beetle and the irregular forest structure and compositions, both within and among stands, tend to produce wildfire resilient forests (Graham et al. 2009) more so than in alternative 1. Untreated stands on the Fishlake in the past have seen a total loss of all overstory trees (Cove area on Monroe Mountain, UM and Niotche in the seven Mile area). Some areas where treatments have occurred prior to infestation have lost some of the larger trees in the overstory but have structure remaining and replacement trees for the future.

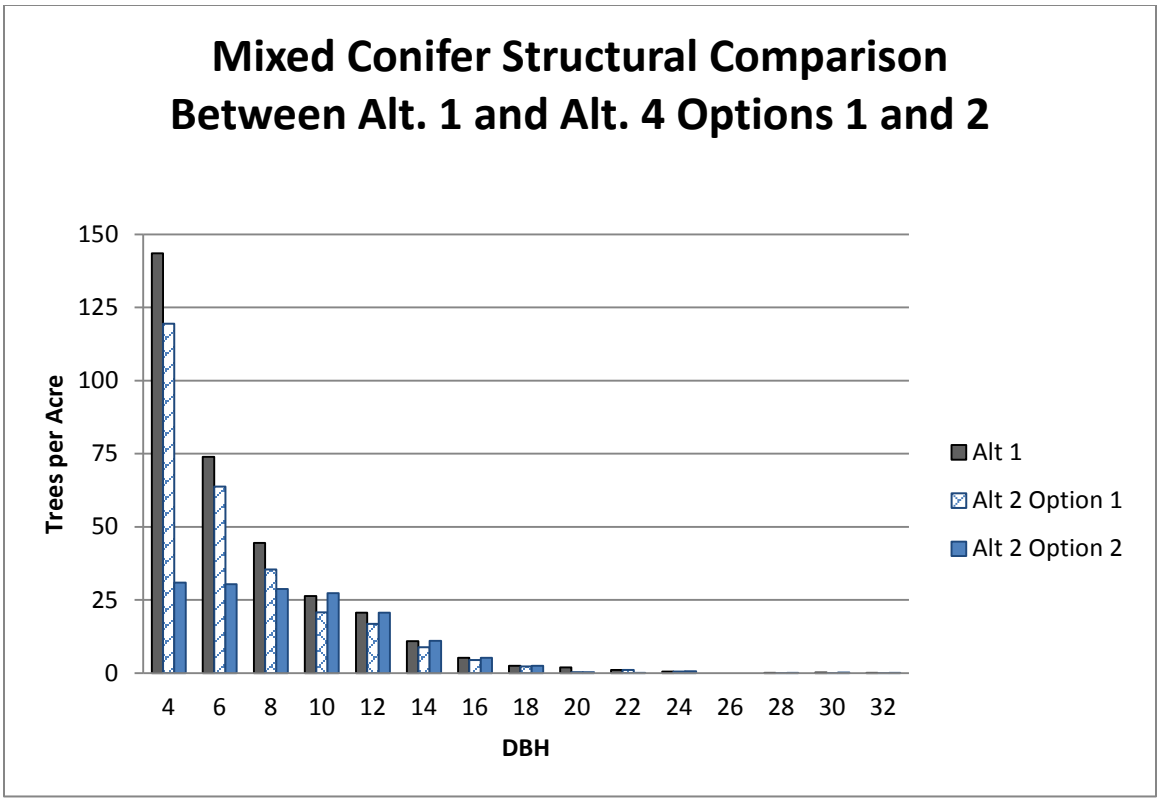


Figure 30- Structural comparison for mixed conifer cover type between Alternative 1 and Alternative 4 Options 1 and 2.

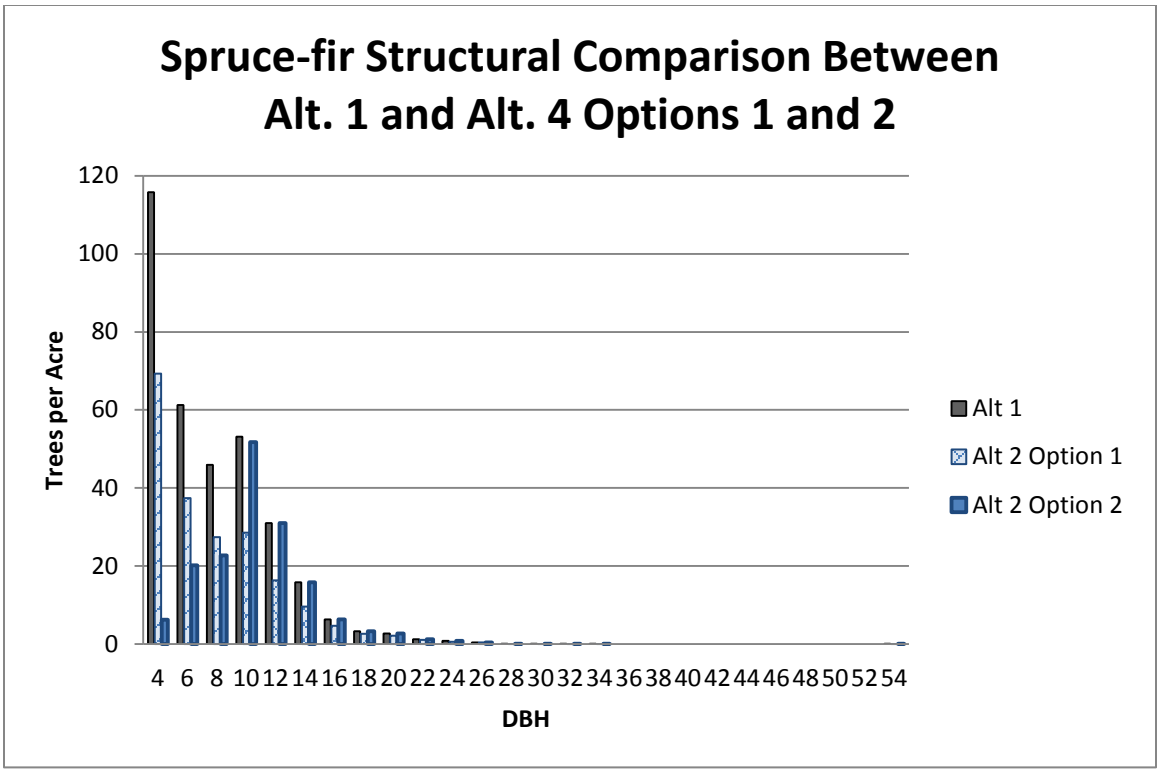


Figure 31- Structural comparison for spruce/fir cover type between Alternative 1 and Alternative 4 Options 1 and 2.

Spruce budworm has shown up on the aerial detection survey (2013). This pest is usually the precursor to the Douglas fir beetle. The Douglas fir beetle attacks the tree while it is stressed from the spruce budworm. In option 1 or 2 this could have an effect depending on when the treatment occurs and when the mortality happens. It is the District Forester's professional opinion that it is likely to occur within the next 5 years regardless of treatment. It will have an effect on the older larger Douglas fir trees within the mixed conifer type and would affect the mature structural elements within the type. It would have some effect on old growth potential (in alternative 1 old growth for the type does not show until 100 years from now) by extending the time frame out even further (perhaps as long as 200 years).

In areas where the stand(s) are heavily infested and/or already dead, sanitation and salvage will be employed to remove trees. Removal of the infested will assist in removing some of the larvae resulting in a lower population. Sanitation and salvage is an intermediate treatment designed to remove dead or dying trees. The LRMP outlines stocking levels after a final harvest. It is assumed that some areas impacted by the beetle may need planting because of known outbreaks on Monroe Mountain in conjunction with the knowledge gained from other outbreaks on the Forest. If this happens, it would be considered a final harvest and in need of restocking, as outlined on page IV-32 of the LRMP, if stocking is less than 150 to 200 seedlings per acre (minimums depend on site productivity).

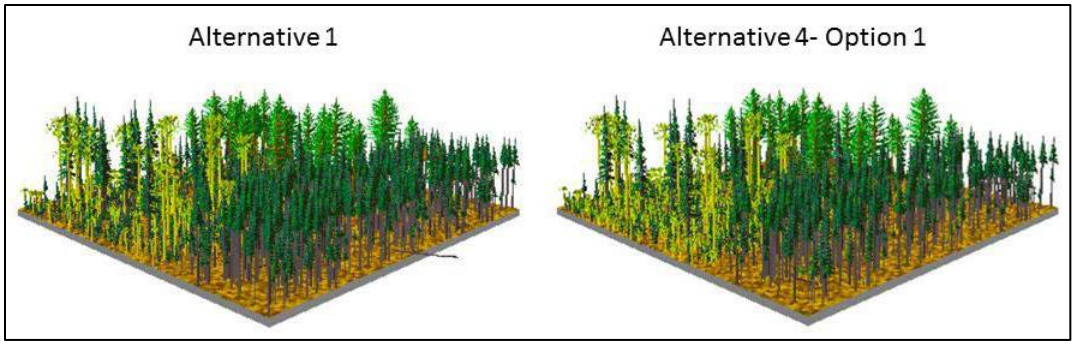


Figure 32- Comparison of mixed conifer between alternative 1 vs. alternative 4 option 1.

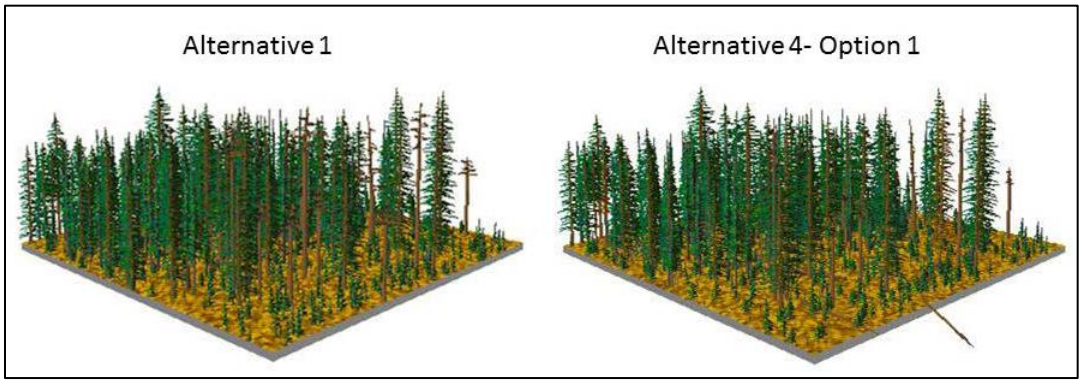


Figure 33- Comparison of spruce/fir between Alternative 1 and Alternative 4 Option 1.

Mechanical option 2 is to remove all conifer 8 inches and below within IRAs and draft UUAs. Outside of those areas will remove conifers using singletree and group selection to a BA of less than or equal to 90 square feet per acre.

Treatments under this option remove all conifers less than or equal to 8 inches DBH. By removing the smaller trees, densities would be lowered short-term as compared to alternative 1; however, the larger overstory trees remain increasing the probability of spruce beetle infestation. Infestations occurring after treatment may lead to a loss of all spruce and conversion to a different cover type. If option 2 is chosen within spruce/fir cover type, the risk is high for total loss of the cover type given the current epidemic.

The elimination of the smaller trees will lower BA in comparison to alternative 1 (Table 17); however, the effects will be short-lived because the cone bearing trees remain and they would immediately start re-establishing themselves.

Over all, cover type structure will change from an uneven-aged one to a more even-aged structure as compared to alternative 1. Stands that are of this structure type are more susceptible to beetles and are less resilient to the effects of fire. Figures 30, 31, 34 and 35 illustrate the differences in option 2 to alternative 1.

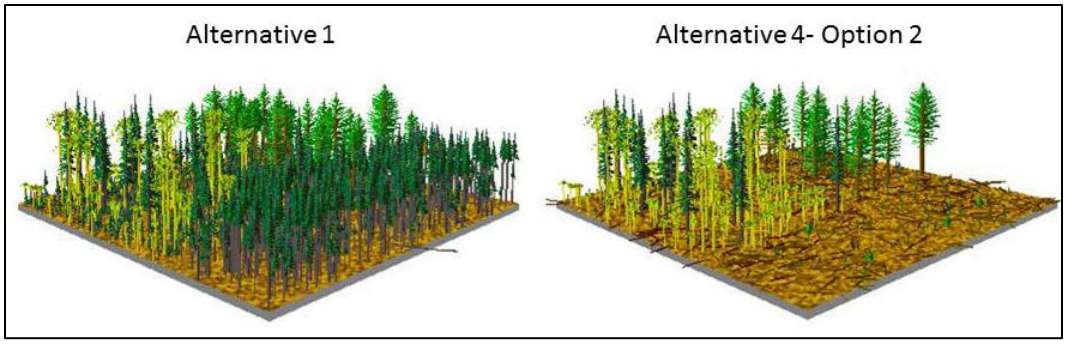


Figure 34- Comparison of mixed conifer between alternative 1 and alternative 4 option 2.

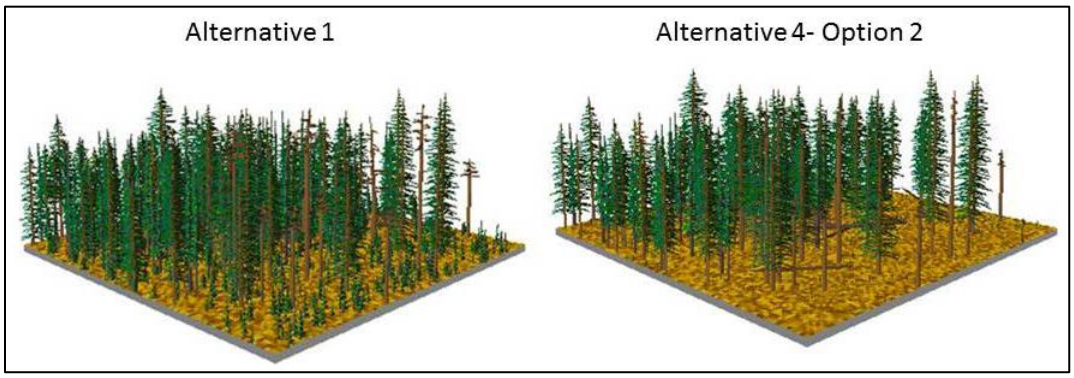


Figure 35- Comparison of Spruce/fir between alternative 1 and alternative 4 option 2.

Old Growth

Table 18 compares forested old growth between alternative 4, options 1 and 2, with alternative 1.

Table 18- Old growth comparison between alternative 1 and alternative 4.

Old Growth									
	Mech Treatment (total Acres)	Mechanical Acres in Old Growth Option 1 and 2	60% of Acres Burned	Acres in Old Growth- 60% of Acres Burned	Current Forested Acres	Current Acres in Old Growth	Total Acres of Old Growth Affected by Treatments	Difference	Percentage of Old Growth Remaining After Treatment
Alt 1	0	0	0	0	48330	14121	0	0	29%
Alt 4	19,837	411	16,462	4,547	48,330	14,121	4,958	9,163	19%

Alternative 4 shows a 10 percent decline in forested old growth for option 1 and 2 versus alternative 1. Implementation of alternative 4, options 1 and 2 result in LRMP related old growth standards being achieved.

Fire Effects

Burning will take place within all the cover types. The aspen cover type should see a higher regeneration rate than the mechanically treated (option 1 and 2) areas. The proposed mechanical treatment of conifer removal within aspen stands will regenerate but past mechanical activities also removed the overstory aspen. The results of past mechanical activities, in terms of suckering and sapling response have been similar to the response to fire. With the proposed mechanical treatments, it is expected that the regeneration rate would meet the desired but less than expected as compared to fire treatments due to limited aspen overstory removal. Previous fires on the

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Mixed conifer and spruce/fir cover types may be severely damaged by a fire. With the exception of Douglas fir, most of the species associated with these cover types, are not fire hardy and are easily damaged or killed by fire (Hood and Miller 2007 and Evans 2011). Where fire occurs, almost all the understory will be burned (regardless of species). Most of the trees would be burned in the spruce/fir cover type. Engelmann spruce, subalpine fir, and other subalpine vegetation evolved with limited adaptations to fire and few trees survive (Jenkins et al. 2014). Larger Douglas fir in the mixed conifer type would likely survive most of the other species would be burned in the mixed conifer cover type. Jenkins et al (2014) writes about a beetle out break on the Markagunt Plateau, Utah that killed 93 percent of the spruce overstory. They state that given the magnitude of overstory Engelmann spruce loss and the paucity of Engelmann spruce regeneration, 300 to 400 years may elapse before Engelmann spruce dominated forests are restored. Fires would have a more devastating effect than spruce beetle because more than just the spruce would be affected. Where fires affect the spruce/fir type there exist an increased potential for a cover type conversion from spruce/fir to grasses and shrubs lasting many years. There is also a potential for a type conversion from a mixed conifer to a Douglas fir type. Because of the removal of other conifer within the mixed conifer type by a fire, bare mineral soil would be exposed. This is an ideal site for seedling germination for the remaining Douglas fir. Mixed conifer stands containing aspen would see an increase in suckering with scattered Douglas fir. To help minimize impacts to spruce/fir and mixed conifer from prescribed fire, as described in the EIS, within the spruce/fir and mixed conifer dominated stands that have little to no aspen presence (less than 15 aspen recruits per acre), prescribed burning would occur when low to moderate fire severities would be expected. In addition, no fire ignitions that would likely result in moderate to high fire severities in Douglas fir dominated areas would occur. Low severity fire in the Douglas fir dominated stands would be allowed. After prescribed fire treatments, if needed to meet LRMP standards, spruce/fir and mixed conifer would be replanted.

Vegetative Structural Stage

The structural characteristics for VSS are common for all alternatives; therefore, they are being addressed in the, “Effects Common to all Alternatives” section. The only distinguishing characteristic that is different is the number of acres affected within each alternative.

Economics

The cost to implement alternative 4, option 1 is approximately $8.7 million and the cost to implement alternative 4, option 2 is approximately $9.2 million. Compared to alternative 1 ($178 million) the cost to implement alternative 4, options 1 or 2 is considerably less than alternative 1. See appendix B for a breakdown of the costs.

Indirect Effects

A long-term concern for the aspen is the health of the aspen overstory. Walters et al. (1982) and Solarik et al. (2012) discuss results related to partial harvest of aspen. Waters et al focuses more on regeneration and concludes that more trees harvested and/or the lower the BA after treatment the more sprouts there were. He also concludes that their minimum (6,000 sprouts per acre) was achieved on partial harvest but grazing impacts wiped them out on some of the plots within the study. Solarik et al. talks some about regeneration but the primary focus is the overstory. In his research, he indicates that there is an increase in aspen mortality after harvest activities. Sunscald

is a concern related to management alternatives where aspen overstory retention is the goal. Sunscald is thought to be a mortality factor; however, both research papers conclude that although sunscald was a factor and caused some mortality it was not the primary cause. Cankers and wind damage (or a combination of both) was the primary cause of death with sunscald being the entry point for the canker. Ironically, in Solarik et al., the more BA removed the higher the death rate of overstory aspen. Conversely, Waters et al., requires more BA removed to increase reproduction. Solarik et al. points out that higher mortality rates occurred 5 years and increased higher yet 10 years later. Since mechanical treatments in any alternative and options have aspen overstory retention within the aspen cover type it is likely that an unknown number of aspen overstory trees will die. Areas on Monroe Mountain where aspen was retained at low basal area are showing symptoms of sunscald and may be lost.

Cumulative Effects

Cumulative effects area (CEA) is Monroe Mountain (see appendix A for a map of the CEA). Total CEA acres are 175,706 surrounding 11,805 acres of private property. Monroe Mountain lies near the center of the Fishlake National Forest. The southern part of Monroe Mountain falls outside the project boundary but is included as part of the cumulative affects area because there is likely to be activity that may affect this project. There are no known activities associated with BLM lands that surround the mountain; therefore, that area was not considered for inclusion.

Table 20 below outlines the cumulative effects for alternative 4. Harvest and prescribed burn are the past activities associated with alternative 4. Wildfire acres, although not a management activity, are included because they have had an effect on vegetation and have occurred throughout the CEA in the past. Past activities have affected 19 percent of the total acreage within the cumulative effects boundary. Alternative 4 would impact an additional 21 percent of the area. In addition, future activities scheduled for 2015 include 5,778 acres of prescribed fire. Activities past, present, and future would affect 43 percent of the cumulative effects area (Table 19).

Table 19- Alternative 4 cumulative effects.

Alternative 4							
Activity	**Past Activity Acres**	**% of Past CEA Impacted (Acres)**	**Alt 4 Acres**	**% of CEA Impacted**	**Foreseeable Future Acres**	**Total Activity Acres**	**% CEA Impacted**
Harvest	5,774	3%	19,837	11%	0	25,611	15%
Prescribed Burn	13,998	8%	16,462	9%	5,778	36,238	21%
Wildfire	12,894	7%	0	0%	0	12,894	7%
Total	**32,666**	**19%**	**36,299**	**21%**	**5,778**	**74,743**	**43%**

Past activities come from every decade since the 1960s. Past activities from 1960 to 1990 would have little cumulative bearing on cover type vegetation because those areas are largely recovered from past activities and are in various stages of development. Therefore the discussion will center on those activities from 2000 to the present. Past activities in the 2000 decade totals 4 percent with a 5 percent increase in the 2010 decade (Table 20).

Table 20- Past and foreseeable future activities by decade.

	2000's	2010's	Total- by Activity
Harvest Acres	1,156	3,035	4,191
Prescribed Burn Acres	1,291	11,597	12,888
Wildfire Acres	4,192	1,520	5,712
Total	6,639	16,152	22,791
Percentage by Decade	4%	9%	13%

Aspen Cover Type

Harvest and/or fire within past activities have removed most conifers within the type. Even-aged management has been the goal, removing all trees and regenerating aspen. Within the type, it has been largely successful. To that end, fire treatments for this alternative should be as successful as in the past. Option 1 mechanical treatments will result in two-aged stands with no conifer. Option 1 will also move the successional stage back and, for a time, create a pure stand of aspen. Option 2 treatments will not show a whole lot of change in reference to overstory composition and structure. Leaving the conifer in the overstory will result in succession progressing. Past treatments, particularly those from the 1990 to 2010 decades, in conjunction with option 1 mechanical treatments and prescribed fire, would decrease the number of mid to late-seral aspen acres because these stands would be in an earlier successional stage, the treatment would last longer across a larger area. Table 21 shows that the aspen cover type will have a 55 percent affect across the CEA. The past treatments in concert with the proposed treatments (regardless of option 1 or option 2 treatments) should provide a good mosaic of age classes and still maintain biological diversity.

Mixed Conifer/Spruce/fir

Past activities combined with proposed activities would have the following effects. Thin barked trees such as Engelmann spruce and sub-alpine are all less fire hardy and are killed more readily than Douglas fir (Hood and Miller 2007). This would tend to skew composition weighted more heavily to Douglas fir and white fir. Regardless of species, fire is lethal to the smaller trees. If there is a crown fire, all trees would likely die.

Option 1 combined with past activities would create a mosaic of stands with uneven-aged stands dominating from the mechanical treatment while the fire treatment areas would remove trees from all age classes and/or may eliminate some stands. Over all cumulative effects would reflect a landscape with uneven-aged structure in a mosaic pattern. Fifty percent of mixed conifer acres and 44 percent of spruce/fir acres would be affected across the CEA (Table 21). Option 2 combined with past activities would stands with (at least temporarily) less smaller trees and changing the structure one that is skewed to the larger classes.

Table 21- CEA affects by cover type.

	Alternative 4				
	Current Acres of Cover Type in CEA	Mechanical Treatment Option1 and 2	Prescribed Fire Treatment	60% Burned	Total Acres affected in CEA
Aspen	31129	9492	12763	7658	17150
Percentage		30%		25%	55%
Mixed Conifer	5220	102	4178	2507	2609
Percentage		2%		48%	50%
Spruce/fir	14392	4113	3802	2281	6394
Percentage		29%		16%	44%

Old Growth

Old growth will decline by 10 percent via past and present actions and decline an additional 1% through foreseeable future actions, totaling 11% for past present and foreseeable future actions (Table 22).

Table 22- CEA effects on old growth for Alternative 4.

Cumulative Effects- Old Growth							
	Present Forested Acres	Present Acres in Old Growth	Alt. 4 Acres of Old Growth Affected	Past, Present and Foreseeable Future Actions Affecting Old Growth	Total Acres Affecting Old Growth (Past, Present and Foreseeable Future)	Percent of Old Growth remaining after Alt. 2	Percentage of Old Growth remaining after all past, present, and reasonably foreseeable actions are completed
Alt 1	48330	14121	0	0	0	0	29%
Alt 4	48,330	14,121	4,958	228	5,186	19%	18%

Alternative 5

Direct Effects

Aspen Cover Type

Mechanical option 1 is to remove all conifers. Treatment under option 1 within the aspen cover type would result in total removal of conifer. The effects of this treatment would result in a more pure stand of aspen (at least for a time). In effect, this would create a two-aged stand of aspen (see Figure 36). The expected regeneration result would meet the minimum stocking rate of 300 suckers per acre as established in the LRMP on page IV-32 and the desired condition of 5,000 aspen suckers per acre. It is believed minimum stocking levels would be achieved as outlined in the LRMP; however, grazing may affect the regeneration and cause the numbers to fall below

LRMP standards. Stands of aspen will be monitored for this outcome and would be addressed through the browse thresholds and response options outlined in the EIS.

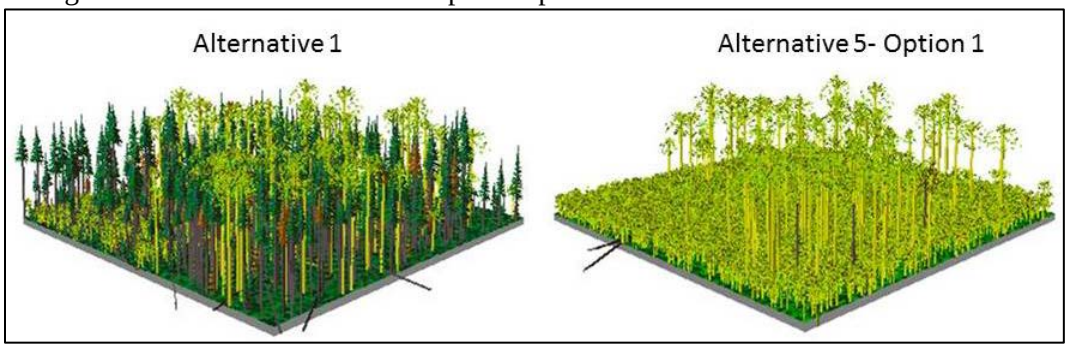

Figure 36- Comparison of aspen between alternative 1 and alternative 5 option1.

Mechanical option 2 is to remove all conifers 8 inches DBH and below within IRAs and draft UUAs. All conifers would be removed outside of these areas.

The results from this treatment leave all the overstory. Removing the smaller trees would not likely have much of an impact (particularly in the long-term) on succession, although it would be better than alternative 1, as seen in Figure 37. Conifer encroachment has not been halted but has been reduced as compared to alternative 1. The conifers in the overstory are the ones that produce the seed to begin the next generation of conifers. It has often been thought that seral stands are nurseries for conifers. Conifers are more shade tolerant than aspen and are more adept at surviving under and overstory where light levels are less. Therefore, although this treatment may provide some regeneration of aspen, the effects would likely be short-lived and survival rates would be low given the remaining overstory. Understory diversity would also be affected as Campbell (1995) describes, "As conifers gain dominance less light penetrates to the forest floor, and undergrowth shrubs and herbs decrease in both variety and abundance." Both aspen regeneration and understory diversity would be better than alternative 1 but the effects would be short-lived.

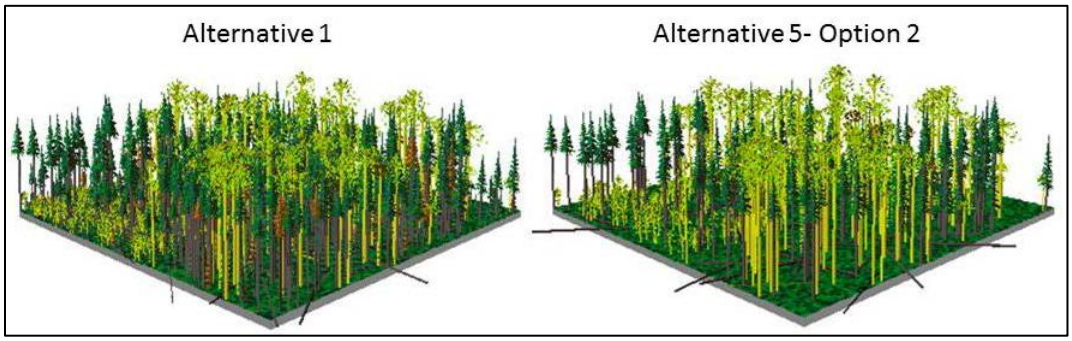

Figure 37- Comparison of aspen between alternative 1 and alternative 5 option 2.

Mixed Conifer and Spruce/fir Cover Types

Mechanical option 1 is to use group and singletree selection to remove conifer to a BA of less than or equal to 90 square feet per acre within all mechanical treatment areas.

Treatments under option 1 using group and singletree selection are designed to create or maintain and uneven-aged stand of trees. The goal of the 90 BA is to open the canopy and provide space for trees to grow and regenerate. Creating openings within the canopy would also break up the canopy fuels and minimize the potential of surface and/or crown fires.

Table 23- Basal area (in square feet per acre) comparison between alternative 1 and alternative 5 options 1and 2.

Basal Area			
Cover Type	**Alt 1**	**Alt 5 Option 1**	**Alt 5 Option 2**
Mixed Conifer	123	91	76
Spruce/fir	144	88	109

Spruce beetles are at epidemic levels in some areas of the project, the less than or equal to 90 square feet per acre will also help minimize the impacts associated with this insect. To reach low hazard status, sites should be thinned to a basal area of less than or equal to 100 square feet per acre, average diameter should be reduced to less than 10 inches and spruce species composition to less than 50 percent (Costello and Howell 2006). Alternative 5, option 1 provides better resiliency than alternative 1 because spruce/fir stand BA would be lower (see Table 23). Stand structure, in both cover types, (as an uneven-aged stand) for alternative 5, option 1compared to alternative 1 is the same as described in the affected environment for both cover types (see Figures 38, 39, 40 and 41). Employing uneven-aged structure will also help with resiliency to spruce beetle and the irregular forest structure and compositions, both within and among stands, tend to produce wildfire resilient forests (Graham et al. 2009) more so than in alternative 1. Untreated stands on the Fishlake in the past have seen a total loss of all overstory trees (Cove area on Monroe Mountain, UM and Niotche in the seven Mile area). Some areas where treatments have occurred prior to infestation have lost some of the larger trees in the overstory but have structure remaining and replacement trees for the future.

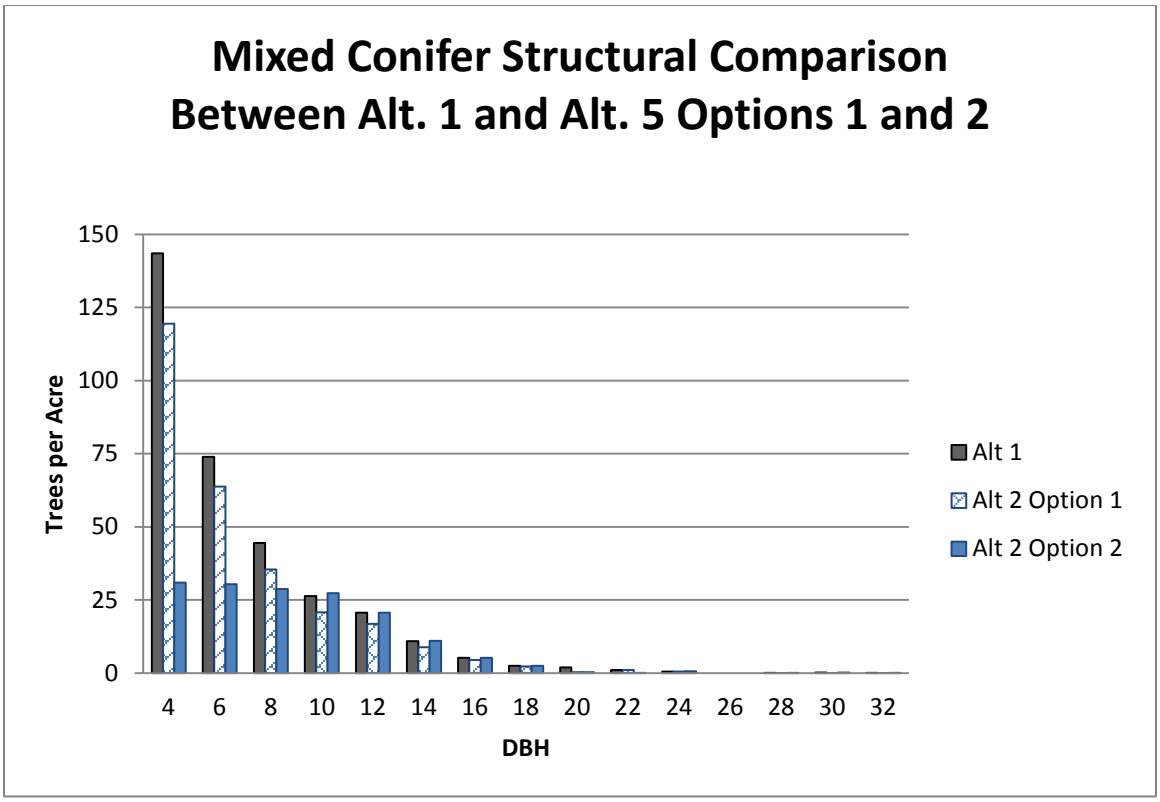

Figure 38- Structural comparison for mixed conifer cover type between Alternative 1 and Alternative 5 Options 1 and 2.

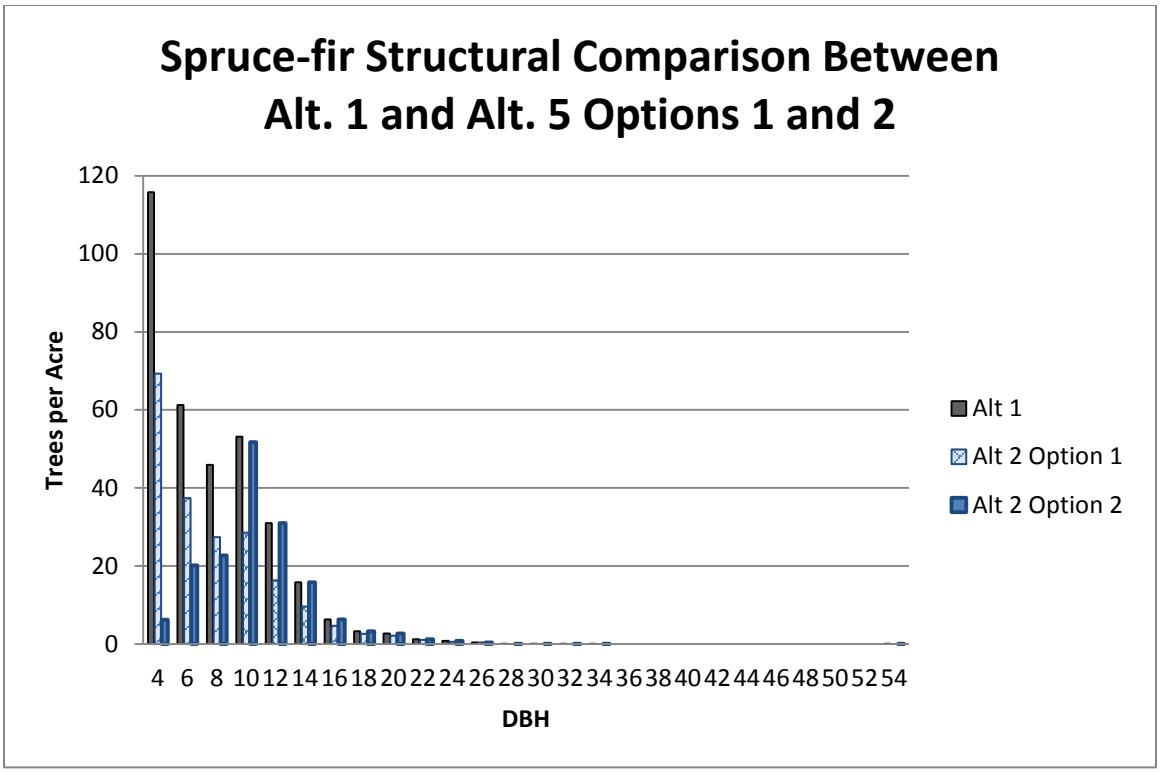

Figure 39- Structural comparison for spruce/fir cover type between Alternative 1 and Alternative 5 Options 1 and 2.

Spruce budworm has shown up on the aerial detection survey (2013). This pest is usually the precursor to the Douglas fir beetle. The Douglas fir beetle attacks the tree while it is stressed from the spruce budworm. In option 1 or 2 this could have an effect depending on when the treatment occurs and when the mortality happens. It is the District Forester's professional opinion that it is likely to occur within the next 5 years regardless of treatment. It will have an effect on the older larger Douglas fir trees within the mixed conifer type and would affect the mature structural elements within the type. It would have some effect on old growth potential (in alternative 1 old growth for the type does not show until 100 years from now) by extending the time frame out even further (perhaps as long as 200 years).

In areas where the stand(s) are heavily infested and/or already dead, sanitation and salvage will be employed to remove trees. Removal of the infested trees will assist in removing some of the larvae resulting in a lower population. Sanitation and salvage is an intermediate treatment designed to remove dead or dying trees. The LRMP outlines stocking levels after a final harvest. It is assumed that some areas impacted by the beetle may need planting because of known outbreaks on Monroe Mountain in conjunction with the knowledge gained from other outbreaks on the Forest. If this happens, it would be considered a final harvest and in need of restocking, as outlined on page IV-32 of the LRMP, if stocking is less than 150 to 200 seedlings per acre (minimums depend on site productivity).

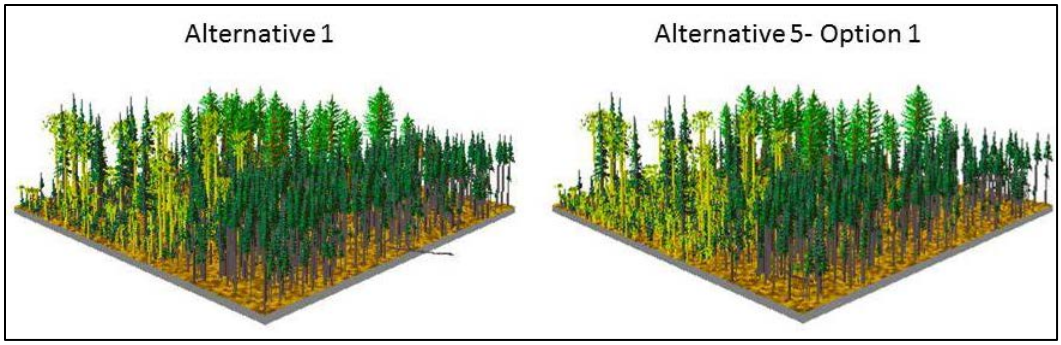

Figure 40- Comparison of mixed conifer between alternative 1 vs. alternative 5 option 1.

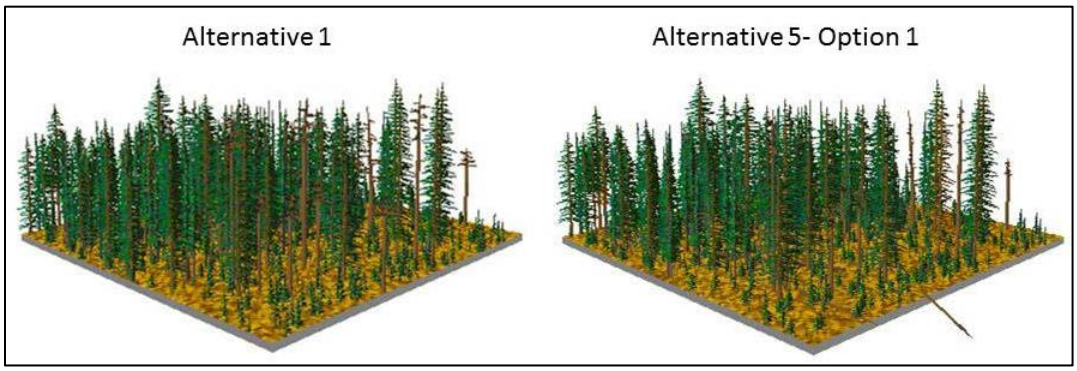

Figure 41- Comparison of spruce/fir between alternative 1 and alternative 5 option 1.

Mechanical option 2 is to remove all conifer 8 inches DBH and below within IRAs and draft UUAs. Outside of those areas will remove conifers using singletree and group selection to a BA of less than or equal to 90 square feet per acre.

Treatments under this option remove all conifers less than or equal to 8 inches BH. By removing the smaller trees, densities would be lowered short-term as compared to alternative 1; however, the larger overs-tory trees remain increasing the probability of spruce beetle infestation. Infestations occurring after treatment may lead to a loss of all spruce and conversion to a different cover type. If option 2 is chosen within spruce/fir cover type, the risk is high for total loss of the cover type given the current epidemic.

The elimination of the smaller trees will lower BA in comparison to alternative 1 (Table 23); however, the effects will be short-lived because the cone bearing trees remain and they will immediately start re-establishing themselves.

Overall, cover type structure will change from an uneven-aged one to a more even-aged structure as compared to alternative 1. Stands that are of this structure type are more susceptible to beetles and are less resilient to the effects of fire. Figures 38, 39, 42 and 43 illustrate the differences in option 2 to alternative 1.

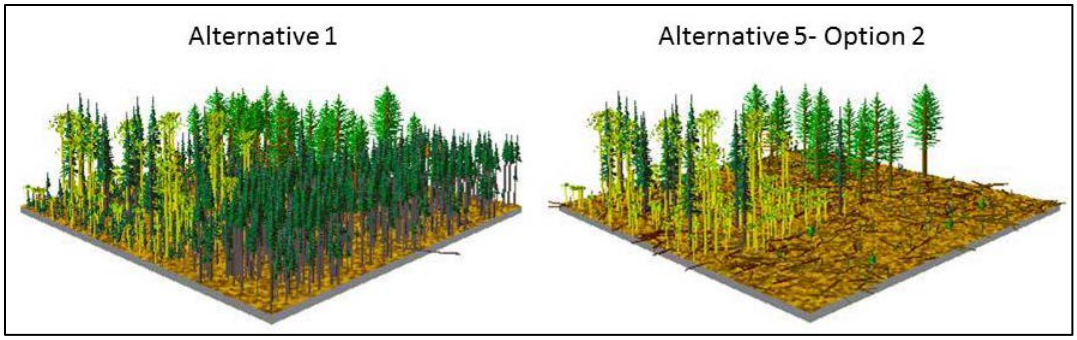

Figure 42- Comparison of mixed conifer between alternative 1 and alternative 5 option 2.

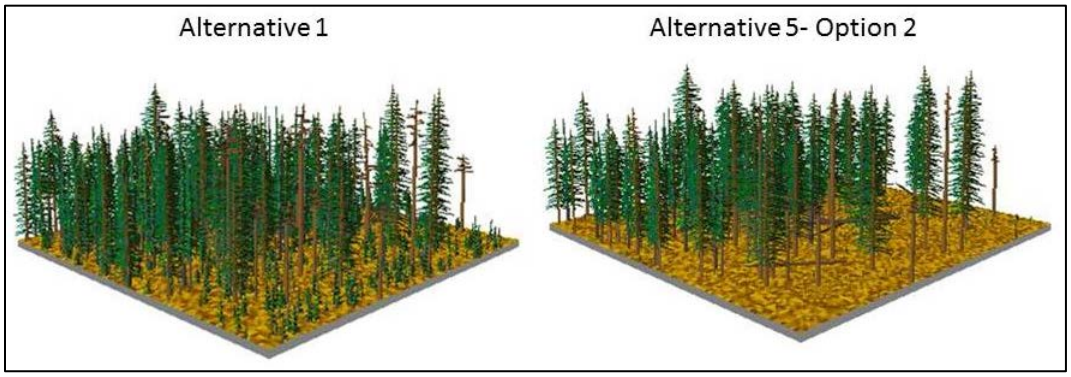

Figure 43- Comparison of Spruce/fir between alternative 1 and alternative 5 option 2.

Old Growth

Table 24 compares forested old growth between alternative 5, options 1 and 2, with alternative 1.

Table 24- Old growth comparison between alternative 1 and alternative 5.

Old Growth									
	Mech Treatment (total Acres)	Mechanical Acres in Old Growth Option 1 and 2	60% of Acres Burned	Acres in Old Growth- 60% of Acres Burned	Current Forested Acres	Current Acres in Old Growth	Total Acres of Old Growth Affected by Treatments	Difference	Percentage of Old Growth Remaining After Treatment
Alt 1	0	0	0	0	48330	14121	0	0	29%
Alt 5	15,072	291	15,872	4,325	48,330	14,121	4,616	9,505	20%

Alternative 5 shows a 9 percent decline in forested old growth for option 1 and 2 versus alternative 1. Implementation of alternative 5, options 1 and 2 result in LRMP related old growth standards being achieved.

Fire Effects

Burning will take place within all the cover types. The aspen cover type should see a higher regeneration rate than the mechanically treated (option 1 and 2) areas. The proposed mechanical treatment of conifer removal within aspen stands will regenerate but past mechanical activities also removed the overstory aspen. The results of past activities, in terms of suckering and sapling response have been similar to the response to fire. With the proposed mechanical treatments it is expected that the regeneration rate will meet the desired but less than expected as compared to fire treatments due to limited aspen overstory removal. Previous fires on the Fishlake National

Forest have generated thousands of suckers/saplings. One example is the Lost Lake fire of 2012; it generated 2,465 suckers and sapling per acre (Lost Lake fire monitoring report 2014).

Mixed conifer and spruce/fir cover types may be severely damaged by a fire. With the exception of Douglas fir, most of the species associated with these cover types, are not fire hardy and are easily damaged or killed by fire (Hood and Miller 2007 and Evans 2011). Where fire occurs, almost all the understory will be burned (regardless of species). Most of the trees would be burned in the spruce/fir cover type. Engelmann spruce, subalpine fir, and other subalpine vegetation evolved with limited adaptations to fire and few trees survive (Jenkins et al. 2014). Larger Douglas fir in the mixed conifer type would likely survive while most of the other species would be burned in the mixed conifer cover type. Jenkins et al. 2014 writes about a beetle out break on the Markagunt Plateau, Utah that killed 93 percent of the spruce overstory. They state that given the magnitude of overstory Engelmann spruce loss and the paucity of Engelmann spruce regeneration, 300 to 400 years may elapse before Engelmann spruce dominated forests are restored. Fires would have a more devastating effect than spruce beetle because more than just the spruce would be affected. Where fires affect the spruce/fir type there exist an increased potential for a cover type conversion from spruce/fir to grasses and shrubs lasting many years. There is also a potential for a type conversion from a mixed conifer to a Douglas fir type. Because of the removal of other conifer within the mixed conifer type by a fire, bare mineral soil would be exposed. This is an ideal site for seedling germination for the remaining Douglas fir. Mixed conifer stands containing aspen would see an increase in suckering with scattered Douglas fir. To help minimize impacts to spruce/fir and mixed conifer from prescribed fire, as described in the EIS, within the spruce/fir and mixed conifer dominated stands that have little to no aspen presence (less than 15 aspen recruits per acre), prescribed burning would occur when low to moderate fire severities would be expected. In addition, no fire ignitions that would likely result in moderate to high fire severities in Douglas fir dominated areas would occur. Low severity fire in the Douglas fir dominated stands would be allowed. After prescribed fire treatments, if needed to meet LRMP standards, spruce/fir and mixed conifer would be replanted.

Vegetative Structural Stage

The structural characteristics for VSS are common for all alternatives; therefore, they are being addressed in the, “Effects Common to all Alternatives” section. The only distinguishing characteristic that is different is the number of acres affected within each alternative.

Economics

The cost to implement Alternative 5, option 1 is approximately $7.7 million and the cost to implement alternative 5, option 2 is approximately $8 million. Compared to alternative 1 ($178 million) the cost to implement alternative 5, options 1 or 2 is considerably less than alternative 1. See appendix B for a breakdown of the costs.

Indirect Effects

A long-term concern for the aspen is the health of the aspen overstory. Walters et al. 1982 and Solarik et al. 2012 discuss results related to partial harvest of aspen. Waters et al. focuses more on regeneration and concludes that more trees harvested and/or the lower the BA after treatment the more sprouts there were. He also concludes that their minimum (6,000 sprouts per acre) was achieved on partial harvest but grazing impacts wiped them out on some of the plots within the study. Solarik et al. talks some about regeneration but the primary focus is the overstory. In his research he indicates that there is an increase in aspen mortality after harvest activities. Sunscald is a concern related to management alternatives where aspen overstory retention is the goal.

Sunscald is thought to be a mortality factor; however, both research papers conclude that although sunscald was a factor and caused some mortality it was not the primary cause. Cankers and wind damage (or a combination of both) was the primary cause of death with sunscald being the entry point for the canker. Ironically, in Solarik et al., the more BA removed the higher the death rate of overstory aspen. Conversely, Waters et al., requires more BA removed to increase reproduction. Solarik et al. points out that higher mortality rates occurred 5 years and increased higher yet 10 years later. Since mechanical treatments in any alternative and options have aspen overstory retention within the aspen cover type it is likely that an unknown number of aspen overstory trees will die. Areas on Monroe Mountain where aspen was retained at low basal area are showing symptoms of sunscald and may be lost.

Cumulative Effects

Cumulative effects area (CEA) is Monroe Mountain (see appendix A for a map of the CEA). Total CEA acres are 175,706 surrounding 11,805 acres of private property. Monroe Mountain lies near the center of the Fishlake National Forest. The southern part of Monroe Mountain falls outside the project boundary but is included as part of the cumulative affects area because there is likely to be activity that may affect this project. There are no known activities associated with BLM lands that surround the mountain; therefore, that area was not considered for inclusion.

Table 26 below outlines the cumulative effects for alternative 5. Harvest and prescribed burn are the past activities associated with alternative 5. Wildfire acres, although not a management activity, are included because they have had an effect on vegetation and have occurred throughout the CEA in the past. Past activities have affected 19 percent of the total acreage within the cumulative effects boundary. Alternative 5 will impact an additional 18 percent of the area. In addition, future activities scheduled for 2015 include 5,778 acres of prescribed fire. Activities past, present and future will impact 39 percent of the cumulative effects area (Table 25).

Table 25- Alternative 5 cumulative effects.

Alternative 5							
Activity	**Past Activity Acres**	**% of Past CEA Impacted (Acres)**	**Alt 5 Acres**	**% of CEA Impacted**	**Foreseeable Future Acres**	**Total Activity Acres**	**% CEA Impacted**
Harvest	5,774	3%	15,072	9%	0	20,846	12%
Prescribed Burn	13,998	8%	15,872	9%	5,778	35,648	20%
Wildfire	12,894	7%	0	0%	0	12,894	7%
Total	**32,666**	**19%**	**30,944**	**18%**	**5,778**	**64,414**	**39%**

Past activities come from every decade since the 1960s. Past activities from 1960 to 1990 will have little cumulative bearing on cover type vegetation because those areas are largely recovered from past activities and are in various stages of development. Therefore the discussion will center on those activities from 2000 to the present. Past activities in the 2000 decade totals 4 percent with a 5 percent increase in the 2010 decade Table 26.

Table 26- Past and foreseeable future activities by decade.

	2000's	2010's	Total- by Activity
Harvest Acres	1,156	3,035	4,191
Prescribed Burn Acres	1,291	11,597	12,888
Wildfire Acres	4,192	1,520	5,712
Total	6,639	16,152	22,791
Percentage by Decade	4%	9%	13%

Aspen Cover Type

Harvest and/or fire within past activities have removed most conifers within the type. Even-aged management has been the goal, removing all trees and regenerating aspen. Within the type it has been largely successful. To that end, fire treatments for this alternative should be as successful as in the past. Option 1 mechanical treatments will result in two-aged stands with no conifer. Option 1 will also move the successional stage back and, for a time, create a pure stand of aspen. Option 2 treatments will not show a whole lot of change in reference to overstory composition and structure. Leaving the conifer in the overstory will result in succession progressing. Past treatments particularly those from the 1990 to 2010 decades, in conjunction with option 1 mechanical treatments and prescribed fire, would decrease the number of mid to late-seral aspen acres because these stands would be in an earlier successional stage, the treatment would last longer across a larger area. Table 27 shows that the aspen cover type will have a 44 percent affect across the CEA. The past treatments in concert with the proposed treatments (regardless of option 1 or option 2 treatments) should provide a good mosaic of age classes and still maintain biological diversity.

Mixed Conifer/Spruce/fir

Past activities combined with proposed activities would have the following effects. Thin barked trees such as Engelmann spruce and sub-alpine are all less fire hardy and are killed more readily than Douglas fir (Hood and Miller 2007). This would tend to skew composition weighted more heavily to Douglas fir and white fir. Regardless of species, fire is lethal to the smaller trees. If there is a crown fire, all trees would likely die.

Option 1 combined with past activities would create a mosaic of stands with uneven-aged stands dominating from the mechanical treatment while the fire treatment areas would remove trees from all age classes and/or may eliminate some stands. Over all cumulative effects would reflect a landscape with uneven-aged structure in a mosaic pattern. Fifty percent of mixed conifer acres and 36 percent of spruce/fir acres would be affected across the CEA (Table 27). Option 2 combined with past activities would stands with (at least temporarily) less smaller trees and changing the structure one that is skewed to the larger classes.

Table 27- CEA affects by cover type.

	Alternative 5				
	Current Acres of Cover Type in CEA	Mechanical Treatment Option1 and 2	Prescribed Fire Treatment	60% Burned	Total Acres affected in CEA
Aspen	31129	6736	11676	7006	13742
Percentage		22%		23%	44%
Mixed Conifer	5220	92	4190	2514	2606
Percentage		2%		48%	50%
Spruce/fir	14392	2905	3810	2286	5191
Percentage		20%		16%	36%

Old Growth

Old growth will decline by 9 percent via past and present actions and decline and additional 1% through foreseeable future actions, totaling 10% for past present and foreseeable future actions (Table 28).

Table 28- CEA effects on old growth for alternative 5.

Cumulative Effects- Old Growth							
	Present Forested Acres	Present Acres in Old Growth	Alt. 5 Acres of Old Growth Affected	Past, Present and Foreseeable Future Actions Affecting Old Growth	Total Acres Affecting Old Growth (Past, Present and Foreseeable Future)	Percent of Old Growth remaining after Alt. 2	Percentage of Old Growth remaining after all past, present, and reasonably foreseeable actions are completed
Alt 1	48330	14121	0	0	0	0	29%
Alt 5	48,330	14,121	4,616	228	4,844	20%	19%

Effects Common to All Alternatives

Vegetative structural stage (VSS) is being discussed here because the effects are common to all the alternatives. The only difference is the number of acres being affected by prescribed fire and mechanical treatments. The desired condition for VSS (in percent) is as follows: VSS 1, 10 percent; VSS 2, 10 percent; VSS 3, 20 percent; VSS 4, 20 percent; VSS 5, 20 percent; and VSS 6, 20 percent. To maintain consistency with the rest of this document the discussion will proceed with a break down between the cover types.

Aspen Cover Type

Table 29 compares VSS for the aspen cover type between alternative 1 and the other alternatives and options.

Table 29 would indicate that alternative 1 has better structure than all other alternatives; however, there are a couple of items to note about that. 1) Seral stands have a high degree of conifer and those conifers are longer lived than aspen. Although you cannot necessarily correlate age and diameter, larger trees tend to be older. Trees in the VSS 5 and 6 are shown in Table 29 to increase in percent due largely to the conifers present; and 2) As time progresses, seral aspen will likely change to either a mixed conifer or spruce/fir cover type. Stable stands would not be affected by conifers but more aspen stand conversion would lead to less aspen diversity in terms of structure across the mountain.

All alternatives option 1 show a slight surge in VSS 1, 10 years after treatment. The number runs on a 10 year cycle and would show a higher result right after treatment than currently shows. Regardless, it is a lower value in all the years than alternative 1 and never fully meets the desired. Alternative 1 meets it only in its current year. Vegetative Structural Stage 2 is better in all alternatives in option 1 than alternative 1. Aspen have a higher rate of growth in the early years, more so than conifers. Cutting and fire initiates suckering whereas alternative 1 has little to no suckering; therefore, a higher percentage within this class is presented. Vegetative Structural Stage 3, 4, 5, and 6 have better percentages than any of the other alternatives within option 1; however, the balance between classes is better achieved within 100 years than alternative 1. Within the VSS 5 and 6 classes under alternatives 2 through 5, option 1 the size class is lacking and would likely always be lacking within the aspen cover type (especially VSS 6 class). Although aspen can achieve 24 plus inches in diameter, the sizes are not common.

All alternatives, option 2 shows a slight surge in VSS 1, 10 years after treatment. Two items are different from option 1. First, overstory conifers are still present and producing seed thus leading to conifer regeneration. Second, aspen regeneration has been reduced because of the conifer production. Alternative 1 is still better than this option but through time this alternative maintains some presence within the class. All other classes within option 2 are better than alternative 1. This is likely due to the presence of conifer within this option.

Table 29- Vegetative Structural Stage comparison through time between Alternative 1 and all Alternatives and Options for the aspen cover type.

		VSS Class					
		1	2	3	4	5	6
Alternative 1	Aspen						
	Desired	10	10	20	20	20	20
	Current	13.60%	15.50%	56.78%	12.62%	1.11%	0.39%
	year 50	1.02%	32.32%	37.66%	23.60%	4.83%	0.58%
	year 100	2.12%	1.56%	33.51%	36.81%	21.17%	4.83%
Alternatives 2 through 5- Option 1	Aspen						
	Desired	10	10	20	20	20	20
	after treatment	1.81%	49.88%	36.57%	10.81%	0.93%	0.00%
	year 50	0.00%	70.80%	17.90%	10.30%	1.10%	0.00%
	year 100	0.00%	52.80%	27.70%	17.30%	2.20%	0.00%
Alternative 2 through 5- Option 2	Aspen						
	Desired	10	10	20	20	20	20
	after treatment	6.90%	15.31%	54.13%	20.42%	1.89%	1.34%
	year 50	0.64%	73.12%	12.58%	11.67%	1.95%	0.33%
	year 100	1.03%	4.73%	69.56%	12.14%	9.66%	2.88%

Mixed Conifer Cover Type

Table 30 compares VSS for the mixed conifer cover type between alternative 1 and all other alternatives and options.

Option 1 treatments are slightly lower in VSS 1 and 3, than alternative 1. Both alternative 1 and option 1 meet the desired either in its current state or after treatment within VSS 1, 2, and 3. Vegetative Structural Stage 4 is slightly better in option 1. Neither alternative 1 nor alternatives 2 through 5, option 1 fully meet the desired for VSS 5 and 6. Fifty years from now option 1 for alternatives 2 through 5 is better overall than alternative 1 for VSS 5 and 6. Alternate 1 has a higher percentage of VSS 1, 2, 3, and 4 but both meet the desired. One hundred years from now shows a decrease in VSS 1 for option 1 treatments as compared to alternative 1. Vegetative Structural Stage 2, 3, 4, and 5 in Alternative 1 and Option1 meet the desired. VSS 6 is not fully met by any of the alternatives but is closer to the desired and is trending upwards in Alternatives 2-5.

Option 2 treatments when compared to alternative1 show that the desired is being met by both alternatives in VSS 2 and 3. Vegetative Structural Stage 1 is being met by alternative 1 and not by option 2; however, option 2 meets the desired for VSS 4 but not in alternative 1. Neither alternative meets the desired condition for VSS 5 and 6. Fifty years after treatment indicates a further decrease in VSS 1 within option1 treatments, fall far below the desired while there is an increase in VSS 1 for alternative 1. Vegetative Structural Stage 2 and 4 meet the desired in both alternatives while VSS 3 only meets the desired in alternative 1. Neither alternative fully meets the desired within VSS 5 and 6 by year 50.

Year 100 shows a decrease in VSS 1 in both alternatives; however, alternative 1 still meets the desired. Vegetative Structural Stage 3 and 4 meet the desired for both alternatives while only alternative 1 meets the desired for VSS 1 and 2. Only option 2 meets the desired for VSS 5 and alternative 1 does not. Neither alternative fully meets the desired for VSS 6; however, both are trending in that direction.

Table 30- Vegetative Structural Stage comparison between alternative 1 and all other alternatives and options for the mixed conifer cover type.

		VSS Class					
		1	**2**	**3**	**4**	**5**	**6**
Alternative 1		**Mixed Conifer**					
	Desired	**10**	**10**	**20**	**20**	**20**	**20**
	Current	12.97%	19.69%	42.24%	19.32%	4.25%	1.52%
	year 50	68.00%	33.56%	33.37%	23.41%	6.58%	2.40%
	year 100	19.00%	10.29%	42.91%	29.39%	12.89%	4.34%
Alternatives 2 through 5- Option 1		**Mixed Conifer**					
	Desired	**10**	**10**	**20**	**20**	**20**	**20**
	after treatment	10.22%	25.70%	35.27%	21.38%	5.48%	1.95%
	year 50	10.81%	30.78%	23.94%	19.97%	10.21%	4.29%
	year 100	2.89%	30.92%	22.35%	18.95%	16.28%	8.61%
Alternative 2 through 5- Option 2		**Mixed Conifer**					
	Desired	**10**	**10**	**20**	**20**	**20**	**20**
	after treatment	4.84%	24.93%	29.75%	31.47%	6.68%	2.34%
	year 50	1.09%	42.15%	16.17%	28.61%	8.51%	3.46%
	year 100	0.38%	4.38%	45.32%	24.24%	20.08%	5.60%

Spruce/fir Cover Type

Table 31 compares VSS for the spruce/fir cover type between alternative 1 and all other alternatives and options.

Both alternative 1 and option 1 meet the desired for VSS 1, 2, 3, and 4 while neither meets the desired condition for VSS 5 and 6. In year 50, option 1 meets the desired for VSS 1 while alternative 1 does not. Vegetative Structural Stage classes 2, 3, and 4 are meeting the desired for both while VSS 5 and 6 are still not meeting the desired. By year 100 neither alternative 1 nor option 2 meet the desired for VSS 1. Both meet the desired for VSS classes 2, 3, and 4. Neither meets the desired for VSS 5 and 6. Alternative 1 and option 1 are showing a trend towards meeting the desired throughout most of the VSS classes.

Alternative 1 meets the desired for VSS 1, while option 2 does not. Vegetative Structural Stage 2, 3, and 4 is met by both while neither meets the desired for VSS 5 and 6. By year 50 neither alternative nor option 2 fully meet the desired condition. Vegetative Structural Stage 2 and 4 are being met by both while VSS 3 is being met by alternative 1, only. Neither fully meets desired conditions for VSS 5 and 6. Year 100 still shows a downward shift in VSS 1 so much so that neither alternative 1 nor option 2 fully meets VSS 1. Vegetative Structural Stage 2, 3, and 4 are being met by both. Vegetative Structural Stage 5 and 6 are fully met by neither; however, VSS 5 for option 2 is only 0.74 of a percent away from meeting the desired. Both alternative 1 and option 2 are trending towards meeting the desired through time.

Table 31- Vegetative Structural Stage comparison between alternative 1 and all other alternatives and options for the spruce/fir cover type.

		VSS Class					
		1	**2**	**3**	**4**	**5**	**6**
Alternative 1		**Spruce/fir**					
	Desired	**10**	**10**	**20**	**20**	**20**	**20**
	Current	13.39%	15.85%	41.24%	21.00%	6.19%	2.34%
	year 50	6.40%	21.83%	29.84%	28.58%	9.54%	3.81%
	year 100	4.20%	15.76%	25.42%	32.56%	15.01%	7.07%
Alternatives 2 through 5- Option 1		**Spruce/fir**					
	Desired	**10**	**10**	**20**	**20**	**20**	**20**
	after treatment	20.10%	14.58%	32.15%	21.66%	7.86%	3.65%
	year 50	10.14%	32.09%	19.64%	20.62%	12.04%	5.47%
	year 100	3.47%	31.92%	19.74%	18.60%	16.53%	9.74%
Alternative 2 through 5- Option 2		**Spruce/fir**					
	Desired	**10**	**10**	**20**	**20**	**20**	**20**
	after treatment	8.78%	12.92%	33.97%	32.33%	8.69%	3.32%
	year 50	2.67%	28.14%	15.42%	36.91%	12.74%	4.11%
	year 100	1.66%	12.48%	23.82%	34.98%	19.26%	7.80%

Climate Change

Initial direction was given to analyze for effects on climate change in a letter written by Abigail Kimbell, Chief of the Forest Service in 2009 (Kimbell 2009). New guidance was given, for Federal Agencies, through a 2014 Draft CEQ (Committee of Environmental Quality). This guidance is not a rule or regulation, and the recommendations it contains may not apply to a particular situation based upon the individual facts and circumstances. This guidance does not change or substitute for any law, regulation, or other legally binding requirement, and is not legally enforceable. The use of non-mandatory language such as “guidance,” “recommend,” “may,” “should,” and “can,” is intended to describe CEQ policies and recommendations. The use of mandatory terminology such as “must” and “required” is intended to describe controlling requirements under the terms of NEPA and the CEQ regulations, but this document does not establish legally binding requirements in and of itself. The new draft guidance recommends addressing climate change via analyzing GHG emissions and carbon storage. As per the draft document, CEQ defines GHG emissions as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Analysis

This section will look at how each alternative effects climate change as it relates to vegetation changes through management and fire. Although some information will likely be available for GHG emissions and there is quantitative data concerning volume of the removed trees; what the quantities of GHG emission would likely be, given volume removal, is unknown at this time. That part of the analysis will be mostly qualitative in nature.

To give a better understanding about what constitutes an emission, it is important to understand what plants, in general, need to sustain their life processes. Plants need minerals, water and carbon to survive. From a physiological perspective, all plants (not just trees) need carbon and water to produce the sugar necessary for growth and development. Plants get this sugar through a process known as photosynthesis. Photosynthesis, as defined by the *Dictionary of Forestry* (Helms, 1998), is the manufacture of organic compounds, particularly carbohydrates, in the chlorophyll cells of plants from carbon dioxide, water, and enzymes in the presence of light as the energy source. The by-product is oxygen and water vapor. Also worth noting, photosynthesis is dependent on favorable temperature and moisture conditions as well as an adequate atmospheric carbon dioxide concentration.

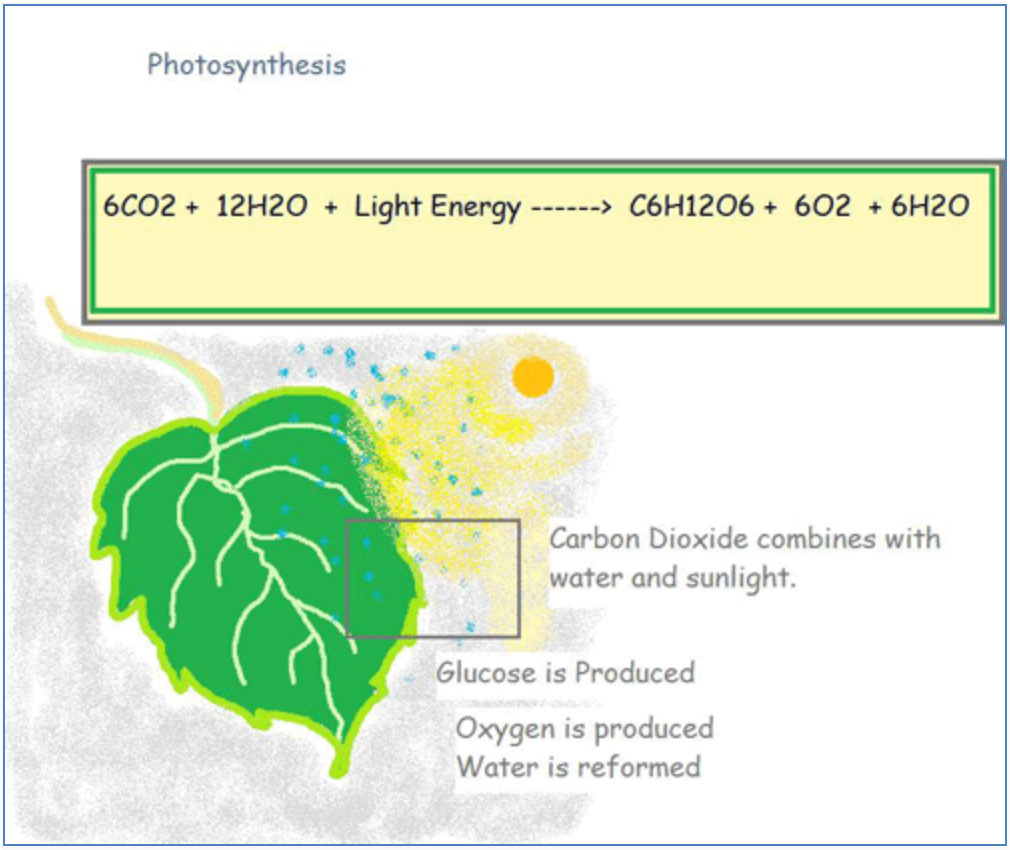

Figure 44- Photosynthesis chart.

Figure 44 shows the photosynthetic process. From the equation, C6H12O6 is the sugar. This sugar is stored in the bole, branches, leaves/needles and roots of the trees. In fact, Tappeiner (2007) states that nearly half of the energy that a stand "fixes" is consumed in respiration and other physiological processes. There is carbon stored in soil, but vegetation is what we are referring to here so the bole, branches, leaves, and roots of the tree all contain the stored carbon and each will contribute some amount to either an emission or storage after project completion.

Traditionally, forester's focused their efforts on volume for a given stand or individual trees. The purpose of that focus was mainly to determine how productive a given stand of trees are to produce wood fiber products. Forester's still focus on volume but the measure can also be applied to carbon sequestration and storage. Net volume is usually used to determine volume for wood fiber production. Diameter caps are usually the metric used for net volume. Gross volume takes into account of all the volume accumulated from all diameters. For the purposes of this section, the volume data is for live trees only and will use gross volume. Dead tree volume is already stored in the tree and no new additions of carbon storage will take place. Determining volume in this context gives a way to determine how fast a stand would grow and therefore, how fast a stand would remove carbon from the atmosphere. So this will be the first thing that will be analyzed for carbon storage and sequestration. The second will be what the effects on each cover type might be if a large change in climate were to occur.

This paragraph will discuss the volume. Differences between alternatives are related to acres and options. Primary effects will come between the options. For clarity and to maintain consistency with the rest of this document, the following paragraphs will address volume by cover type.

Stand volume growth (PAI or periodic annual increment) is what we'll look at here. Tappeiner (2007) describes PAI as the annual growth of a stand, usually for the previous 5-10 years. In the case of this analysis it is 10 years. Tappeiner also states that as stand density increases volume growth increases until severe inter-tree competition occurs. Then growth and yield may decrease from the loss of trees by self-thinning, poor tree vigor, and in some cases stand stagnation. It is common to analyze individual stands for production because individual stands have different growth rates. In this case we are looking at cover types as a whole so averages are used for the combined stands within the subsequent paragraphs. Suffice it to say that productivity will vary from high to low within the project area as a whole.

Mechanical Analysis

Aspen Cover Type

Figure 45 below shows stand growth comparison between alternative 1 and mechanical options 1 and 2 for the aspen cover type. The alternatives are not discussed until later. Alternative 1 starts out at around 58 cubic feet (cuft) per year, peaks at 65 cuft and declines through time to a low of 28 by year 2114. Both option 1 and 2 start at zero because that is the time harvest occurs and there is no stand growth. Option 1 is a sigmoidal (s-shaped) curve peaking at the beginning at about 48 cuft and declining in stand growth at 20 cuft by year 2064. From 2064 to 2104 the volume increases at a steady rate and begins to decline again in 2114. The decline from 2034 to 2064 is likely due to a lack of full site occupancy and a possibly decline in the remaining overstory trees. Option 2 is marked by a slow decline in growth over the cycle, peaking around 2044 at 42 cuft and ending at 26 cuft.

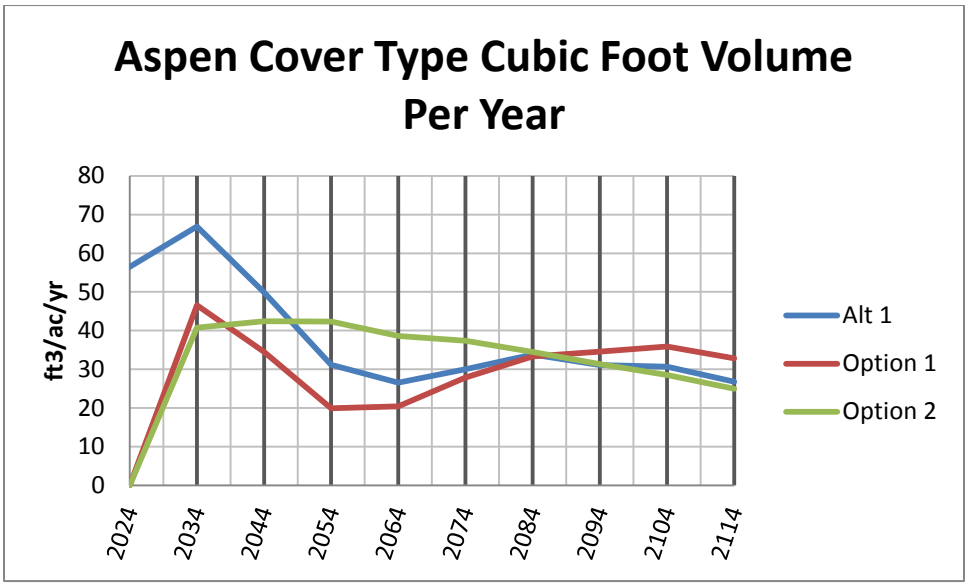

Figure 45- Aspen volume growth between alternative 1 and options 1 and 2.

So what does this mean in terms of climate? Tappiener (2007) lists some authors that have done studies related to photosynthetic process and trees removing carbon from the atmosphere. The authors of those studies were Smithwick and others (2002), Acker and others (2002), and Acker et al. (2002). Most of the work was done in the Cascades but they looked at forests from young to old. Tappiener concludes that the volume growth of wood in forest stands is closely related to rates of C fixation. The average age for the aspen cover type is 124 years. Campbell and Bartos (2001) describe aspen stands over 100 years of age as declining, from an ecological perspective. This can also be seen from the graph, particularly the more rapid volume decline in Alternative 1.

In the short term, Option 2 appears to be the better volume producer and the higher carbon consumer. Long term, Option 1 exceeds both Option 2 and Alternative 1

I did not discuss or compare alternatives 2 through 5 because either option 1 or 2 could be deployed in any of the alternatives. Since the main difference is the number of acres being treated, the alternative that reflects the highest number of acres treated would remove and store the most carbon from the atmosphere (alternative 4). Volume removed from any of the alternatives is not reflected in the graph and would be considered already stored carbon (they would no longer be able to remove any more from the atmosphere through time). Carbon and/GHG emissions, from mechanical treatments, would be less than what is removed since most of the stored carbon exists in the boles of trees. What remains are the tops, branches, stumps, and roots. They would be left to decay or be burned.

Mixed Conifer Cover Type

Figure 46 below shows stand growth comparison between alternative 1 and options 1 and 2 for the mixed conifer cover type. The alternatives are not discussed until later. Alternative 1 starts relatively high at 46 cuft and peaks in 2034 at 48 cuft then slowly declines to 25 cuft at the end of the cycle. Option 1 is a series of peaks and valleys. This is reflective of the way the FVS model functions to perform the uneven aged analysis. The valleys are indicative of volume removal at a cutting cycle and reflect mostly zero stand growth (meaning stand growth was less than what was removed). Between cycles stand growth exceeds alternative 1 and option 2. Option 2 shows a starting point around 32 cuft rising to a peak of 45 cuft and declining to meet the same volume per year as alternative 1 by 2114.

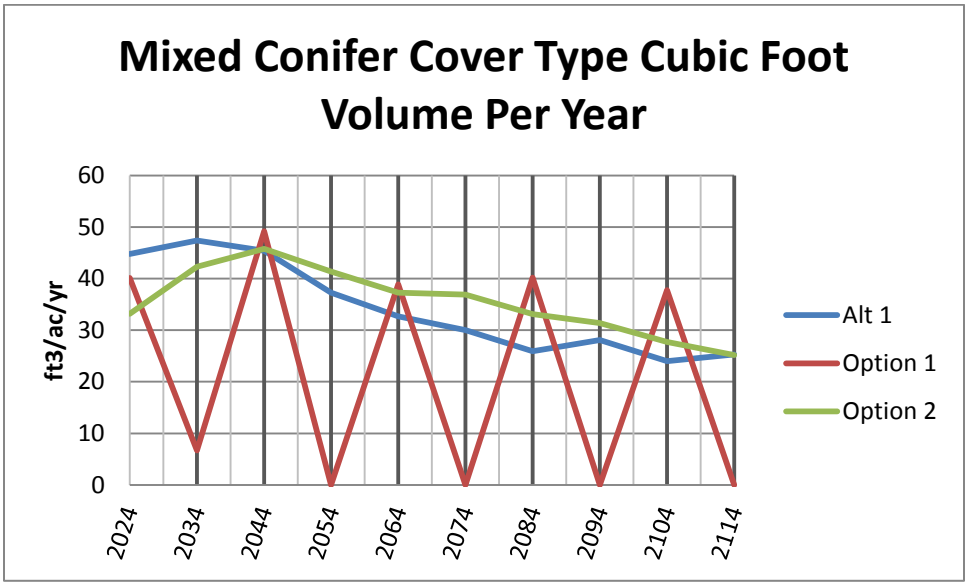

Figure 46- Mixed conifer volume growth between alternative 1 and options 1 and 2.

It is hard to predict whether alternative 1, option 1 or option 2 is the best at carbon removal or storage. What can be said is that alternative 1 and option 2 are declining throughout the period. Option 1 is up and down but at each peak exceeds the volume attained in alternative 1 or option 2 even at the end. If this pattern continues it is likely that option 1 would be the better option because it is a constant high at nearly 40 cuft at every peak. Conversely, alternative 1 and option 2 continue on a downward slope. It is likely that the downward slope of alternative 1 and option 2 is caused by the total age of the type at the end of the cycle. The average age of the type is 105.

By the end of the cycle it would be 205, approaching old growth. In old forests the amount of carbon added to the forest is about equal to the amount lost by respiration of dead biomass (Tappiener 2007).

I did not discuss or compare alternatives 2 through 5 because either option 1 or 2 could be deployed in any of the alternatives. Since the only difference is the number of acres, the alternative that reflects the highest number of acres treated would remove and store the most carbon from the atmosphere (alternative 4). Volume removed from any of the alternatives is not reflected in the graph and would be considered already stored carbon (they would no longer be able to remove any more from the atmosphere through time). Carbon and/GHG emissions, from mechanical treatments, would be less than what is removed since most of the stored carbon exists in the boles of trees. What remains are the tops, branches, stumps, and roots. They would be left to decay or be burned.

Spruce-fir Cover Type

Figure 47 below shows stand growth comparison between alternative 1 and options 1 and 2 for the mixed conifer cover type. The alternatives are not discussed until later. Alternative 1 peaks at 35 at the beginning of the cycle and slowly declines to 20 cuft by the end. Option 1 is similar in style to option 1 in the mixed conifer for the same reason. Volume tops out at about 37 cuft and then levels off at around 30 cuft. The pattern appears constant after 2104. The highest volume accumulation occurs with option 2. That value is 42 cuft in 2044. After that time it slowly declines until it nearly matches alternative 1.

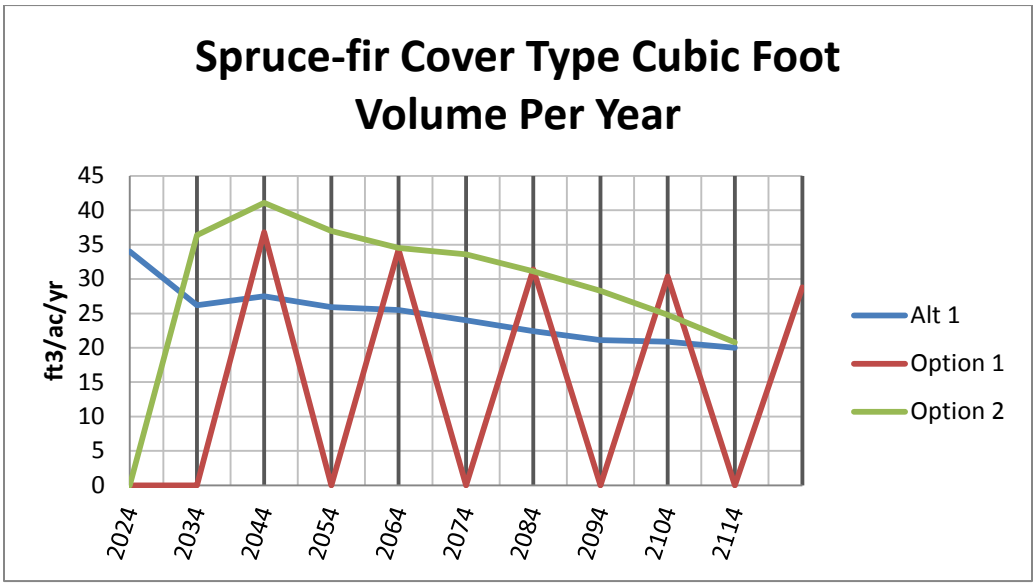

Figure 47- Spruce-fir volume growth between alternative 1 and options 1 and 2.

It is hard to predict whether alternative 1, option 1 or option 2 is the best at carbon removal or storage. What can be said is that alternative 1 and option 2 are declining throughout the period. Option 1 is up and down but at each peak exceeds the volume attained in alternative 1 or option 2 even at the end. If this pattern continues it is likely that option 1 would be the better alternative because it is a constant high at nearly 40 cuft at every peak. Conversely, alternative 1 and option 2 continue on a downward slope. It is likely that the downward slope of alternative 1 and option 2 is caused by the total age of the type at the end of the cycle. The average age of the type is 105. By the end of the cycle it would be 205, approaching old growth. In old forests the amount of

carbon added to the forest is about equal to the amount lost by respiration of dead biomass (Tappiener 2007).

I did not discuss or compare Alternatives 2 through 5 because either option 1 or 2 could be deployed in any of the alternatives. Since the only difference is the number of acres, the alternative that reflects the highest number of acres treated would remove and store the most carbon from the atmosphere (alternative 4). Volume removed from any of the alternatives is not reflected in the graph and would be considered already stored carbon (they would no longer be able to remove any more from the atmosphere through time). Carbon and/GHG emissions, from mechanical treatments, would be less than what is removed since most of the stored carbon exists in the boles of trees. What remains are the tops, branches, stumps, and roots. They would be left to decay or be burned.

Conclusions

Throughout this document the discussion has centered on cover types. This was done mainly because the LRMP reads this way. Although the purpose and need for action is to restore aspen ecosystems, two other cover types were covered (mixed conifer and spruce/fir) by this analysis. Many aspen stands are adjacent to mixed conifer and spruce/fir stands. Aspen also occurs in the mixed conifer and spruce/fir cover types. A large portion of the project proposes to use prescribed fire to improve aspen. To use fire in a safe and effective manner, it became necessary to treat within the mixed conifer and spruce/fir cover types, as well.

Many items were discussed in this report ranging from the effects of fire on cover types, insect and disease current and likely impacts, and economics. Two environmental indicators were analyzed as part of this report; VSS and old growth. A large portion of the preceding paragraphs will focus on the environmental indicators.

Old Growth

Table 32- All alternatives old growth comparison.

Old Growth									
	Mech. Treatment (total Acres)	Mechanical Acres in Old Growth Option 1 and 2	60% of Acres Burned	Acres in Old Growth- 60% of Acres Burned	Current Forested Acres	Current Acres in Old Growth	Total Acres of Old Growth Affected by Treatments	Difference	Percentage of Old Growth Remaining After Treatment
Alt 2	8,186	92	19,795	5,479	48,330	14,121	5,571	8,550	18%
Alt 3	13,648	236	18,814	5,223	48,330	14,121	5,459	8,662	18%
Alt 4	19,837	411	16,462	4,547	48,330	14,121	4,958	9,163	19%
Alt 5	15,072	291	15,872	4,325	48,330	14,121	4,616	9,505	20%

All of the alternatives and options meet the requirement in the LRMP of 5 percent or more in old Growth. Alternative 1 (no action) is currently at 29 percent old growth for the project as a whole. Overall, option 1and 2 treatments show a 9 to 11 percent decrease in forested old growth compared to alternative 1. Additionally, old growth declines by an additional 1% for each alternative when factoring the cumulative effects. All alternatives and options (considering past, present and future) meet the LRMP and the changes (plus or minus) are minimal, in terms of percent, amongst one another (Table 32).

Vegetative Structural Stage

The LRMP discusses criteria for VSS based on cover type and this paragraph will as well.

Aspen Cover Type

It is clear that the conifer component is shifting the percentages farther to the larger size classes. There is a substantial difference in VSS 5 and 6 in alternative 1 vs the other alternatives and options. It was expected that VSS 5 and 6 would be more represented within option 2 than option 1 because only conifers below 8 inches DBH were removed within option 2. All overstory conifers remained and grew over time. Option 1 treatments lack conifer and are more pure aspen compared to option 2 and alternative 1. Vegetative Structural Stage 5 and 6 are slowly increasing through time.

Mixed Conifer Cover Type

None of the alternatives fully meet the desired condition; however, they are all trending towards the desired as time progresses. Given the high density associated with alternative 1, option 1 treatments would give a better result for a longer period of time. Higher stand densities slow growth, increase risk to insect and disease, and increase risk to crown fire. Given this, option 1 is a better treatment for maintaining structure in the future.

Overall, VSS 5 and 6 percentages are better in option 2 than either alternative 1 or option 1; however, the type changes from an uneven-aged to an even-aged type. The risks of cover type conversion are certainly higher for this option. Bark beetles, in particular, usually prefer larger older trees. Option 2 leaves the larger older trees.

Spruce/fir Cover Type

The results for this type, under any alternative, do not fully meet the desired condition but are trending in that direction as time progresses. Option 1 treatments are similar through time as alternative 1. The primary difference between the two relates to density. Alternative 1 is denser than option 1.

Option 2 treatments are similar to the results from alternative 1 and option 1 with one primary difference; structure. Like mixed conifer option 2, structure for option 2 is even-aged. Given the current spruce beetle outbreak, removing the lower classes of trees seems almost silly. The risk of a cover type change is high because few replacement trees would exist after treatment and the overstory trees would likely die due to the beetle.

It is the professional opinion of the District Forester that option 1 is the better option for VSS. Option 1 maintains uneven-aged structure within mixed conifer and spruce/fir cover types while lowering density. Given the current beetle outbreak, this is a more prudent action to maintain mixed conifer and spruce/fir cover types, and still provide, and maintain structure for the future. Vegetative Structural Stage declines seen in the aspen cover type within option 1 can be offset by

maintaining and preventing a type conversion. Biological diversity will be maintained across a broader scale by preventing further aspen stand degradation due to conifer encroachment.

Averages of VSS percentages fit with what has been seen on the Fishlake National Forest for these cover types. Data collected on other projects has revealed that most stands are in VSS 2 and 3 followed by VSS 4. Vegetative Structural Stage 5 and 6 are rarely identified as the dominant structure; however, they are usually an element within a stand. It is more common to see mixed conifer and spruce/fir cover types with higher values for VSS 5 and 6. Logically this makes sense because they are longer-lived species and usually reside on more productive sites than aspen. The problem is the older and larger they become the more susceptible they become to other things such as insects, diseases, and fires. Therefore, even though the condition can get to where the LRMP desires, it usually does not stay there that long.

Economics

Table 33: Implementation cost for all alternatives.

	Option 1 Implementation Cost	Option 2 Implementation Cost
Alternative 1 – Wildfire Cost	$178.5 Million	$178.5 Million
Alternative 2	$7.1 Million*	$7.2 Million*
Alternative 3	$8.2 Million*	$9.6 Million*
Alternative 4	$8.7 Million*	$9.2 Million*
Alternative 5	$7.7 Million*	$8.0 Million*

* This implementation cost does not include any wildfire cost. Implementation is expected to occur over approximately 10 years. During this 10 year timeframe, wildfires are likely to occur. The location, size, and duration of the wildfire(s) is unknown so wildfire cost was not included into the implementation cost.

Table 33 outlines the implementation cost for all of the alternatives. Compared to alternative 1, of the action alternatives, alternative 3 option 2 would be the most expensive to implement. Alternative 2 (either option) would be the cheapest to implement. Implementation cost for alternatives 3 and 4 (either option) are similar in cost. Alternative 5 implementation costs fall between alternatives 2, 3, and 4. Suppressing wildfire, alternative 1, would be the most expensive; 18 to 25 times higher than any alternative and option.

There is no known dollar value to restoring aspen but it could be argued that losing aspen would be a greater cost in terms of ecological and biological diversity than the dollar value to restore. There is a risk that a wildfire could occur during implementation.

Climate Change

This project would remove trees and would likely have little impact on carbon released into the atmosphere. Harvested wood from this project would mostly come from the bole of the tree. The majority of the trees volume is in the bole; consequently, the majority of the carbon is stored here. It stands to reason, therefore, that the carbon stored in the bole would have no emissions when hauled off site. Smith, et al. 2006 explains this in *Methods for Calculating Forest Ecosystem and Harvest Carbon with Standard Estimates for Forest Types of the United States*. He says, “When wood is harvested and removed from the forest, not all of the carbon flows immediately to the atmosphere. In fact, the portion of harvested carbon sequestered in long-lasting wood products may not be released to the atmosphere for years or even decades.” Harvested wood products serve as reservoirs of carbon that are not immediately emitted to the atmosphere at the time of

harvest. Furthermore, the amount of carbon sequestered in products depends on how much wood is harvested and removed from the forest, to what products the harvested wood is allocated, and the half-life of wood in these products. The stump and roots would be left on site and these would contribute some to GHG emissions, albeit slowly over time as they decompose. Branches and leaves/needles (slash) would contribute the most to immediate GHG emissions because they would be piled and burned. These emissions would be minor in terms of overall global GHG emissions.

Within every cover type alternative 1 results in the highest carbon consumption and storage; however, within every cover type it steadily declined and was either lower or equal to options 1 and 2. Although the difference between option 1 and 2 for carbon consumption and storage is minor, option 1 has a slightly higher consumption and storage of carbon over the long term. This is likely due to the uneven aged nature of the stand and the repeated lowering of density reducing competition and regeneration of younger more vigorous trees. As far as alternatives 2 through 5, those that employ option 1 and more acres of treatment would be the larger consumers and collectors of carbon (alternative 4).

The purpose and need of this project is to restore aspen ecosystems. In terms of climate this could be important. The prediction is for higher temperatures and continued/increased drought. If higher temperatures and continued/increased drought occurs, all tree species would likely move up in elevation and those species that reside at the lower elevations would likely decline. Since the aspen cover type currently reside across a wide elevational band and a wider latitudinal area than the other species on Monroe Mountain, aspen have the ability and may better adapt and be more resilient to climate change. Improving the aspen ecosystems by removing competing conifers, increasing regeneration and recruitment is expected to help aspen on Monroe Mountain be more resilient to climate change. The spruce-fir cover type needs cooler and wetter conditions than the other cover types and would likely decline. In the mixed conifer type, associated species such as spruce and fir (white and subalpine) would likely also decline with stand dominance turning more towards either pure Douglas-fir to Douglas-fir/aspen mix; hence, a cover type change.

In terms of alternatives, alternatives 2 through 5 would likely have less impact from carbon emissions than alternative 1. It is unknown when, how many acres, and/or where wildfires will occur on Monroe Mountain. What can be stated is that because of the uncertainty of these things, the amount of GHG emissions can be better controlled under alternatives 2 through 5 by controlling when, where and how prescribed fires would be implemented. The “when” portion has to be submitted and approved through Utah Smoke Management. The “where and how” is described in the Fire/Fuels Specialist Report and in the EIS. Alternatives 2 through 5 also emit less carbon due to mechanical treatments removing additional fuel which would not be burned.

Best Available Science

All of the research listed in the literature cited section is considered the best available science for this project. Site visitations to the project area, discussions with other professionals (fire, silviculturist, GIS, etc.), in addition to the comparative analysis and research has provided this document with the necessary background for scientific analysis.

Compliance with the Forest Plan and Other Regulatory Direction

This action responds to the goals and objectives outlined in the LRMP (1986). The desired conditions described above and the purpose and need for this project are consistent with the Forest's goals, the objectives found in chapter IV of the LRMP, and the Utah Fire Amendment (USFS 2001). The proposed treatment units are within management areas 2B – Rural and Roaded Natural Recreation; 4A – Fish Habitat Improvement; 4B – Habitat for Management Indicator Species; 5A – Big Game Winter Range - Non-forested; 6B – Intensive Livestock Management; 7B – Wood-Fiber Production - Genetics; and 9F – Improved. The relevant goals and objectives are listed below:

1. Ecosystems are restored and maintained, consistent with land uses and historic fire regimes, through wildland fire use and prescribed fire (Utah Fire Amendment, pg. A-40).
2. Manage forest cover types to provide variety in stand sizes shape, crown closure, edge contrast, age structure and interspersion (LRMP p. IV-99).
3. Prescribed fire is authorized forest-wide (Utah Fire Amendment, pg. A-41).
4. Use prescribed fire to reduce fuel buildup and meet resource objectives (LRMP p. IV-5).
5. Reduce hazardous fuels; the full range of reduction methods is authorized, consistent with forest and MA emphasis and direction (Utah Fire Amendment, pg. A-41).
6. Identify and improve habitat for sensitive, threatened, and endangered species including participation in recovery efforts for both plants and animals (LRMP IV-4).
7. Improve or maintain the quality of habitat on big game winter ranges (LRMP IV-4).
8. Maintain structural diversity of vegetation on management areas dominated by forested ecosystems (LRMP IV-11).
9. Manage aspen for retention where needed for wildlife, watershed, or esthetic purposes (LRMP IV-11).
10. Manage seral aspen stands for a diversity of age classes (LRMP IV-11).
11. Manage aspen to perpetuate the species and improve quality (LRMP IV-4).
12. Provide wood fiber while maintaining or improving other resource values LRMP IV-4).
13. Improve timber age class distribution and maintain species diversity (LRMP IV-4).
14. Manage tree stands using both commercial and noncommercial methods. Enhance visual quality, diversity, and insect and disease control (LRMP IV-62 and IV-84d).
15. Maintain and manage forested inclusions to provide a high level of forage production, wildlife habitat, and diversity (LRMP IV-112).
16. The area will have a mosaic of fully stocked stands that follow natural patterns and avoid straight lines and geometric shapes (LRMP IV-113).
17. Prevent and control insect infestation and disease (LRMP IV-5)

One goal of this project is to re-establish fire regimes to Monroe Mountain. Wildland fire is authorized forest-wide by the Utah Fire Amendment (A-41) under management area goal IV-3 (Diversity), except in the following areas:

1. Administrative sites;
2. Developed recreation sites;
3. Summer home sites;
4. Designated communication sites;
5. Oil and gas facilities;
6. Mining facilities;
7. Above-ground utility corridors; and,
8. High-use travel corridors.

The management response for these locations will be wildland fire suppression if they are threatened. In areas authorized for wildland fire use, the full range of management responses (from full suppression to monitoring of wildland fire activity) may be used. One goal is to increase the probability that future naturally caused fires can be managed (if possible, not suppressed) and allowed to play the greatest feasible natural role in the aspen ecosystems on Monroe Mountain (Utah Fire Plan 2001).

The District has also compared the action alternatives with the general direction and standards and guidelines listed in the LRMP to determine compliance, and found that the action alternatives are compliant with the general direction and standards and guidelines listed in the LRMP. This review, along with supporting rationale is found in the project record.

After this analysis was completed, an additional Northern goshawk nest with its associated territory (NA and PFA) was found in the Indian Peak area. Approximately 310 acres of the NA and PFA overlap this aspen project. These 310 acres occur mostly in stable aspen. These 310 acres make up less than 1% of the project area. If these 310 acres were not treated, there would be little impact to VSS and old growth.

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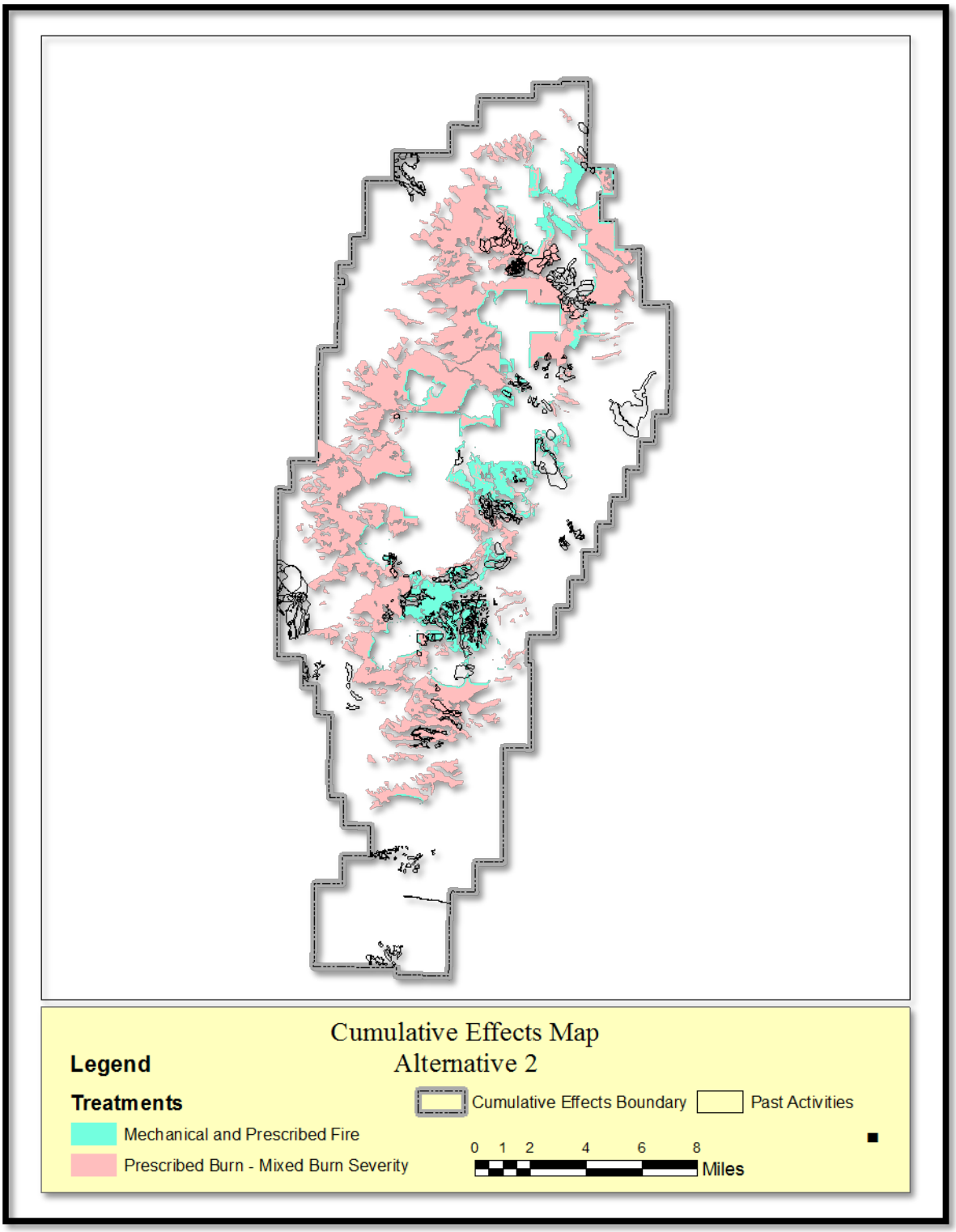
Appendix A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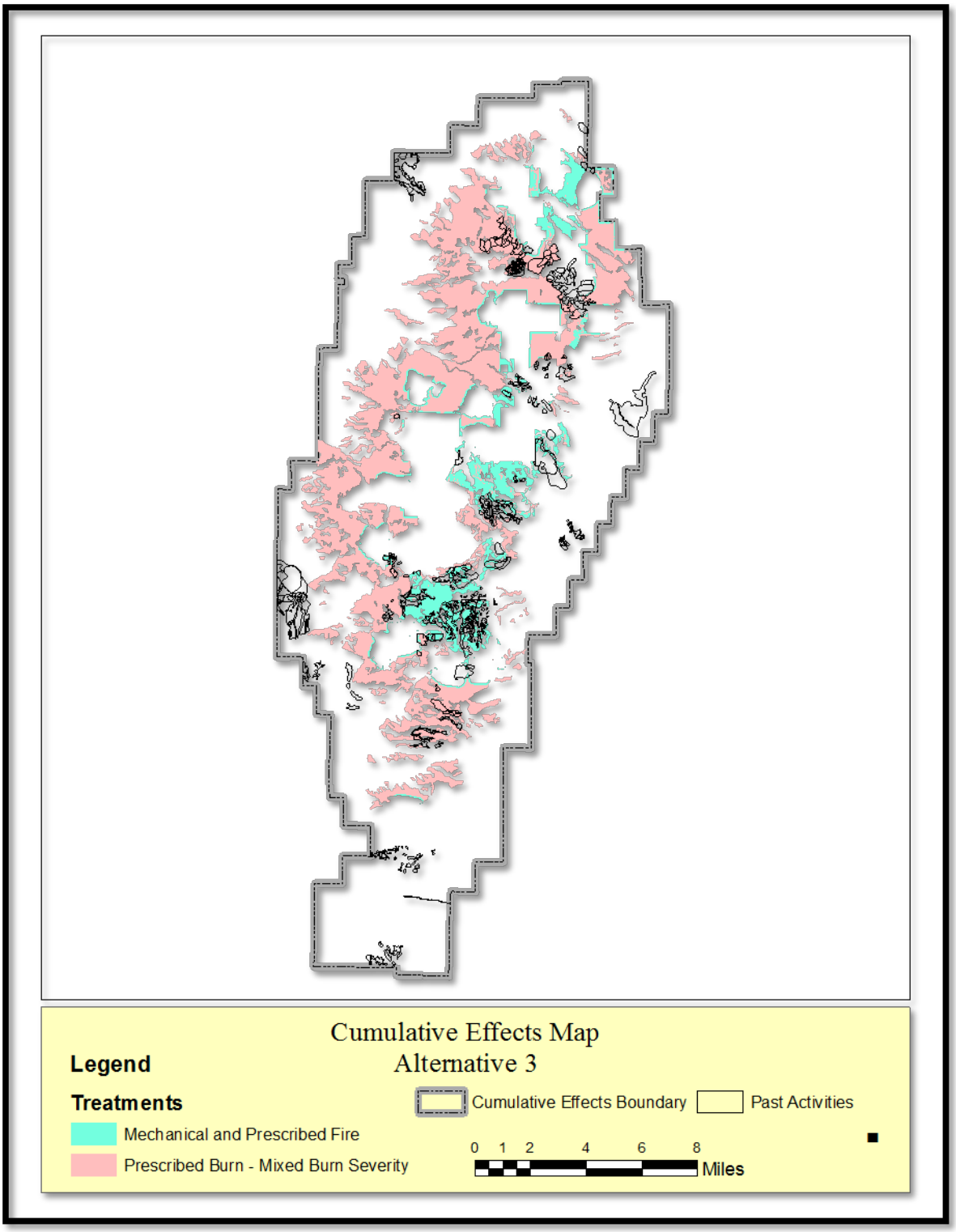
Legend
Treatments
Mechanical and Prescribed Fire
Prescribed Burn - Mixed Burn Severity
Cumulative Effects Boundary
Past Activities
0 1 2 4 6 8
Miles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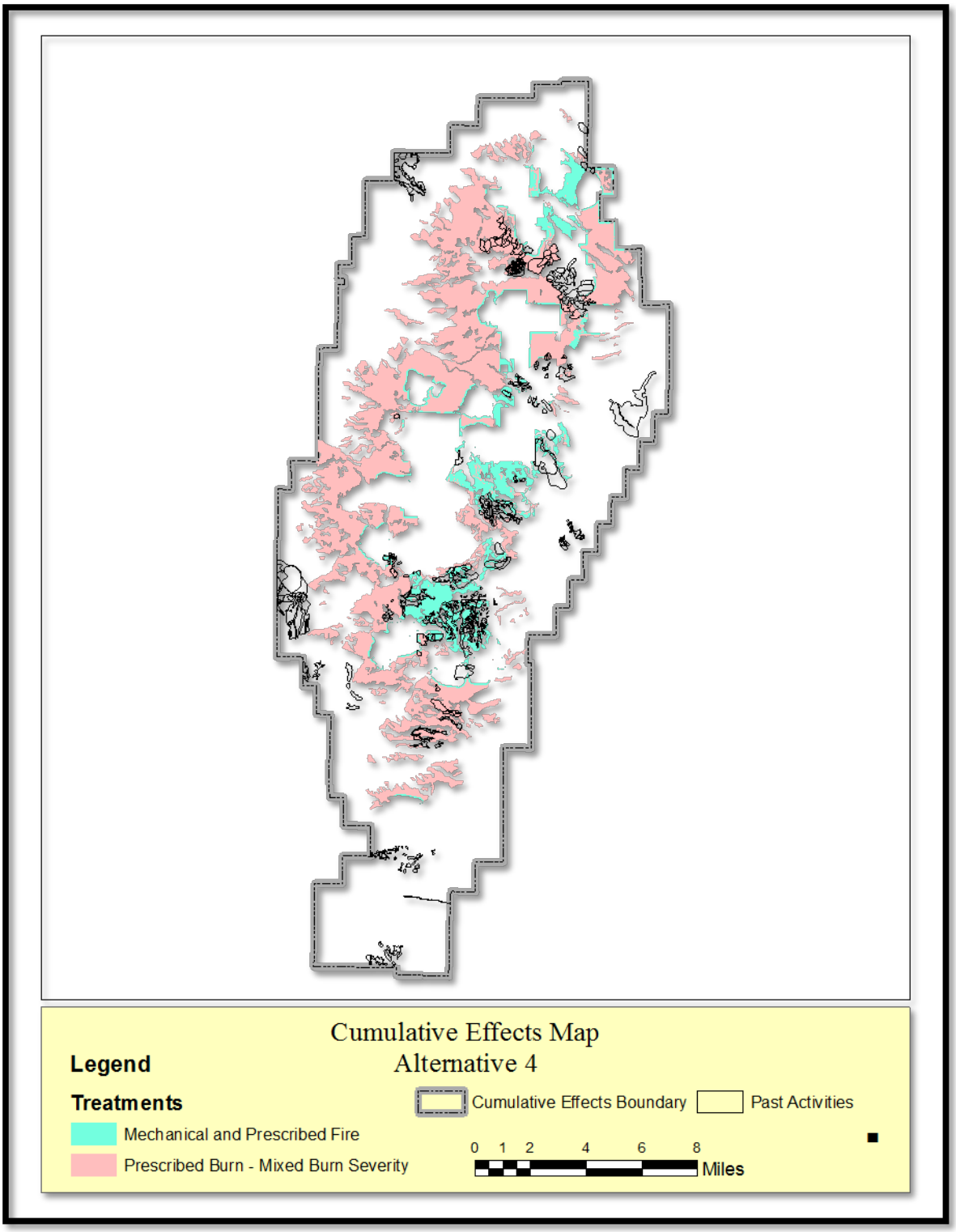
Treatments
Mechanical and Prescribed Fire
Prescribed Burn - Mixed Burn Severity
Cumulative Effects Boundary
Past Activities
0 1 2 4 6 8
Miles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Treatments
Mechanical and Prescribed Fire
Prescribed Burn - Mixed Burn Severity
Cumulative Effects Boundary
Past Activities
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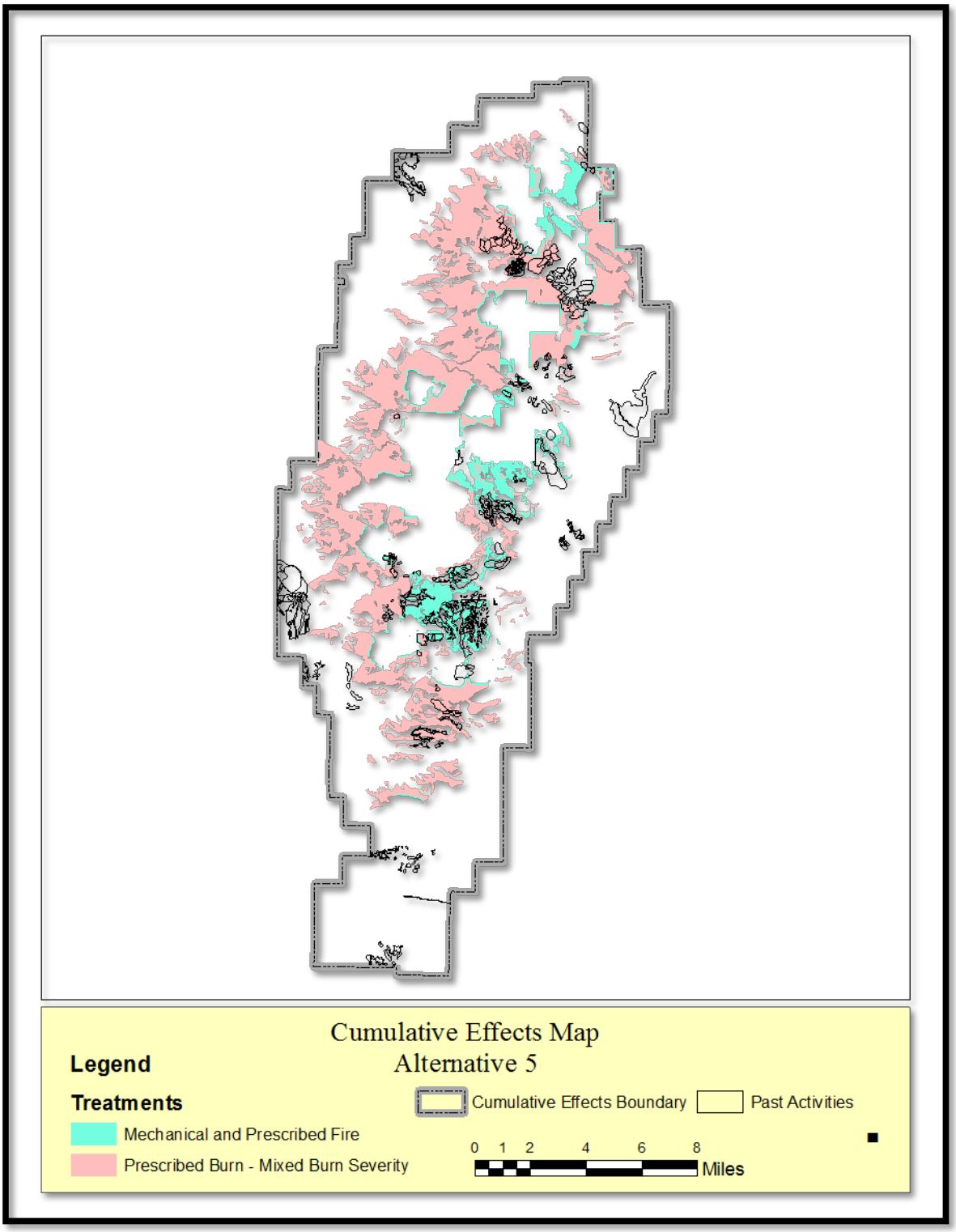
Miles


Cumulative Effects Map
Alternative 5
Legend
Treatments
Mechanical and Prescribed Fire
Prescribed Burn - Mixed Burn Severity
Cumulative Effects Boundary
Past Activities
0 1 2 4 6 8
Miles

Appendix B

0.03

Monroe Aspen- Alternative 1
FISHLAKE NATIONAL FOREST

PNV = ($178,500,501.19)

Interest Rate = 3 %

TOTAL DISCOUNTED POSITIVE EFFECTS = $0.00

TOTAL DISCOUNTED NEGATIVE EFFECTS = ($178,500,501.19)

POS/NEG EFFECT DESCRIPTION	BEG YR	END YR	# OF UNITS	POS/NEG EFFECT PER UNIT PER YEAR	TOTAL POS/NEG EFFECT PER YEAR	DISCOUNTED NEGATIVE EFFECTS	DISCOUNTED POSITIVE EFFECTS
---	--	--	---	---	---	---	---
Wildfire- Total project acres	1	10	4833.1	($4,323.00)	($20,893,491.30)	($178,225,718.76)	$0.00
NEPA	1	5	1	($60,000.00)	($60,000.00)	($274,782.43)	$0.00
	0	0	0	$0.00	$0.00	$0.00	$0.00
=	=	=	=	=	=	=	=
						($178,500,501.19)	$0.00
						PVC	PVB
						NEG EFFECTS	POS EFFECTS

Monroe Aspen- Alternative 2 Option 1
FISHLAKE NATIONAL FOREST

PNV = ($7,102,746.24)

Interest Rate = 3 %

TOTAL DISCOUNTED POSITIVE EFFECTS = $277,322.87
TOTAL DISCOUNTED NEGATIVE EFFECTS = ($7,380,069.11)

POS/NEG EFFECT DESCRIPTION	BEG YR	END YR	# OF UNITS	POS/NEG EFFECT PER UNIT PER YEAR	TOTAL POS/NEG EFFECT PER YEAR	DISCOUNTED NEGATIVE EFFECTS	DISCOUNTED POSITIVE EFFECTS
NEPA	1	5	1	($60,000.00)	($60,000.00)	($274,782.43)	$0.00
SALE PREPARATION- Acre	1	10	818.6	($126.50)	($103,552.90)	($883,327.24)	$0.00
HARVEST- Mixed Conifer- CCF	1	10	1247.8	$13.50	$16,845.30	$0.00	$143,693.83
HARVEST- Spruce-fir- CCF	1	10	580.2	$27.00	$15,665.40	$0.00	$133,629.04
HARVEST- Aspen- CCF	1	10	0	$1.00	$0.00	$0.00	$0.00
SALE ADMINISTRATION- Acre	2	12	818.6	($98.37)	($80,525.68)	($723,372.69)	$0.00
SLASH TREATMENT- 70% of total acreage	2	12	573	($56.19)	($32,196.87)	($289,228.68)	$0.00
ROAD MAINTENANCE- ccf/mile	2	12	207.7	($0.20)	($41.54)	($373.16)	$0.00
Pile Burning- 25% of Total Acres	2	12	204.7	($110.00)	($22,517.00)	($202,273.14)	$0.00
Temporary Road Construction	2	12	0.9	($5,000.00)	($4,500.00)	($40,424.09)	$0.00
Temporary Road Removal	4	14	0.9	($3,000.00)	($2,700.00)	($22,862.15)	$0.00
Prescribed Burn	2	12	1979.5	($278.00)	($550,301.00)	($4,943,425.54)	$0.00
=	=	=	=	=	=	=	=
						($7,380,069.11)	$277,322.87
						PVC	PVB
						NEG EFFECTS	POS EFFECTS

Monroe Aspen- Alternative 3 Option 1
FISHLAKE NATIONAL FOREST

PNV = ($8,203,437.39)

Interest Rate = 3 %

TOTAL DISCOUNTED POSITIVE EFFECTS = $534,539.19

TOTAL DISCOUNTED NEGATIVE EFFECTS = ($8,737,976.58)

POS/NEG EFFECT DESCRIPTION	BEG YR	END YR	# OF UNITS	POS/NEG EFFECT PER UNIT PER YEAR	TOTAL POS/NEG EFFECT PER YEAR	DISCOUNTED NEGATIVE EFFECTS	DISCOUNTED POSITIVE EFFECTS
NEPA	1	5	1	($60,000.00)	($60,000.00)	($274,782.43)	$0.00
SALE PREPARATION- Acre	1	10	1364.8	($126.50)	($172,647.20)	($1,472,715.64)	$0.00
HARVEST- Mixed Conifer- (ground based) CCF	1	10	2429.8	$13.50	$32,802.30	$0.00	$279,810.27
HARVEST- Spruce-fir- (ground based) CCF	1	10	1106	$27.00	$29,862.00	$0.00	$254,728.92
HARVEST- Mixed Conifer- (helicopter log) CCF	4	10	97.9	($125.00)	($12,237.50)	($69,773.23)	$0.00
HARVEST- Spruce-fir- (helicopter log)CCF	4	10	167.6	($125.00)	($20,950.00)	($119,448.34)	$0.00
HARVEST- Aspen- CCF	1	10	0	$1.00	$0.00	$0.00	$0.00
SLASH TREATMENT-70% of total Acres	2	12	955.4	($56.19)	($53,683.93)	($482,249.70)	$0.00
ROAD MAINTENANCE-CCF/Miles	2	12	639.7	($0.20)	($127.94)	($1,149.30)	$0.00
SALE ADMINISTRATION- Acre	2	12	1364.8	($98.37)	($134,255.38)	($1,206,033.52)	$0.00
Temporary Road Construction	2	12	0.9	($5,000.00)	($4,500.00)	($40,424.09)	$0.00
Temporary Road Removal	4	14	0.9	($3,000.00)	($2,700.00)	($22,862.15)	$0.00
Pile Burning- 25% of Total Acres	2	12	341.2	($110.00)	($37,532.00)	($337,154.84)	$0.00
Prescribed Burn	2	12	1881.4	($278.00)	($523,029.20)	($4,698,439.41)	$0.00
=	=	=	=	=	=	=	=
						($8,737,976.58)	$534,539.19
						PVC	PVB
						NEG EFFECTS	POS EFFECTS

Monroe Aspen- Alternative 4 Option 1
FISHLAKE NATIONAL FOREST

PNV = ($8,738,796.29)

Interest Rate = 3 %

TOTAL DISCOUNTED POSITIVE EFFECTS = $937,325.41

TOTAL DISCOUNTED NEGATIVE EFFECTS = ($9,676,121.70)

POS/NEG EFFECT DESCRIPTION	BEG YR	END YR	# OF UNITS	POS/NEG EFFECT PER UNIT PER YEAR	TOTAL POS/NEG EFFECT PER YEAR	DISCOUNTED NEGATIVE EFFECTS	DISCOUNTED POSITIVE EFFECTS
NEPA	1	5	1	($60,000.00)	($60,000.00)	($274,782.43)	$0.00
SALE PREPARATION- Acre	2	12	1983.7	($126.50)	($250,938.05)	($2,254,209.18)	$0.00
HARVEST- Mixed Conifer- CCF	2	12	3729.9	$13.50	$50,353.65	$0.00	$452,333.39
HARVEST- Spruce-fir- CCF	2	12	1999.6	$27.00	$53,989.20	$0.00	$484,992.01
HARVEST- ASPEN- CCF	2	12	0	$1.00	$0.00	$0.00	$0.00
SALE ADMINISTRATION- Acre	2	12	1983.7	($98.37)	($195,136.57)	($1,752,937.21)	$0.00
SLASH TREATMENT- 70% of total acreage	2	12	1388.6	($56.19)	($78,025.43)	($700,912.63)	$0.00
ROAD MAINTANENCE- CCF/Mile	2	12	430.8	($0.20)	($86.16)	($773.99)	$0.00
Temporary Road Construction	2	12	1.3	($5,000.00)	($6,500.00)	($58,390.35)	$0.00
Temporary Road Removal	4	14	1.3	($3,000.00)	($3,900.00)	($33,023.10)	$0.00
Pile Burning- 25% of Total Acres	2	12	495.9	($110.00)	($54,549.00)	($490,020.77)	$0.00
Prescribed Burn	2	12	1646.2	($278.00)	($457,643.60)	($4,111,072.05)	$0.00
=	=	=	=	=	=	=	=
						($9,676,121.70)	$937,325.41
						PVC	PVB
						NEG EFFECTS	POS EFFECTS

Monroe Aspen- Alternative 5 Option 1
FISHLAKE NATIONAL FOREST

PNV = ($7,683,219.46)

Interest Rate = 3 %

TOTAL DISCOUNTED POSITIVE EFFECTS = $664,972.17

TOTAL DISCOUNTED NEGATIVE EFFECTS = ($8,348,191.64)

POS/NEG EFFECT DESCRIPTION	BEG YR	END YR	# OF UNITS	POS/NEG EFFECT PER UNIT PER YEAR	TOTAL POS/NEG EFFECT PER YEAR	DISCOUNTED NEGATIVE EFFECTS	DISCOUNTED POSITIVE EFFECTS
NEPA	1	5	1	($60,000.00)	($60,000.00)	($274,782.43)	$0.00
SALE PREPARATION- Acre	2	12	1507.2	($114.95)	($173,252.64)	($1,556,351.02)	$0.00
HARVEST- CONIFERS- CCF	2	12	2650.5	$13.50	$35,781.75	$0.00	$321,432.12
HARVEST- CONIFERS- CCF	2	12	1416.4	$27.00	$38,242.80	$0.00	$343,540.05
HARVEST- ASPEN- CCF	2	4	0	$1.00	$0.00	$0.00	$0.00
SALE ADMINISTRATION- Acre	2	12	1507.2	($114.96)	($173,267.71)	($1,556,486.42)	$0.00
SLASH TREATMENT- 70% of total acreage	2	12	1055	($56.19)	($59,280.45)	($532,524.00)	$0.00
ROAD MAINTANENCE- CCF/Mile	2	12	317.7	($0.20)	($63.54)	($570.79)	$0.00
Temporary Road Construction	2	12	1.3	($5,000.00)	($6,500.00)	($58,390.35)	$0.00
Temporary Road Removal	4	14	1.3	($3,000.00)	($3,900.00)	($33,023.10)	$0.00
Pile Burning- 25% of Total Acres	2	12	376.8	($110.00)	($41,448.00)	($372,332.78)	$0.00
Prescribed Burn	2	12	1587.2	($278.00)	($441,241.60)	($3,963,730.75)	$0.00
=	=	=	=	=	=	=	=
						($8,348,191.64)	$664,972.17
						PVC	PVB
						NEG EFFECTS	POS EFFECTS

Monroe Aspen- Alternative 2 Option 2
FISHLAKE NATIONAL
FOREST

PNV = ($7,164,790.84)

Interest Rate = 3 %

TOTAL
DISCOUNTED
POSITIVE EFFECTS
= $215,195.27

TOTAL
DISCOUNTED
NEGATIVE EFFECTS
= ($7,379,986.10)

POS/NEG EFFECT DESCRIPTION	BEG YR	END YR	# OF UNITS	POS/NEG EFFECT PER UNIT PER YEAR	TOTAL POS/NEG EFFECT PER YEAR	DISCOUNTED NEGATIVE EFFECTS	DISCOUNTED POSITIVE EFFECTS
NEPA	1	5	1	($60,000.00)	($60,000.00)	($274,782.43)	$0.00
SALE PREPARATION- Acre	1	10	818.6	($126.50)	($103,552.90)	($883,327.24)	$0.00
HARVEST- Mixed Conifer- CCF	1	10	974.5	$13.50	$13,155.75	$0.00	$112,221.22
HARVEST- Spruce-fir- CCF	1	10	447.1	$27.00	$12,071.70	$0.00	$102,974.05
HARVEST- Aspen- CCF	1	10	0	$1.00	$0.00	$0.00	$0.00
SALE ADMINISTRATION- Acre	2	12	818.6	($98.37)	($80,525.68)	($723,372.69)	$0.00
SLASH TREATMENT- 70% of total acreage	2	12	573	($56.19)	($32,196.87)	($289,228.68)	$0.00
ROAD MAINTENANCE- ccf/mile	2	12	161.5	($0.20)	($32.30)	($290.16)	$0.00
Pile Burning- 25% of Total Acres	2	12	204.7	($110.00)	($22,517.00)	($202,273.14)	$0.00
Temporary Road Construction	2	12	0.9	($5,000.00)	($4,500.00)	($40,424.09)	$0.00
Temporary Road Removal	4	14	0.9	($3,000.00)	($2,700.00)	($22,862.15)	$0.00
Prescribed Burn	2	12	1979.5	($278.00)	($550,301.00)	($4,943,425.54)	$0.00
=	=	=	=	=	=	=	=
						($7,379,986.10)	$215,195.27
						PVC	PVB
						NEG EFFECTS	POS EFFECTS

Monroe Aspen- Alternative 3 Option 2
FISHLAKE NATIONAL
FOREST

PNV = ($9,610,538.18)

Interest Rate = 3 %

TOTAL DISCOUNTED POSITIVE EFFECTS = $333,991.99

TOTAL DISCOUNTED NEGATIVE EFFECTS = ($9,944,530.17)

POS/NEG EFFECT DESCRIPTION	BEG YR	END YR	# OF UNITS	POS/NEG EFFECT PER UNIT PER YEAR	TOTAL POS/NEG EFFECT PER YEAR	DISCOUNTED NEGATIVE EFFECTS	DISCOUNTED POSITIVE EFFECTS
NEPA	1	5	1	($60,000.00)	($60,000.00)	($274,782.43)	$0.00
SALE PREPARATION- Acre	1	10	1364.8	($126.50)	($172,647.20)	($1,472,715.64)	$0.00
HARVEST- Mixed Conifer- CCF	1	10	1396.3	$13.50	$18,850.05	$0.00	$160,794.75
HARVEST- Spruce-fir- CCF	1	10	752	$27.00	$20,304.00	$0.00	$173,197.24
HARVEST- Aspen- CCF	1	10	0	$1.00	$0.00	$0.00	$0.00
SALE ADMINISTRATION- Acre	2	12	1364.8	($114.96)	($156,897.41)	($1,409,429.85)	$0.00
SLASH TREATMENT-70% of total Acres	2	12	955.4	($56.19)	($53,683.93)	($482,249.70)	$0.00
ROAD MAINTENANCE-CCF/Miles	2	12	244.1	($0.20)	($48.82)	($438.56)	$0.00
SALE ADMINISTRATION- Acre	2	12	1364.8	($98.37)	($134,255.38)	($1,206,033.52)	$0.00
Temporary Road Construction	2	12	0.9	($5,000.00)	($4,500.00)	($40,424.09)	$0.00
Temporary Road Removal	4	14	0.9	($3,000.00)	($2,700.00)	($22,862.15)	$0.00
Pile Burning- 25% of Total Acres	2	12	341.2	($110.00)	($37,532.00)	($337,154.84)	$0.00
Prescribed Burn	2	12	1881.4	($278.00)	($523,029.20)	($4,698,439.41)	$0.00
=	=	=	=	=	=	=	=
						($9,944,530.17)	$333,991.99
						PVC	PVB
						NEG EFFECTS	POS EFFECTS

Monroe Aspen- Alternative 4 Option 2
FISHLAKE NATIONAL FOREST

PNV = ($9,185,987.29)

Interest Rate = 3 %

TOTAL DISCOUNTED POSITIVE EFFECTS = $489,758.01

TOTAL DISCOUNTED NEGATIVE EFFECTS = ($9,675,745.31)

POS/NEG EFFECT DESCRIPTION	BEG YR	END YR	# OF UNITS	POS/NEG EFFECT PER UNIT PER YEAR	TOTAL POS/NEG EFFECT PER YEAR	DISCOUNTED NEGATIVE EFFECTS	DISCOUNTED POSITIVE EFFECTS
NEPA	1	5	1	($60,000.00)	($60,000.00)	($274,782.43)	$0.00
SALE PREPARATION- Acre	2	12	1983.7	($126.50)	($250,938.05)	($2,254,209.18)	$0.00
HARVEST- Mixed Conifer- CCF	2	12	1848.9	$13.50	$24,960.15	$0.00	$224,220.28
HARVEST- Spruce-fir- CCF	2	12	1094.8	$27.00	$29,559.60	$0.00	$265,537.74
HARVEST- ASPEN- CCF	2	12	0	$1.00	$0.00	$0.00	$0.00
SALE ADMINISTRATION- Acre	2	12	1983.7	($98.37)	($195,136.57)	($1,752,937.21)	$0.00
SLASH TREATMENT- 70% of total acreage	2	12	1388.6	($56.19)	($78,025.43)	($700,912.63)	$0.00
ROAD MAINTANENCE- CCF/Mile	2	12	221.3	($0.20)	($44.26)	($397.59)	$0.00
Temporary Road Construction	2	12	1.3	($5,000.00)	($6,500.00)	($58,390.35)	$0.00
Temporary Road Removal	4	14	1.3	($3,000.00)	($3,900.00)	($33,023.10)	$0.00
Pile Burning- 25% of Total Acres	2	12	495.9	($110.00)	($54,549.00)	($490,020.77)	$0.00
Prescribed Burn	2	12	1646.2	($278.00)	($457,643.60)	($4,111,072.05)	$0.00
=	=	=	=	=	=	=	=
						($9,675,745.31)	$489,758.01
						PVC NEG EFFECTS	PVB POS EFFECTS

Monroe Aspen- Alternative 5 Option 2
FISHLAKE NATIONAL FOREST

PNV = ($8,016,509.67)

Interest Rate = 3 %

TOTAL DISCOUNTED POSITIVE EFFECTS = $331,388.57

TOTAL DISCOUNTED NEGATIVE EFFECTS = ($8,347,898.25)

POS/NEG EFFECT DESCRIPTION	BEG YR	END YR	# OF UNITS	POS/NEG EFFECT PER UNIT PER YEAR	TOTAL POS/NEG EFFECT PER YEAR	DISCOUNTED NEGATIVE EFFECTS	DISCOUNTED POSITIVE EFFECTS
NEPA	1	5	1	($60,000.00)	($60,000.00)	($274,782.43)	$0.00
SALE PREPARATION- Acre	2	12	1507.2	($114.95)	($173,252.64)	($1,556,351.02)	$0.00
HARVEST- Mixed Conifer- CCF	2	12	1219	$13.50	$16,456.50	$0.00	$147,830.88
HARVEST- Spruce- CCF	2	12	756.8	$27.00	$20,433.60	$0.00	$183,557.69
HARVEST- Aspen- CCF	2	4	0	$1.00	$0.00	$0.00	$0.00
SALE ADMINISTRATION- Acre	2	12	1507.2	($114.96)	($173,267.71)	($1,556,486.42)	$0.00
SLASH TREATMENT- 70% of total acreage	2	12	1055	($56.19)	($59,280.45)	($532,524.00)	$0.00
ROAD MAINTANENCE- CCF/Mile	2	12	154.4	($0.20)	($30.88)	($277.40)	$0.00
Temporary Road Construction	2	12	1.3	($5,000.00)	($6,500.00)	($58,390.35)	$0.00
Temporary Road Removal	4	14	1.3	($3,000.00)	($3,900.00)	($33,023.10)	$0.00
Pile Burning- 25% of Total Acres	2	12	376.8	($110.00)	($41,448.00)	($372,332.78)	$0.00
Prescribed Burn	2	12	1587.2	($278.00)	($441,241.60)	($3,963,730.75)	$0.00
=	=	=	=	=	=	=	=
						($8,347,898.25)	$331,388.57
						PVC	PVB
						NEG EFFECTS	POS EFFECTS

Appendix O – Monroe Mountain Aspen Ecosystems Restoration Project Visual Quality Specialist Report (Christensen 2015c)

Prepared by:

Dave A. Christensen
Fishlake Forest Recreation Specialist

For:

Richfield Ranger District
Fishlake National Forest

June 6, 2015

Executive Summary

The purpose of this project is to restore aspen ecosystems on the Monroe Mountain by achieving the desired conditions outlined in the Fishlake National Forest's Land and Resource Management Plan. The area affected by the proposal includes Monroe Mountain, located in south-central Utah, south of Richfield, west of Koosharem, and east of Marysvale, encompasses approximately 175,706 acres of National Forest lands administered by the Fishlake National Forest, Richfield Ranger District, and approximately 11,805 acres of private inholdings. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire because of an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. Restoring aspen communities on Monroe Mountain will result in multiple benefits.

This report considers potential effects to visual resources as a result of the no action and four action alternatives of the Monroe Mountain Aspen Ecosystems Restoration Project. Mechanical treatments would affect 5% to 11% of the project area. Prescribed fire would affect 15% to 19% of the project area. Stumps and burn piles would be noticeable as well as a charred landscape in the treated areas. Treatments would be completed in a mosaic pattern and would over time improve plant size, age and species diversity. Fire breaks and control lines would be feathered to appear natural. Stumps would be cut mostly flush with the ground. Tracked vehicles would be used for mechanical treatments and temporary roads would be reclaimed. The affects would quickly lessen as vegetation grows and would be the same or better than current conditions within three to five years. The Scenic Integrity Objective (SIO) designated as Moderate would remain slightly altered but still naturally appearing over time. Areas designated in the SIO of High would also be slightly altered yet would remain appearing unaltered over time.

Based upon my findings, I conclude the action alternatives would move conditions closer to desired conditions in all measures evaluated. All of the action alternatives (including mechanical options 1 & 2) comply with the Forest Plan in that forest resource uses or activities would meet Visual Quality Objectives (VQOs) or in this case Scenic Integrity Objectives (SIOs). Burning and mechanical treatments will enhance aspen ecosystems and over time maintain or improve visual resources.

No action would result in a much slower movement towards desired conditions and desired conditions would not be achieved in the foreseeable future. Visual resources would remain unchanged from the current condition.

Introduction

Monroe Mountain, located in south-central Utah, south of Richfield, west of Koosharem, and east of Marysvale, encompasses approximately 175,706 acres of National Forest lands administered by the Fishlake National Forest, Richfield Ranger District, and approximately 11,805 acres of private inholdings. Of these 175,706 acres, quaking aspen (*Populus tremuloides*) historically occurred on approximately 71,000 acres on Monroe Mountain. Soil survey information was used to estimate the historic occurrence of aspen. It is widely recognized that aspen ecosystems are capable of supporting one of the largest arrays of plant and animal species due to its high productivity and structural diversity. However, it is also widely recognized that aspen ecosystems have been in decline throughout the Intermountain West during the twentieth century.

On Monroe Mountain, unsustainable aspen ecosystem conditions include, but are not limited to, (1) conifer encroachment due to reduced fire, and (2) lack of recruitment due to domestic and wild browsing by cattle, sheep, elk, and deer. Absence of fire and overbrowsing has been identified by the District as the primary underlying causes for aspen ecosystems on Monroe Mountain being at risk. Aspen of 5 to 15 feet in height ("recruitment") are uncommon on Monroe Mountain, despite continued sprouting of aspen ("regeneration"). Due to high cost and continual maintenance, fencing is not a long-term sustainable response option for protecting aspen sprouts from overbrowsing, and does not address underlying causes of the lack of recruitment.

Aspen is a keystone species and historically was a landscape dominant on Monroe Mountain. Aspen ecosystems support the highest level of biodiversity for interior western forests and the productivity of aspen ecosystem understories (grass, forbs, and shrubs) is higher than all other forest types. Individual aspen trees arise almost exclusively from root suckers and are relatively short-lived (i.e. 100 to 200 years). Aspen is shade intolerant and sprouts heavily following disturbance, such as fire, and benefits from disturbance especially where conifer currently shades and competes with aspen. Mechanical treatments can also be an effective disturbance tool for aspen restoration.

Regulatory Framework

The National Environmental Policy Act of 1969 (NEPA) states that it is the "continuing responsibility of the federal government to use all practicable means to assure for all Americans, aesthetically and culturally pleasing surroundings." NEPA 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."

The National Forest Management Act of 1976 directs that the preservation of aesthetic values be analyzed at all planning levels.

Preliminary visual analysis was undertaken utilizing the 1974 Visual Management System (VMS) for portions of the Fishlake National Forest. However, a comprehensive visual quality inventory was never fully completed for subsequent approval and formal adoption.

The Forest Service has begun to use a newer (1995) Scenery Management System (SMS), which is in varying stages or processes of implementation throughout our National Forests. Under the Scenery Management System, Scenic Integrity Objectives (SIOs) are assigned to areas of the Forest by employing a systematic determination much as that used in establishing Visual Quality Objectives (VQOs) for the initial Visual Management System (VMS). These SIOs or levels of deviation from valued landscape character are clearly intended to flexibly serve as objectives or goals by which to more sustainably manage visual quality. The Fishlake National Forest has completed the inventory process of developing SIOs (both existing and desired condition) for all of the lands it manages. This determination for management of the scenery resource is consistent with any available visual inventories undertaken pursuant to the Fishlake National Forest Land and Resource Management Plan (LRMP) (1986).

Methodology for Analysis

The methodology comes from the preliminary visual analysis using the 1974 Visual Management System (VMS) and the more current inventory process using the 1995 Scenery Management System (SMS).

Resource Issues and Purpose and Need

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions described below and in the EIS. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire because of an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. Restoring aspen communities on Monroe Mountain will result in multiple benefits, which include but are not limited to:

- Improving and increasing the amount of habitat for wildlife species dependent upon aspen ecosystems (i.e., mule deer, elk, and Northern goshawk);
- Improving and increasing the amount of habitat and forage for domestic ungulates (i.e., cattle and sheep);
- Improving native species diversity;
- Reducing hazardous fuel accumulations;
- Reducing the risk for large-scale, intense wildland fires. This results in lower risk to the safety of the public and firefighters. This also results in lower risk to sensitive wildlife species (i.e. Northern goshawk, Western Boreal toad *(Bufo boreas*), and Bonneville cutthroat trout (*Oncorhynchus clarki utah*)); and,
- Increasing the probability that future naturally caused fires can be managed (if possible, not suppressed) and allowed to play the greatest feasible natural role in the aspen ecosystems on Monroe Mountain (Utah Fire Plan 2001).

The interdisciplinary team reviewed the scoping comments from public individuals, interest groups, local governments, and other agencies, to develop a list of issues to address. The issues were separated into two groups: key and non-key issues. Key issues were defined as those directly or indirectly caused by implementing the proposed action. Non-key issues were identified as those: (1) Addressed through LRMP or implementation of LRMP standards and guidelines and best management practices; (2) Addressed through implementation of project-specific mitigation measures/design criteria; (3) Addressed during processes or analyses routinely

conducted by an interdisciplinary team; (4) Addressed through spatial location of activities during alternative design; (5) Beyond the scope of the project; or (6) general comment. The Council on Environmental Quality (CEQ) NEPA regulations explain these delineations in Sec. 1501.7, "…identify, and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-key issues and reasons regarding their categorization as non-significant is in the project record. Following are the key issues identified by the public and used to focus the analysis or drive alternative development.

Key Issues:

- Impacts to wilderness attributes and roadless area characteristics resulting from mechanical treatments within inventoried roadless areas and draft unroaded-undeveloped areas may result in these areas not being eligible for wilderness designation.
- Prescribed fire activities may impact adjacent private property.
- Project activities may result in Northern goshawks being displaced.
- Project activities may result in Bonneville cutthroat trout and Boreal toad habitat being severely degraded.
- Browsing by domestic and wild ungulates on new aspen sprouts post-treatment and/or the continued high levels of aspen browsing in the stable aspen areas may result in complete loss of aspen stands.
- Project activities may result in livestock permittees not having a place to graze their livestock while vegetation is reestablishing on Monroe Mountain (2 or more growing seasons).
- Project activities may result in adverse impacts old growth characteristics.

Overview of the Proposed Action

The action proposed by the District to meet the purpose and need is to conduct a combination of prescribed fire and/or mechanical thinning treatments in stable and seral aspen stands, and spruce/fir and mixed conifer stands to promote the regeneration and recruitment of aspen communities. Some stands currently dominated by spruce/fir and mixed conifer may have been dominated by aspen at some point in the past. Aspen occurs in varying percentages in spruce/fir, mixed conifer, and seral aspen dominated stands. Treating spruce/fir, mixed conifer, and aspen stands would reduce competition for resources, and encourage aspen to regenerate.

The proposed action is similar for all of the alternatives. What vary within the alternatives are the acreages of mechanical thinning verses the acreages of prescribed fire that would be treated depending on the issues, and the mileage of temporary roads proposed for each alternative. The treatment options proposed for the project area are: (1) areas would be mechanically thinned with the associated slash piled and burned, and (2) areas would receive prescribed fire treatments (see chapter 2 of the EIS for detailed descriptions of these treatment options and each alternative).

Addressing the reduced occurrence of wildland fire due to an increase in wildland fire suppression on Monroe Mountain is critical to the long-term restoration of aspen ecosystems. The average fire return intervals for each of the vegetation cover types occurring on Monroe Mountain can be found in chapter 1 of the EIS. This table also shows that the maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen,

spruce/fir, and mixed conifer is 47,274 acres (alternative 4). However, the management guidelines for Northern goshawk require leaving 40 percent interlocking crowns in foraging areas. To be compliant with the guidelines, prescribed burning would only occur when 60 percent of the prescribed fire area is expected to burn. This would leave 40 percent of the area with interlocking crowns intact. As for the areas proposed for mechanical treatments, by removing just conifer, thinning to a Basal Area of 90, and/or removing conifer trees up to 8 inch DBH, using group and singletree selection, desiring uneven-aged management, and proposing minimal mechanical treatments in the stable aspen stands, 40 percent of the area with interlocking crowns would also remain intact in the mechanical treatment areas. Therefore, the maximum area proposed for mechanical and prescribed fire treatments on Monroe Mountain for aspen, spruce/fir, and mixed conifer (assuming only 60 percent of the prescribed fire treatment areas are burned) is 36,300 acres (alternative 4). The approximate duration of this project is 10 years; therefore, approximately 18,150 acres would be mechanically treated and/or prescribed burned every 5 years. This number is well within the Forest Service recommended range of area to treat within a 5-year period of 5,000 to 24,000 acres (see chapter 2 of the EIS for a detailed description of the proposed action and alternatives).

Mechanical thinning and prescribed fire treatments are proposed within five Inventoried Roadless Areas (IRAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore) and within five draft Unroaded-Undeveloped Areas (UUAs) (Langdon, Little Creek, Marysvale Peak, Signal Peak, and Tibadore). No roads would be constructed within IRAs. Temporary roads would be constructed in treatment areas located outside of the IRAs (for all alternatives) including within draft UUAs (see alternatives 4 and 5). The mileage for these temporary roads varies depending on the alternative (see chapter 2 of the EIS for specific road locations, mileage, and specifications). In addition, temporary fencing would be installed around Manning Meadows Reservoir and Barney Lake (see chapter 2 of the EIS for fencing locations, mileage, and specifications).

No active treatments are proposed within the sagebrush cover-type where scattered aspen trees and stands occur in portions of the sagebrush communities. These areas are expected to improve through passive restoration (i.e., by trying to allow naturally ignited fires to burn, and changing grazing and browsing management). See chapter 2 of the EIS for a detailed description of the District’s proposal to address overbrowsing of aspen.

Affected Environment

Scenery is an important natural resource on the Monroe Mountain and, as is the case with other resources, must be cared for and managed for future generations. The scenic resource varies by location and is largely influenced by existing natural features including vegetation, water, landforms, and geology. It is primarily through their visual sense that most visitors perceive the Forest and its interrelated components. Scenic forest settings contribute much too recreational experiences. Benefits derived from scenic settings include identity, self-image of communities and individuals, and enhanced quality of life. Sight-seeing, driving for pleasure and outdoor photography are among the nation’s leading recreational activities and demand for them will continue.

Scenic Integrity is a continuum ranging over five levels of integrity from very high to very low. Corresponding levels of existing scenic conditions and visual quality levels from the original Visual Management System have been crosswalked (see table 1 below) to assist in familiarity of understanding and comparative analysis.

The term Scenic Integrity Objective (SIO), or its counterpart, Visual Quality Objective (VQO) refers the degree of acceptable visual alteration of the landscape and is defined as a desired level of scenic excellence based on both physical and sociological characteristics of an area. Typically, more stringent SIOs or VQOs are incorporated to protect the most highly visible and frequently seen areas that have the greatest amount of variety in vegetation and other naturally occurring features.

Although inherently subjective, these long-term objectives or goals based on a large-scale visual inventory as defined in either the old Visual Management System (VMS) or the newer Scenery Management System (SMS) framework can facilitate the attainment of subtle, yet very important aesthetic goals, while balancing other equally important resource needs.

For more information please refer the SIO and VQO crosswalk in Table 1.

Table 1: Scenic Integrity Objective (SIO) Visual Quality Objective (VQO) Crosswalk

Scenic Integrity Objective - SIO	Visual Quality Objective - VQO
VERY HIGH scenic integrity refers to landscapes where the valued landscape character is intact with only minute if any deviations. The existing landscape character and sense of place is expressed at the highest possible level. *(unaltered)*	***PRESERVATION***. Allows for ecological changes only. Management activities, except for very low visual impact recreation facilities, are prohibited.
HIGH scenic integrity refers to landscapes where the valued landscape character appears intact. Deviations may be present but must repeat the form, line color, texture, and pattern common to the landscape character so completely and at such a scale that they are not evident. *(appears unaltered)*	***RETENTION***. Management activities may only repeat the form, line, color, and texture frequently found in the characteristic landscape. Changes should not be evident to the casual forest visitor, and all retention activities to restore the area to a naturally appearing condition should be accomplished either during the operation or immediately after. *(visitors to the Forest should not notice the management activity)*
MODERATE scenic integrity refers to landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed. *(slightly altered)*	***PARTIAL RETENTION.*** Management activities remain visually subordinate to the characteristic landscape. Management activities should repeat form, line, color, or texture common to the characteristic landscape, but structures can introduce form, line, color, or texture that are found infrequently or not at all in the characteristic landscape. Reduction in form, line, color, and texture to meet Partial Retention should be accomplished as soon after project completion as possible, or at a minimum, within the first year. *(any management activity must be blended into the landscape so as to attract little attention)*
LOW refers to landscapes where the valued landscape character appears moderately altered. Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed but compatible or complimentary to the character within. *(moderately altered)*	***MODIFICATION.*** Management activities may visually dominate the original characteristic landscape. However, activities involving vegetative and landform alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type. Additional parts of these activities such as structures and roads must remain visually subordinate to the proposed composition. *(this broad objective allows for most forms of management activity including those such as structures which are more visually obtrusive, provided they are designed to fit the context of the natural surroundings at all viewing distances)*
VERY LOW refers to landscapes where the valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles outside the landscape being viewed. However deviations must be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition. *(heavily altered)*	***MAXIMUM MODIFICATION.*** Management activities of vegetative and landform alterations may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or middleground, they may not appear to completely borrow from naturally established form, line, color, or texture. Alterations may also be out of scale or contain detail, which is incongruent with natural occurrences as seen in foreground or middleground. (*This yet broader objective is similar to Modification except that as with structures, vegetative and landform alterations can be obvious in foreground or middleground views. In background, however, these changes must fit aesthetically with the natural surroundings)*

Additionally, it is helpful to define some related terms:

> ***SEEN AREA.*** The total landscape area observed based upon landform screening. Seen areas may be divided into zones of immediate foreground, middleground, and background. Some landscapes are seldom seen by the public.
>
> ***DISTANCE ZONES.*** Areas of landscapes (foreground, middleground, or background) denoted by specific distances from the observer. Used as a frame of reference in which to discuss landscape characteristics or activities of humans.
>
> ***FOREGROUND.*** The detailed landscape typically found within zero to one-fourth through one-half mile of the observer.
>
> ***MIDDLEGROUND.*** This is the space between the foreground and middleground in a viewed landscape. The area usually located one-fourth through one-half to three through five miles from the observer.
>
> ***BACKGROUND.*** This is the distant part of a landscape or surroundings, especially that behind something that provides harmony or contrast. It is usually located three to five miles from the observer.
>
> ***SCENIC INTEGRITY.*** This is a measure of the degree to which a landscape is visually perceived to be complete. In other words, it indicates the degree of intactness and wholeness of the landscape character. Human alterations can sometimes raise or maintain integrity. More often it is lowered depending on the degree of deviation from the character valued for its aesthetic appeal.

Management Direction in the Fishlake National Forest's existing LRMP, when describing a desired condition to be achieved sometime in the future, states that Forest resource uses or activities should meet Visual Quality Objectives. And in further general direction, that reaching this goal is to be facilitated by applying the Visual Management System to all national Forest System lands.

Accordingly, preliminary visual analysis was undertaken utilizing the 1974 Visual Management System (VMS) for portions of the Fishlake National Forest. However, a comprehensive visual quality inventory was never fully completed for subsequent approval and formal adoption.

More recently, the Forest Service has begun to use a newer 1995 Scenery Management System (SMS), which is in varying stages or processes of implementation throughout our National Forests. This continually evolving SMS is designed to be more consistent with far-sighted ecosystem management principles in which societal influence plays a vital role. Under this newer Scenery Management System, Scenic Integrity Objectives are assigned to areas of the Forest by employing a systematic determination much as that used in establishing Visual Quality Objectives for the initial Visual Management System. Although these newer SIOs are similar in definition to earlier VQOs, their function or management use will differ. These new Scenic Integrity Objectives or levels of deviation from valued landscape character are clearly intended to flexibly serve as objectives or goals by which to more sustainably manage visual quality.

The Fishlake National Forest has completed the inventory process of developing SIOs (both existing and desired condition) for all of the lands it manages. This determination for

management of the scenery resource is consistent with any available visual inventories undertaken pursuant to the Fishlake National Forest LRMP (1986).

Generally, the existing condition of the present scenery on the Monroe Mountain is in pretty good shape when collectively comparing how natural it appears to the amount and types of human alterations present. Although, in parts of the mountain, evidence of human modification in the form of vegetative manipulation (e.g., fuel treatment) or development (e.g., structures, roads, trails, fences and gates) can be apparent. These man-made elements are not typically perceived by the casual Forest visitor to be visually dominant. In other words, relative to overall scenic integrity, the Monroe Mountain landscape has a reasonably high degree of intactness.

Particularly when viewed from the perspective of Forest-wide scale, the SIOs as assigned on the Draft Scenic Integrity Map (Map 1), which would serve as parameters for future management of this visual resource, are not noticeably different in degree of change or alteration from the existing condition. The project area (Monroe Mountain) is mapped in the SIOs of about 65% Moderate and 35% High.

Visual sensitivity usually varies along any travel corridor. The project area is viewed in the foreground and middleground from the main Monroe Mountain Road #068, Monroe Canyon Road #078, Manning Meadows Road #083, Big Flat Road #070, Dry Creek Road #071 and Pole Canyon Road #072. The project area is viewed mostly in the background from Interstate 70, Highway 24 and State Road 62.

Views from areas of concentrated recreation use (both dispersed and developed) outside of these travel corridors are also important to those who may be fishing, camping, riding or hiking on scenic trails or enjoying the view from their cabin window. Sites of this type are near Big Lake, Koosharem Guard Station, Monrovian Park, and Manning Meadows. Views of the Forest from adjacent communities such as Richfield, Annabella, Monroe, Marysvale, Koosharem and Greenwich also need to be considered.

In summary, viewsheds associated with nearby communities, important tourist destinations, well-traveled roads and popular recreation trails, and recreation sites can have high visual value. Forest System lands on the Monroe Mountain are characterized by spacious mountainous terrain and include beautiful landscapes, panoramic ridge and valley views (some with lakes or reservoirs), and abundant wildlife viewing opportunities; resulting in very diverse, yet accessible scenery.

It should be noted that in the short term there may be needed activities or resource uses that produce impacts not meeting planned SIOs, yet through appropriate mitigation/design criteria can remain reasonable in effect and may even facilitate a higher level of scenic quality in the long term. This is congruent with the primary context of the newer Scenery Management System which is designed to be consistent with more far-sighted ecosystem management principles and provide for balance in managing all Forest resources. SIO definitions of High and Moderate are given to help with understanding the current draft Scenic Integrity Objectives shown on Map 1.

HIGH scenic integrity refers to landscapes where the valued landscape character appears intact. Deviations may be present but must repeat the form, line color, texture, and pattern common to the landscape character so completely and at such a scale that they are not evident. *(appears unaltered)*

MODERATE scenic integrity refers to landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed. *(slightly altered)*

Map 1: Monroe Mountain Current Draft Scenic Integrity Objectives

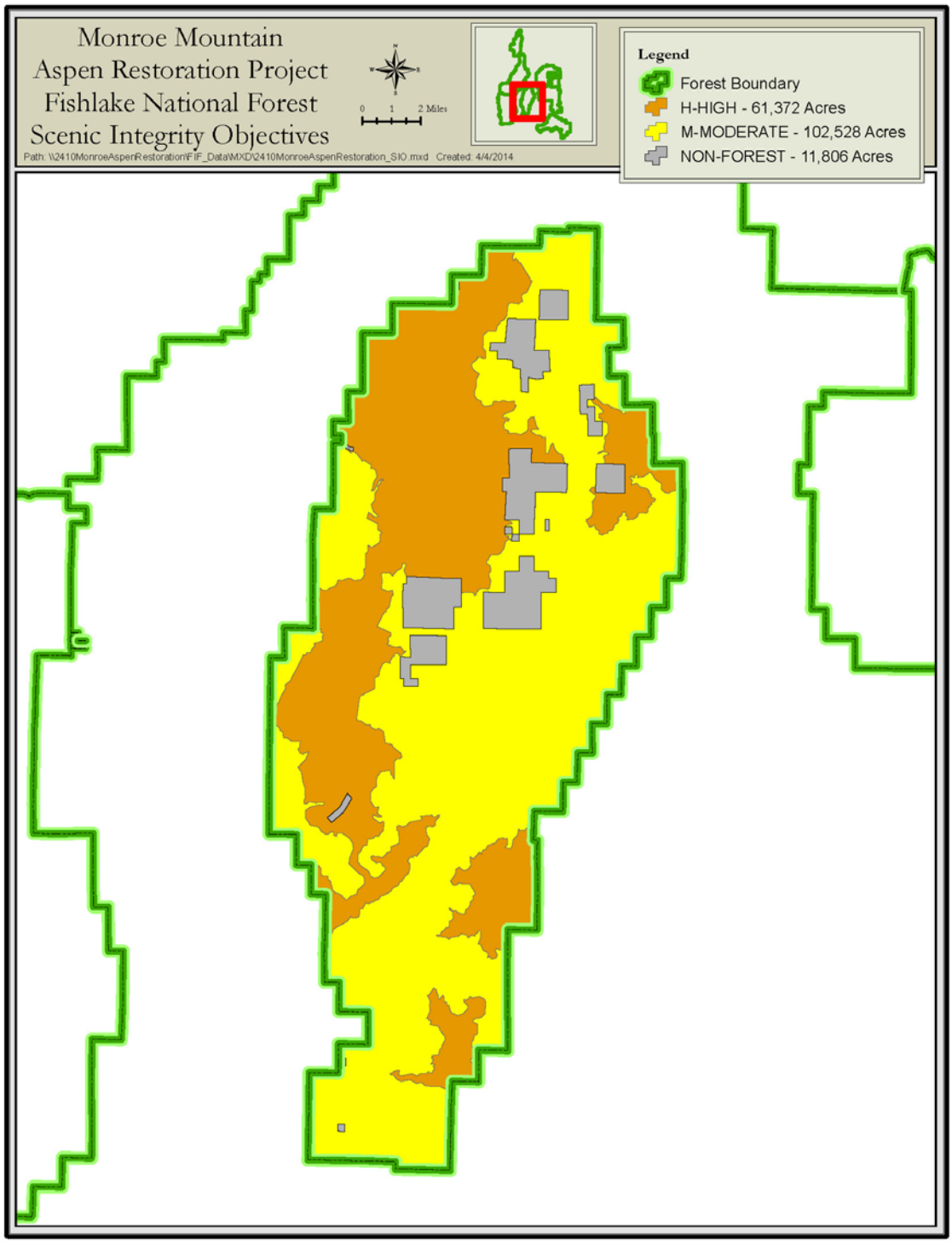


Table 2: Affects to Scenic Integrity by Alternative

	No Action Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Mechanical Treatments	0 acres of mechanical treatment	8,186 acres of mechanical treatments with slash burning or 5% of the project area.	13,647 acres of mechanical treatments with slash burning or 8% of the project area.	19,838 acres of mechanical treatments with slash burning or 11% of the project area.	15,072 acres of mechanical treatments with slash burning or 9% of the project area.
Prescribed Fire	0 acres of prescribed burn	32,991 acres of prescribed burn with mixed burn severities or 19% of the project area.	31,357 acres of prescribed burn with mixed burn severities or 18% of the project area.	27,436 acres of prescribed burn with mixed burn severities or 16% of the project area.	26,453 acres of prescribed burn with mixed burn severities or 15% of the project area.
Other Information	No mechanical treatments or prescribed fire are proposed. Only wildfire would occur; with the potential for large uncharacteristic fire and damage to private land	Stumps and burn piles would be noticeable as well as a charred landscape. Treatments would be completed in a mosaic pattern and would improve plant size, age and species diversity. Fire breaks and control lines would be feathered to appear natural. Tracked vehicles would be used for mechanical treatments and temporary roads would be reclaimed. The affects would quickly lessen as vegetation grows and would be the same or better than current conditions within 3 to 5 years. See Specialist reports.			
Scenic Integrity Objectives (SIOs)	The Scenic Integrity Objectives (SIOs) would remain the same.	The Scenic Integrity Objective (SIO) in Moderate would remain slightly altered but still naturally appearing over time. In High the SIO would also be slightly altered yet would remain appearing unaltered over time.			

Cumulative Effects for All Alternatives

Past, present and reasonable foreseeable actions (See EIS for a list of the actions) on the Monroe Mountain were reviewed to determine the cumulative effects to visual resources. Impacts from natural events, human activities, and forest management activities have created the current Scenic Integrity Objectives of High and Moderate. Implementation of the action alternatives and reasonably foreseeable actions would not permanently lower the current visual resources (SIOs).

Desired Condition

The desired condition as stated in the Forest Plan is that Forest resource uses or activities would meet Visual Quality Objectives. Therefore, visual resources on the Monroe Mountain would maintain or improve the existing situation of being either slightly altered (Moderate) or appearing unaltered (High). Burning and mechanical treatments would enhance aspen ecosystems and over time maintain or possibly improve visual resources.

Conclusions

This report considers how mechanical treatments and prescribed fire would affect visual resources, now and in the future. This would apply to the four action alternatives. Mechanical treatments would affect 5% to 11% of the project area. Prescribed fire would affect 15% to 19% of the project area. Stumps and burn piles would be noticeable as well as a charred landscape in the treated areas. Treatments would be completed in a mosaic pattern and would over time improve plant size, age and species diversity. Fire breaks and control lines would be feathered to appear natural. Trees would be cut as close to the ground as possible. Tracked vehicles would be used for mechanical treatments and temporary roads would be reclaimed. The affects would quickly lessen as vegetation grows and would be the same or better than current conditions within three to five years. The Scenic Integrity Objective (SIO) designated as Moderate would remain slightly altered but still naturally appearing over time. Areas designated in the SIO of High would also be slightly altered yet would remain appearing unaltered over time.

Based upon my findings, I conclude the action alternatives (including mechanical options 1 & 2) would move conditions closer to desired conditions in all measures evaluated. All of the action alternatives comply with the Forest Plan in that forest resource uses or activities should meet Visual Quality Objectives (VQOs) or in this case Scenic Integrity Objectives (SIOs). Burning and mechanical treatments will enhance aspen ecosystems and over time maintain or improve visual resources.

No action would result in a much slower movement towards desired conditions and desired conditions would not be achieved in the foreseeable future. Visual resources would remain unchanged from the current condition.

Compliance with the Forest Plan and Other Regulatory Direction

A comprehensive visual quality inventory was never fully completed for subsequent approval and formal adoption in the Fishlake National Forest Land and Resource Management Plan. The Fishlake National Forest has completed the inventory process of developing SIOs (both existing and desired condition) for all of the lands it manages. This determination for management of the scenery resource is consistent with any available visual inventories undertaken pursuant to the Fishlake National Forest LRMP (1986). All of the action alternatives comply with the Forest Plan in that forest resource uses or activities should meet Visual Quality Objectives (VQOs) or in this case Scenic Integrity Objectives (SIOs).

As described in chapter 1 of the EIS, the desired conditions and the purpose and need for this project are consistent with the Forest’s goals, the objectives found in chapter IV of the Land and Resource Management Plan (LRMP), and the Utah Fire Amendment (USFS 2001). The District

has also compared the action alternatives with the general direction and the standards and guidelines listed in the LRMP to determine compliance, and found that the action alternatives are compliant with the LRMP. This review, along with supporting rationale is found in the project record.

Literature Cited

USDA, Forest Service, 1974, National Forest Landscape Management, Volume 2, Chapter 1, Agriculture Handbook 462, Washington DC

USDA, Forest Service, 1986, Land and Resource Management Plan for the Fishlake National Forest, Richfield, Utah.

USDA, Forest Service, 1995, Landscape Aesthetics: A Handbook for Scenery Management, Agriculture Handbook 701, Washington DC

Appendix P – Monroe Mountain Aspen Ecosystems Restoration Project Wildlife Specialist Report (Rasmussen 2015)

Prepared by:

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Fishlake Forest Wildlife Biologist

For:

Richfield Ranger District
Fishlake National Forest

June 27, 2015

Introduction

This wildlife report for the Monroe Mountain Aspen Ecosystems Restoration Project will present an introduction to the project area, proposed treatment actions, differences in non-action and action alternatives, wildlife species listed as Threatened, Endangered, Sensitive, Candidate, Management Indicator Species, and whether there are issues that warrant further analysis. Analysis for species will result in a final determination of "affect" or "no affect" with the appropriate determination of protection or mitigation to the species and/or their associated habitat.

Proposed Actions and Affected Environment

Seral and Stable Aspen Stands – Proposed Mechanical Treatment Methods

There are two mechanical treatment options being considered in this analysis for seral and stable aspen stands (Photos 1 to 9; Appendix A in EIS) (Tables 1 & 2):

1. This option would occur throughout the project area. Conifers would be removed and the existing aspen would be retained regardless of the size of the conifer or if it is located within an IRA or draft UUA. (Photos 2, 5 and 8; Appendix A in EIS). To access the conifer, some incidental cutting of aspen may occur.
2. Within IRAs and draft UUAs, conifer would be thinned from below up to 8 inch DBH and the existing aspen would be retained (photos 3, 6 and 9; Appendix A in EIS). In all areas outside the IRAs and draft UUAs, treatments would occur as in option 1 for seral and stable aspen.

Spruce/Fir and Mixed Conifer Stands – Proposed Mechanical Treatment Methods

There are also two mechanical treatments options being considered in this analysis for spruce/fir and mixed conifer stands (photos 10 thru 18; Appendix A in EIS) (Tables 1 & 2):

1. This option would occur throughout the project area. If present, beetle killed conifer trees would be removed by salvage while ensuring consistency with the LRMP for snags and down woody debris. If conifer trees are currently infected by beetles and are in the process of dying, the infected trees would be removed (sanitation) while ensuring consistency with the LRMP for snags and down woody debris. In areas of spruce/fir where LRMP stocking levels are below plan guidance due to bark beetle impacts, replanting of spruce may occur. The remaining live trees would be thinned using uneven aged management to a basal area (BA) of 90 with single and group tree selection. If no beetle killed or infested trees are present initially, trees would be thinned

using uneven aged management to a BA of 90 with single and group tree selection (photos 11, 14, and 17; Appendix A in EIS).

2. Within IRAs and draft UUAs, conifer would be thinned from below up to 8 inch DBH (photos 12, 15 and 18; Appendix A in EIS). In all areas outside the IRAs and draft UUAs, treatments would occur as in option 1 for spruce/fir and mixed conifer.

Table 1: Option 1--Mechanical treatments with associated slash burning for seral and stable aspen, spruce/fir, and mixed conifer dominated

	Existing Vegetation	Mechanical and Associated Slash Burning
Alternative 2	Seral Aspen	3,146
	Stable Aspen	4,025
	Spruce/Fir	918
	Mixed Conifer	97
	Total	8,186
Alternative 3	Seral Aspen	6,422
	Stable Aspen	4,780
	Spruce/Fir	2,355
	Mixed Conifer	91
	Total	13,648
Alternative 4	Seral Aspen	9,492
	Stable Aspen	6,130
	Spruce/Fir	4,113
	Mixed Conifer	102
	Total	19,837
Alternative 5	Seral Aspen	6,736
	Stable Aspen	5,340
	Spruce/Fir	2,905
	Mixed Conifer	92
	Total	15,073

Table 2: Option 2--Mechanical treatments with associated slash burning for seral and stable aspen, spruce/fir, and mixed conifer dominated stands

	Existing Vegetation	Mechanical and Associated Slash Burning (Acres Outside IRAs and UUAs)	Mechanical and Associated Slash Burning (Acres Inside IRAs and UUAs)	Project Total
Alternative 2	Seral Aspen	2,349	797	3,146
	Stable Aspen	3,643	382	4,025
	Spruce/Fir	472	446	918
	Mixed Conifer	89	8	97
	Total	6,553	1,633	8,186
Alternative 3	Seral Aspen	3,111	3,311	6,422
	Stable Aspen	3,965	815	4,780
	Spruce/Fir	835	1,520	2,355
	Mixed Conifer	90	1	91
	Total	8,001	5,647	13,648
Alternative 4	Seral Aspen	3,991	5,501	9,492
	Stable Aspen	4,196	1,934	6,130
	Spruce/Fir	1,186	2,927	4,113
	Mixed Conifer	91	11	102
	Total	9,464	10,373	19,837
Alternative 5	Seral Aspen	2,547	4,189	6,736
	Stable Aspen	3,830	1,510	5,340
	Spruce/Fir	984	1,921	2,905
	Mixed Conifer	91	1	92
	Total	7,452	7,621	15,073

Proposed Prescribed Fire Treatments

Prescribed fire would be implemented utilizing aerial and/or hand ignition techniques targeting spruce/fir, mixed conifer, and seral aspen with mosaic burn patterns and mixed burn severities as an objective. To maintain LRMP compliance, prescribed fire would occur when 60 percent of the area would be expected to burn (Table 3).

Mechanical treatments and prescribed fire are the tools of choice for this proposed project. Each treatment will affect wildlife species in different ways. In some cases it will be beneficial short term and long-term while in other cases impacts that affect wildlife populations in the short term will benefit them in the long-term. Mechanical treatments can be applied surgically on the ground to meet habitat objectives and design feature criteria. Prescribed fire has the potential to meet many of the same goals and objectives; however, it carries with it the inherit risk of escape from planned boundaries thus changing the effects to habitat features and wildlife impacts.

Options 1 and 2 have differences in acres treated according to the current condition of the stands or within boundaries of roadless designation or consideration. The impacts and effects to avian and mammalian species will be relative to the amount of acres treated in each scenario. The analysis by species that follows in this document will look at the effects to each species of concern recognized by the U.S. Forest Service Region 4 and/or the Fishlake National Forest.

Table 3: Proposed prescribed fire treatments

	Existing Vegetation	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire - Mixed Burn Severities Factoring 60% of the Acres Get Burned
Alternative 2	Seral Aspen	15,159	9,095
	Stable Aspen	7,991	4,795
	Spruce-Fir	5,658	3,395
	Mixed Conifer	4,183	2,510
	Total	32,991	19,795
Alternative 3	Seral Aspen	14,318	8,591
	Stable Aspen	7,861	4,716
	Spruce-Fir	4,988	2,993
	Mixed Conifer	4,190	2,514
	Total	31,357	18,814
Alternative 4	Seral Aspen	12,763	7,658
	Stable Aspen	6,693	4,016
	Spruce-Fir	3,802	2,281
	Mixed Conifer	4,178	2,507
	Total	27,436	16,462
Alternative 5	Seral Aspen	11,676	7,006
	Stable Aspen	6,777	4,066
	Spruce-Fir	3,810	2,286
	Mixed Conifer	4,190	2,514
	Total	26,453	15,872

Species Addressed

Threatened, Endangered, and Candidate species potentially occurring in the project area were identified through a review of the March 2013 species list. Forest Service Intermountain Region Sensitive Species potentially occurring in the project area were obtained from the most recent Regional Forester's list (Regional Forester's Sensitive Species List 2013). Table 4 provides a comprehensive list of Federally-listed, Sensitive Species, Management Indicator Species and Candidate species on the Fishlake National Forest and identifies species carried forward in the analysis based on known occurrences or the presence of suitable habitat in the project area.

Table 4: List of Threatened (T), Endangered (E), Sensitive (S), Management Indicator Species (MIS) and Candidate (C) Species.

SPECIES Scientific Name	STATUS	SUITABLE HABITAT	HABITAT UNSUITABILITY BASED ON:	SPECIES TO BE ANALYZED FURTHER Y OR N
Utah Prairie Dog *Cynomys parvidens*	T	No	Short-grass prairie type preferred by prairie dogs does not occur in the project area. No prairie dog colonies	No
California Condor (4) *Gymnogyps californianus*	E	No	Project area lacks the rock cliff habitat preferred by California condors. Trees are present for perching.	Yes
Bighorn Sheep *Ovis Canadensis*	S	No	Contiguous acres of cliff face habitat lacking.	No
Bald Eagle *Haliaeetus leucocephalus*	S	Yes	Bald eagles migrate to the project area during the winter (Nov-Mar). Habitat used by eagles is found in the project area, but individuals are only present during the winter months only.	Yes
Northern Goshawk *Accipiter gentilis*	Sensitive, MIS & Migratory Bird Species	Yes	Spruce, mixed conifer and aspen dominated stands containing variable sized mid-aged to mature trees that are near a permanent water source is found in the project area.	Yes
Pygmy Rabbit	S	No	Tall, dense sagebrush habitat below 8500 feet elevation is not	No

Brachylagus idahoensis			present within the project area.	
Greater Sage Grouse *Centrocercus urophasianus*	S	Yes	Suitable Sage grouse habitat is found in the analysis area. Sagebrush is not a targeted vegetation species for treatment in this project.	Yes
Townsend's Big-eared Bat *Corynorhinus townsendii*	S	Yes	Streams, springs, bogs, and lake foraging habitat is found in the project area.	Yes
Spotted Bat *Euderma maculatum*	S	Yes	Sagebrush, wetlands, and forested foraging habitat are found in the project area.	Yes
Peregrine Falcon *Falco peregrinus anatum*	Sensitive & Migratory Bird Species	No	The project area doesn't contain the steep cliffs and rocky ledges needed for nesting or the open country for foraging.	No
Three-toed woodpecker *Picoides tridactylus*	S	Yes	Forested areas used by Three-toed woodpecker are mainly mature spruce forested areas. Spruce forested areas occur in the project area.	Yes
Flammulated Owl *Otus flammeolus*	S	Yes	Forested acres used by Flammulated owls on Monroe Mt. are Douglas fir/spruce mix. The project area contains a scattered Douglas fir component.	Yes
Rocky Mountain Elk *Cervus elaphus*	MIS	Yes	Diverse cover and forage components create ideal summer and transition range for elk within the proposed project boundary.	Yes
Mule Deer *Odocolius*	MIS	Yes	Diverse cover and forage components create ideal summer	Yes

hemionus			and transition range for deer within the proposed project boundary.	
Hairy Woodpecker Western Bluebird Mountain Bluebird Williamson's sapsucker	MIS (Fishlake NF Cavity Nester Group)	Yes	Forested areas containing conifer, mixed conifer and aspen offer cavity making and nesting opportunity within the project area.	Yes
Lincoln's Sparrow Yellow Warbler MacGillivray's Warbler Song Sparrow	MIS (Fishlake NF Riparian Group)	Yes	Riparian, lakes, streams, seeps and bogs exist within the project area. This creates riparian habitat for this selected group.	Yes
Brewer's Sparrow Sage Thrasher Vesper Sparrow	MIS (Fishlake NF Sage Nester Group)	Yes	Acres of sagebrush habitat are found within the CEA but not the proposed forested treatment areas. Traffic associated with the proposed project would pass through suitable sage nester habitat.	Yes
Migratory Birds	MIS	Yes	A diverse variety of habitat for migratory birds exists throughout the project area. Grasses, mountain brush, aspen, mixed conifer and conifer host a variety of migratory birds in the project area.	Yes
Yellow-billed Cuckoo	C	No	Riparian habitat of cottonwood and willow below 6500 feet are not found within the project area.	No

T=Threatened, E=Endangered, S=Sensitive, C=Candidate, MIS=Management Indicator Species.

Assessment Methodology

The techniques and methodologies used in this analysis are considered the best available science. The analysis includes a summary of the credible scientific evidence which is relevant to evaluating reasonably foreseeable impacts. The analysis also identifies methods used and references scientific sources relied on. The conclusions are based on the scientific analysis that shows a thorough review of relevant scientific information, and the acknowledgment of incomplete or unavailable information, scientific uncertainty, and risk.

The elements of science used are:

- On-site data and history. District records and the corporate GIS database were reviewed for sightings and potentially suitable habitat for select Sensitive and MIS species.
- Elk: Utah Division of Wildlife Resources (UDWR), United States Forest Service (USFS), and Bureau of Land Management (BLM) have conducted a cooperative effort to gather data for elk populations on Monroe Mountain. Elk trend data has been gathered for the unit by ground transects and aerial census. Vehicle (ground transects) are conducted annually and the aerial census is conducted on an every 3 year rotation (in project record). Aerial census is accomplished with a helicopter using an intensive search method on winter range areas. The UDWR has made a conscience effort to invite livestock permittees, sportsman representatives, county commissioners, USFS, BLM, private land owners, etc. on the flights to witness the methodology of the flight census. GPS records of flight paths and observation points are recorded and final data are entered into a database. Data from each flight are entered into UDWR's population model to determine an estimated population for the unit. These data are used to determine population goals for the unit that include measures to comply with the cooperative Monroe Mountain Elk Plan as well has hunt strategies. Knowledge of seasonal elk use and migration patterns have been established through a telemetry study conducted in the early 90s. Current data is being gathered via telemetry from elk that share the Dutton and Monroe units.
- Deer: UDWR, USFS, and BLM have conducted a cooperative effort to gather data for deer populations on Monroe Mountain. Deer trend data has been gathered on an annual basis by vehicle transect method cooperatively since the early 80s. Data prior to the early 80s was gathered by UDWR. Data is gathered post hunting season and during the rut period for deer (Greenwood 2014). This method allows a full representation of deer in the population in a given area because bucks of all ages are involved in the rutting part of the life cycle for deer. Transects were established on winter and transition range routes around the Monroe Mountain unit. Data is recorded and used for planning various population dynamics. The data are used to determine population goals for the unit that include measures to comply with the cooperative Monroe Mountain Deer Plan as well has hunt strategies. Currently, an intensive deer-predation study is being conducted on Monroe Mountain to help managers better understand the role of predators on yearling does and newly born fawns. The study is a cooperative effort between Utah Division of Wildlife Resources (UDWR), Brigham Young University (BYU), Utah State University (USU), United States Forest Service (USFS), Bureau of Land Management (BLM), volunteers, conservation groups, and others.
- Goshawk— a variety of methods have been used to search for and locate Northern Goshawk Territories on the Richfield Ranger District. Methods have included Region 4 protocol goshawk surveys for proposed projects, aerial helicopter surveys in suitable habitat (winter months), monitoring existing territories annually, and reporting of nests randomly located by public or survey contractors for other projects. Known nest and alternate nests have been GPS recorded and GIS mapped. Territorial boundaries were established by the District Wildlife Biologist working with the Geographic Information Systems (GIS) shop. Boundaries are drawn according to aerial photo maps using best

judgment of forested areas around the nest areas that may be used by goshawk adults and their young. These boundaries are in no way absolute but are a good representation of suitable territorial habitat. As alternate nests and new territories are found the GIS data base and District wildlife data base records are updated at the end of each field season.

- Neo-tropical migratory birds—Data gathering for avian species were accomplished through walking and driving transect. Established routes have been surveyed on a regular basis since the Burnt Flat Analysis Project (BFAP) was proposed in 1993 (Monroe Mountain). Random point bird counts were established as well for the BFAP. Bird data are also collected along general wildlife survey routes as well as during protocol goshawk survey routes. Avian data were gathered by well experienced birders working for the Richfield Ranger District (RRD).
- Flammulated Owl—Data gathered for Flammulated owl was established throughout the project area on designated routes in suitable habitat. Night surveys during the early summer months using protocol calling methods helped establish a presence of owls and a preferred habitat type on Monroe Mountain. Data points of call responses were GPS recorded and entered into GIS for future analysis. Areas of preferred habitat have been noted and a GIS data base is being established to reference preferred habitat by Flammulated owls.
- Three-toed Woodpecker-- Bird data were collected along general wildlife survey routes as well as during protocol goshawk routes in proposed treatment units. This species was identified and documented as well as its preferred habitat type (Hill 2002). Through years of survey work in the spruce zone on Monroe Mountain we have seen an increase of Three-toed woodpecker use during a spruce bark beetle outbreak. Three-toed woodpeckers continue to remain in the beetle ravaged areas.
- Bats—Bat data were collected with an electronic “Anabat” device. Data was recorded in the proposed project area. Data was retrieved and analyzed at the end of the 2014 field season.
- Scientific literature. Literature reviewed and cited is listed in the Literature Citations section and included within the Life History paper (Rodriguez 2008).
- Professional knowledge, judgment and experience. The primary specialist that conducted this analysis was Kreig Rasmussen, Richfield Ranger District Wildlife Biologist (23 years). Expert birder, Richard Wilkinson has worked summers for approximately 20 years to survey and record bird species around the Richfield Ranger District. Other wildlife technicians have worked several consecutive years on the RRD and helped enhance the collective database. The collective professional knowledge of the project area, judgment of how to integrate science with local conditions and the experience gained from implementation of other projects have been incorporated into the analysis.

Vegetation Classification and the Size-Density Model

Stand exams were conducted in the proposed project area to gather forest data such as, canopy, tree species, tree size, tree density, snags, down woody debris, Vegetation Structural Stages (VSS) and other information. Approximately ten percent of the entire grouping of stands were examined and represent the proposed project as a whole. The Forester for the Richfield Ranger District has conducted random stand exam data throughout the project area and has analyzed the

data. He provides the following narrative that describes the current average VSS class of the project area, future potential and prospective responses to treatment options in the proposed treatment areas.

Table 5: Current and Desired Vegetative Structural Stages (VSS) for Aspen, Mixed Conifer and Spruce/Fir Stands.

		VSS 1: Grass-Forb/Shrub (DBH: 0-1 inch)			VSS 2: Seedling-Sapling (DBH: 1-5 inches")			VSS 3: Young Forest (DBH: 5-12 inches)		
		Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
Current Condition	Aspen: Stable Stands	19%	24%	22%	6%	36%	23%	40%	63%	50%
	Aspen: Seral Stands	0%	18%	13%	5%	47%	15%	37%	82%	58%
	Mixed Conifer Stands	8%	17%	13%	5%	37%	20%	24%	52%	42%
	Spruce/Fir Stands	4%	20%	13%	7%	26%	16%	23%	63%	41%
Desired Condition	All Stands	****	****	10%	****	****	10%	****	****	20%
		VSS 4: Mid-Aged Forest (DBH: 12-18 inches)			VSS 5: Mature Forest (DBH: 18-24 inches)			VSS 6: Old Forest (DBH: 24 plus inches)		
		Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
Current Condition	Aspen: Stable Stands	0%	11%	5%	0%	0%	0%	0%	0%	0%
	Aspen: Seral Stands	0%	32%	13%	0%	5%	1%	0%	5%	0%
	Mixed Conifer Stands	6%	43%	19%	2%	6%	4%	0%	5%	2%
	Spruce/Fir Stands	4%	31%	21%	0%	14%	6%	0%	13%	2%
Desired Condition	All Stands	****	****	20%	****	****	20%	****	****	20%

The VSS as it is applied to Monroe Mountain describes the project area as being primarily in VSS 1, 2, and 3, while the desired condition for stable and seral aspen, mixed conifer and spruce/fir stands for VSS 4, 5, and 6 are not being achieved.

Analysis Area

The area analyzed for direct and indirect effects to TES wildlife species includes the aspen, mixed conifer, and spruce/fir areas described in the range of alternatives (1-5) (Figure 1). The survey area includes the areas described in the range of alternatives (1-5). The project Analysis Area (AA) used for this wildlife report is the cumulative acres of forested vegetation found on Monroe Mountain that covers the range of alternatives and is 67,750 acres (Figure 1 and Figure 5). The cumulative effects area (CEA) for this project has been determined to be lands within the Monroe Mountain forest boundary (175,706 acres, see section 5). Since wildlife respect no

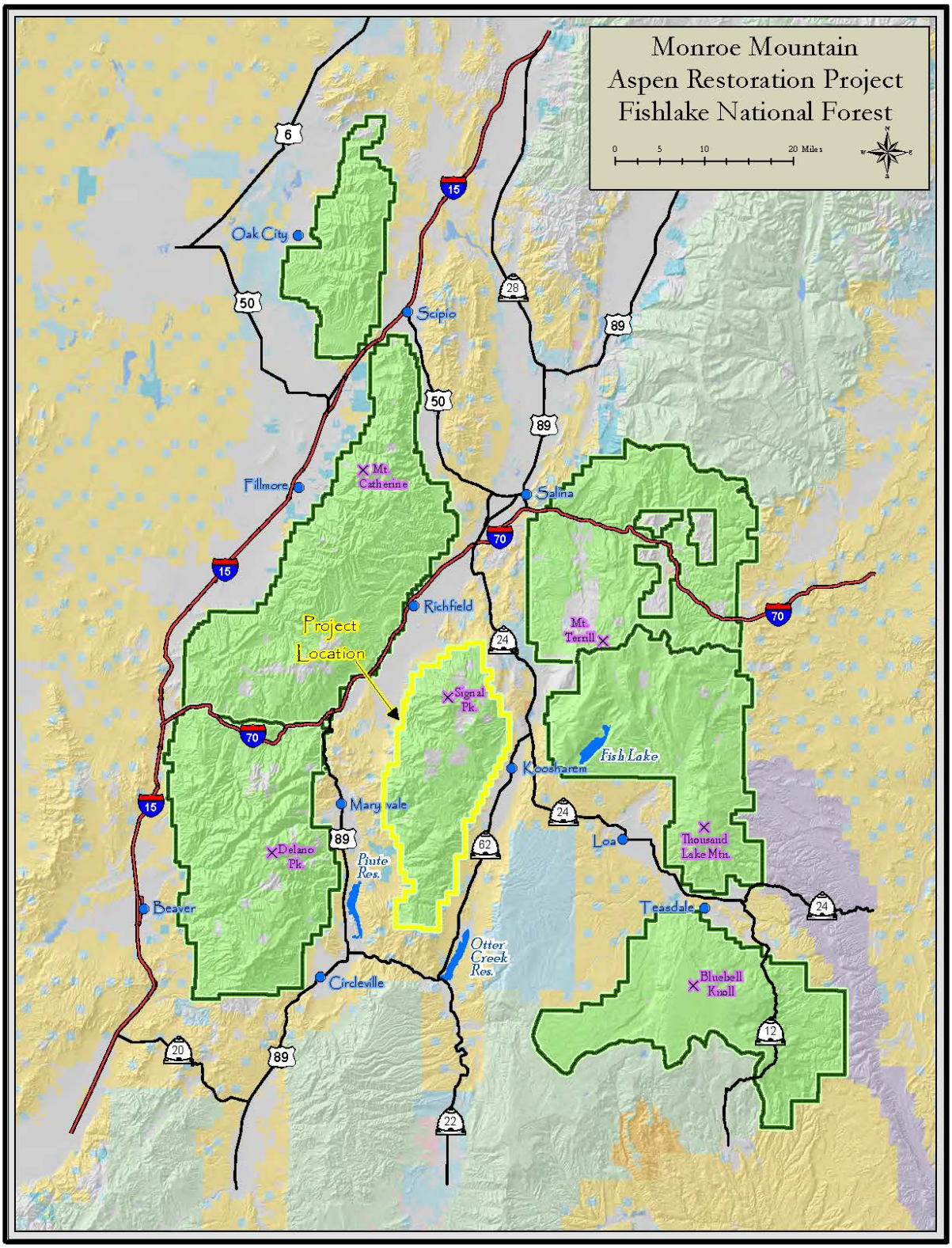

Figure 1: Project Vicinity Map

human imposed boundaries, private land, and any state lands will be included in the total acreage of the CEA.

Project Area, Background and Historic Conditions

Monroe Mountain, located in south-central Utah, south of Richfield, west of Koosharem, east of Marysvale and north east of Circleville, encompasses approximately 175,706 acres of National Forest lands administered by the Fishlake National Forest, Richfield Ranger District, and approximately 11,805 acres of private inholdings.

Of these 175,706 acres, quaking aspen (*Populus tremuloides*) historically occurred on approximately 71,000 acres on Monroe Mountain (Figure 2). Soil survey information was used to estimate the historic occurrence of aspen. It is widely recognized that aspen ecosystems are capable of supporting one of the largest arrays of plant and animal species due to its high productivity and structural diversity. However, it is also widely recognized that aspen ecosystems have been in decline throughout the Intermountain West during the 20th century (UFRWG 2010).

On Monroe Mountain, unsustainable aspen ecosystem conditions include, but are not limited to,

1. On Monroe Mountain, unsustainable aspen ecosystem conditions include, but are not limited to, Conifer encroachment due to a reduced occurrence of wildland fire primarily because of an increase in wildland fire suppression; and,
2. Lack of aspen recruitment due to domestic and wild browsing by cattle, sheep, elk, and deer.

Reduced occurrences of wildland fire primarily due to an increase in wildland fire suppression, and overbrowsing by domestic and wild browsers have been identified by the District as the primary underlying causes for aspen ecosystems on Monroe Mountain being at risk. Aspen of 5 to 15 feet in height (“recruitment”) are uncommon on Monroe Mountain, despite continued sprouting of aspen (“regeneration”). Due to high cost and continual maintenance, fencing is not a long-term sustainable response option for protecting aspen sprouts from overbrowsing, and does not address underlying causes of the lack of recruitment.

Aspen is a keystone species and historically was a landscape dominant on Monroe Mountain. Aspen ecosystems support the highest level of biodiversity for interior western forests and the productivity of aspen ecosystem understories (grass, forbs, and shrubs) is higher than all other forest types. Individual aspen trees arise almost exclusively from root suckers and are relatively short-lived (i.e. 100 to 200 years). Aspen is shade intolerant and sprouts heavily following disturbance, such as fire, and benefits from disturbance especially where conifer currently shades and competes with aspen. Mechanical treatments are an effective disturbance tool for aspen restoration.

One of the main concerns that currently exist on Monroe Mountain is the quantity of grazing and browsing ungulates and the carrying capacity of forage available. The success of an aspen

restoration project on Monroe Mountain would be relative to the amount of ungulate use on the regeneration of aspen following treatments. Ungulates of concern are cattle, sheep, deer and elk.

Few records exist indicating the number of mule deer (*Odocolius hemionus*) that were present on Monroe Mountain prior to the 1930s. Deer Animal Use Months (AUMs) in Figure 3 and Table 6 are rough estimates between the 1930s and 1970s.

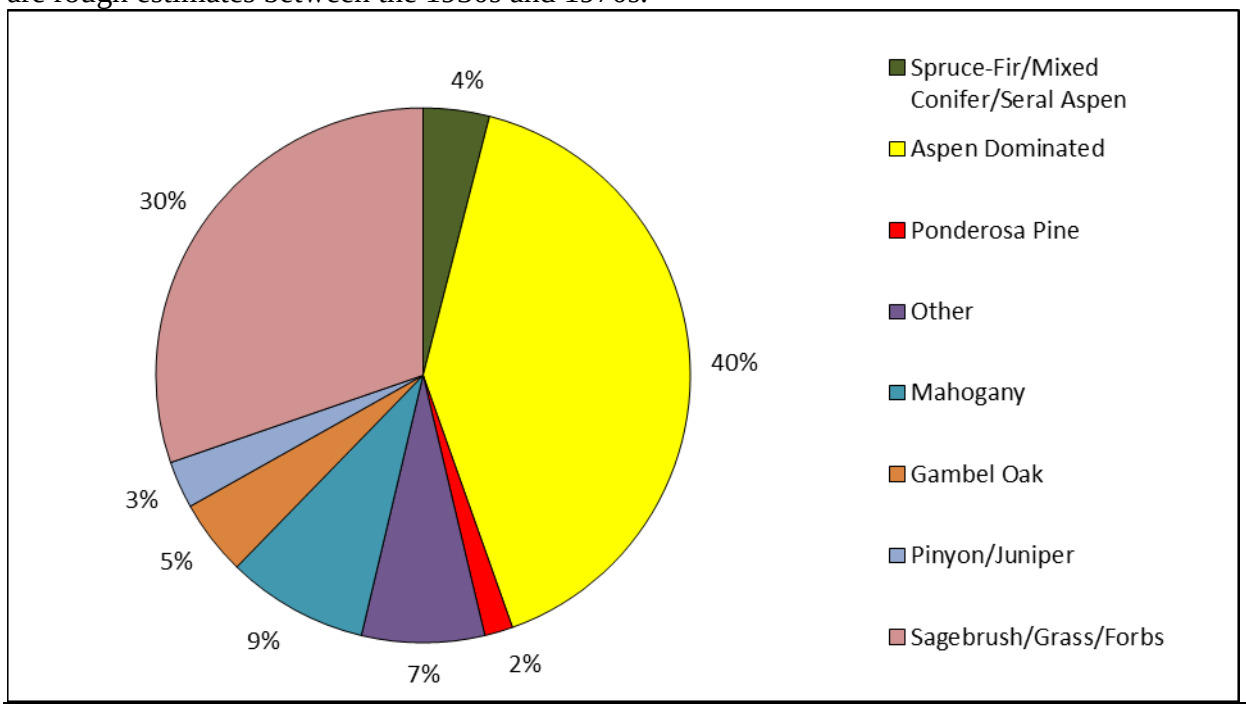

Figure 2: Monroe Mountain historic (200-400 years ago) vegetation distribution

With the exception of 2000 and 2014, deer AUMs have gradually decreased from the 1960s through 2010. Rocky Mountain elk (*Cervus elaphus*) AUMs have steadily increased from the 1970s through 2000, then had a reduction in 2010, and then a slight increase in 2014. Winter counts were used to calculate elk AUMs; therefore, actual summer elk AUMs may be higher than what is displayed in Figure 3 and Table 6, assuming summer elk numbers are higher than winter elk numbers on Monroe Mountain. For example, the UDWR knows a portion of the elk herd that summer on Monroe Mountain leave the mountain during the winter months and utilize winter ranges on adjoining units. Although Figure 3 and Table 6 shows total AUMs in 2014 are similar to total AUMs in 1910, the 1910 AUMs displayed in Figure 3 and Table 6 are likely conservative because mule deer AUMs are not included. In 1910, the AUMs were cattle, sheep, and an unknown number of mule deer, while in 2014 the AUMs were cattle, sheep, deer, and elk. All of these species browse aspen.

Existing Vegetation on Monroe Mountain/Description of Project Area (Figures 4 & 5)

- Aspen-dominated cover (stable aspen) currently occurs on approximately 17,009 acres. Much of this stable aspen has a component of mixed conifer in the understory (primarily subalpine fir).
- Approximately 31,129 acres on Monroe Mountain are dominated by seral aspen. Much of this seral aspen co-exists with mixed conifer (primarily subalpine fir).

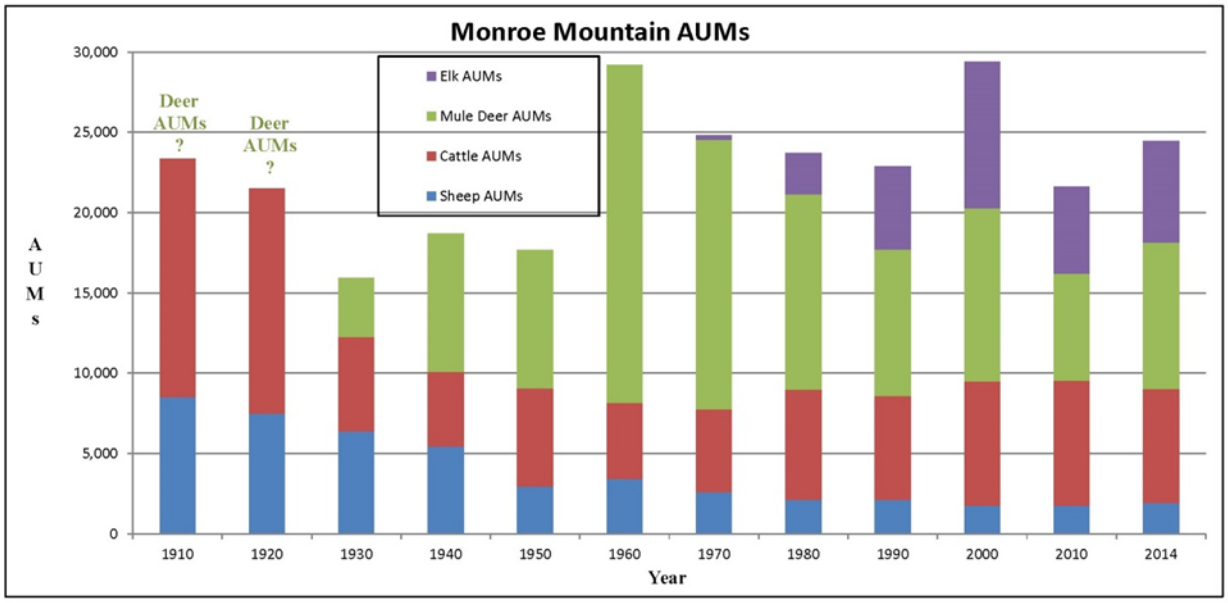

Figure 3: Summary of elk, mule deer, cattle, and sheep Animal Unit Months (AUMs) since the early 1900s. Deer AUMs are unknown for 1910 and 1920.

Year	Sheep AUMs	Cattle AUMs	Mule Deer AUMs	Elk AUMs
1910	8,513	14,851	Not Surveyed	Not Surveyed
1920	7,501	14,020	Not Surveyed	Not Surveyed
1930	6,373	5,887	3,685	Not Surveyed
1940	5,446	4,664	8,597	Not Surveyed
1950	2,935	6,126	8,597	Not Surveyed
1960	3,424	4,754	21,016	Not Surveyed
1970	2,584	5,186	16,785	257
1980	2,124	6,877	12,145	2,573
1990	2,121	6,458	9,143	5,146
2000	1,763	7,731	10,781	9,133
2010	1,780	7,750	6,687	5,403
2014	1,930	7,086	9,146	6,301

Table 6: Summary of elk, mule deer, cattle, and sheep Animal Unit Months (AUMs) since the early 1910s. This table correlates with Figure 3 above.

- Approximately 5,210 acres on Monroe Mountain are dominated by mixed conifer (Engelmann spruce, Douglas fir, Spruce fir, Ponderosa pine and White fir). Some of this mixed conifer co-exists with aspen.
- Approximately 13,667 acres on Monroe Mountain are dominated by spruce/fir. Some of this spruce/fir co-exists with aspen.

- Approximately 43,887 acres on Monroe Mountain are dominated by sagebrush cover types (primarily mountain big sagebrush (*Artemisia tridentata*)), some (approximately 12,231 acres) of which may have been aspen communities in the recent past. These 12,231 acres still have scattered aspen trees/stands in portions of the sagebrush communities.
- The project area overlaps Fishlake Forest Plan Management Areas: 5A – Big Game Winter Range-Non-Forested, 4A – Fish Habitat Improvement, 4B – Habitat for Management Indicator Species, 9F – Improved Watershed, 6B – Intensive Livestock Management, 2B – Rural+Roaded Natural Recreation and 7B – Wood Fiber Products-Thru Genetics.

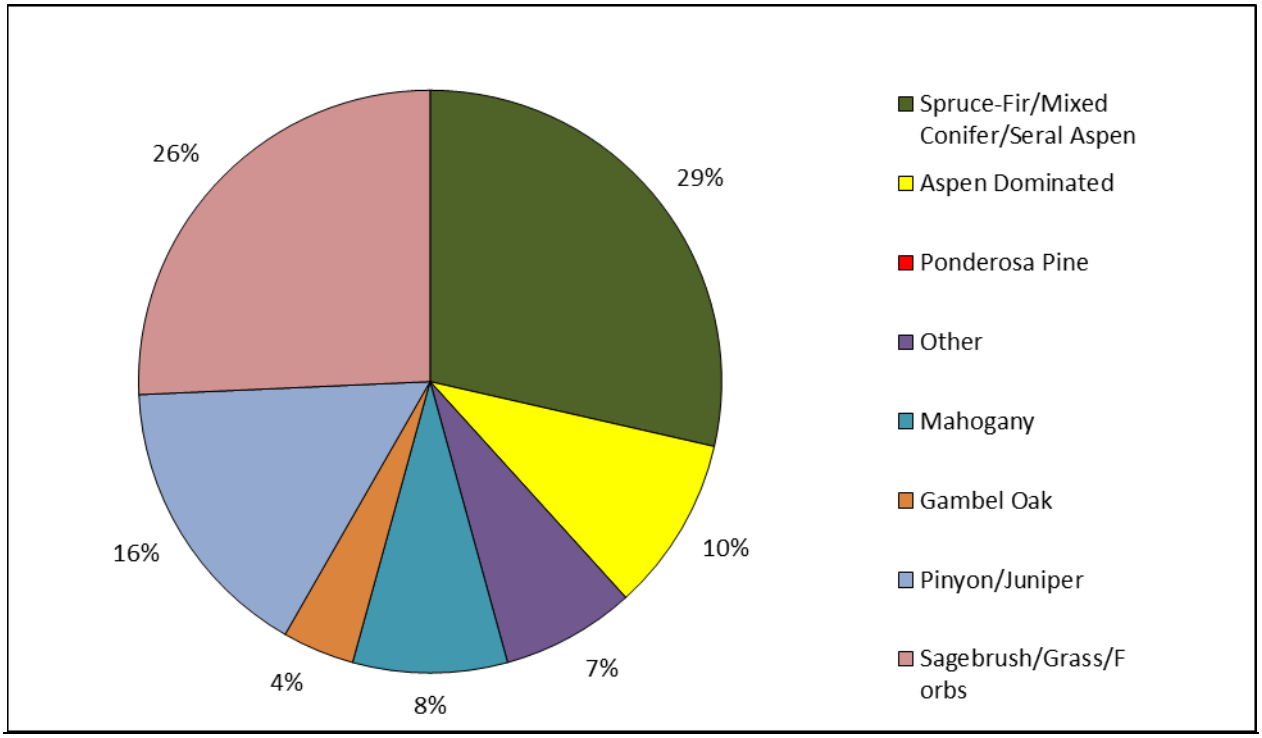

Figure 4: Monroe Mountain existing vegetation distribution

The desired condition as outlined in this document is specific to Monroe Mountain and was developed by the District; it is consistent with the Forest's Land and Resource Management Plan (LRMP; USFS 1986). The desired condition is to have persistent aspen communities, with multi-height stems (as described in Table 6) and adequate recruitment to perpetuate aspen communities, including site-appropriate, bio-diverse understories. Big sagebrush, if present would be a minor component of the aspen community. Fire regimes would be adequate to perpetuate aspen, particularly in areas seral to conifer. Table 6 describes the current and desired aspen stand structure for areas currently classified as seral aspen, spruce/fir, or mixed conifer.

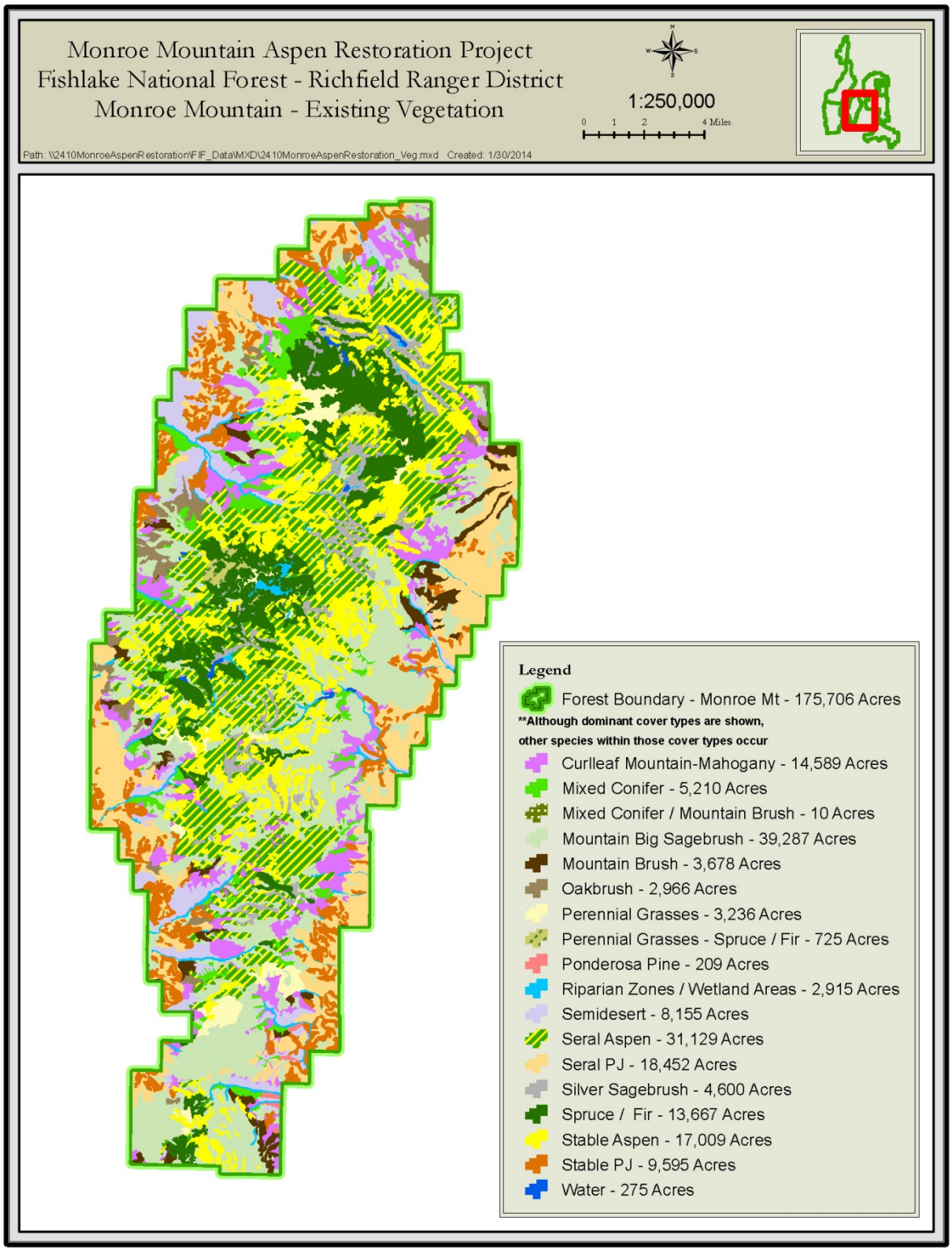

Figure 5: Existing Vegetation on Monroe Mountain

Table 6: Current and desired aspen stand structure in areas currently classified as seral aspen, spruce/fir, or mixed conifer

		Aspen Sprouts/Acre (<6 feet in height)			Aspen Saplings/Acre (6-12 feet in height)			Aspen Recruits/Acre (>12 feet in height)		
		Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
Current Condition	Aspen: Seral Stands	0	3,286	592	0	911	119	59	615	276
	Spruce/Fir Stands	0	4,433	1,121	0	183	38	0	301	137
	Mixed Conifer Stands	0	1,255	677	0	233	108	0	286	117
Desired Condition[38]	Aspen Structure After Implementation of Mechanical and/or Prescribed Fire Treatments	5,000	No Max	10,000 to 20,000	1,000	No Max	1,000 to 2,000	400	No Max	400 to 600

The range of Alternatives are 1-5, with Alternative 1 being the No Action Alternative.

Wildlife Species Discussion

The intent of this project is to create age class diversity in the aspen ecosystems on Monroe Mountain and create a more sustainable aspen landscape over time. Implementation of this project will increase habitat effectiveness for some wildlife species and decreases in habitat effectiveness for others. Monroe Mountain is changing as the landscape is converting to a more mid to late serial community landscape and it is becoming more of a monotypic landscape. Climatic succession in forest species dominates the mountain due to the lack of disturbance. This current condition has restricted the biodiversity that should normally exist among a proper functioning landscape. Diversity of wildlife species is not as broad as in more vegetatively diverse landscapes. As vegetation treatments have been implemented across the landscape in past years and diverse mosaic patterns of treated lands introduced into the older vegetation systems, young healthy early succession vegetation has been documented as it has enhanced the diversity in plant and animal life. This project will help introduce species diversity back into the Monroe Mountain area. A mosaic design is part of the implementation strategy to create a pattern of treated and un-treated acres that will create an increase of biodiversity. Habitat fragmentation should not be an issue for wildlife as care has been taken to have leave areas, old growth areas and treatment areas in good juxtaposition across the landscape to promote species diversity. Like all vegetation management treatments, those species that favor early serial communities and early serial vegetation species will benefit while other species that require late serial will be impacted. This project will provide increases in habitat effectiveness and benefit species such as ungulates, and decrease habitat effectiveness for species such as owls and goshawks that are more closely related to more mature conditions. Mosaic patterns created by the project will

[38] These numbers demonstrate that the desired condition of having aspen communities with multi-height stems with adequate recruitment to prepetuate the aspen communities are being met.

distribute ungulate herbivory across the landscape minimizing overuse to current key areas and allow newly treated areas to have favorable responses to treatments. Temporary roads will be closed and rehabilitated in an attempt to eliminate motorized use of these areas in the future. There will be some short-term (3-5 years) impacts to plant and animal uses of these areas during the implementation phase of the project, however, the overall outcome will provide much needed plant species diversity across the landscape that will last well into the future.

Table 7: Summary of Alternatives.

Summary of Alternatives				
	Existing Vegetation	Mechanical and Associated Slash Burning (Acres)	Prescribed Fire Mixed Burn Severities (Acres)	Prescribed Fire - Mixed Burn Severities Factoring 60% of the Acres Get Burned
Alternative 1	****	0	0	0
Alternative 2	Mixed Conifer	97	4,183	2,510
	Seral Aspen	3,146	15,159	9,095
	Stable Aspen	4,025	7,991	4,795
	Spruce-Fir	918	5,658	3,395
	Total	**8,186**	**32,991**	**19,795**
Alternative 3	Mixed Conifer	91	4,190	2,514
	Seral Aspen	6,422	14,318	8,591
	Stable Aspen	4,780	7,861	4,716
	Spruce-Fir	2,355	4,988	2,993
	Total	**13,647**	**31,357**	**18,814**
Alternative 4	Mixed Conifer	102	4,178	2,507
	Seral Aspen	9,492	12,763	7,658
	Stable Aspen	6,130	6,693	4,016
	Spruce-Fir	4,113	3,802	2,281
	Total	**19,838**	**27,436**	**16,462**
Alternative 5	Mixed Conifer	91	4,190	2,514
	Seral Aspen	6,736	11,676	7,006
	Stable Aspen	5,340	6,777	4,066
	Spruce-Fir	2,905	3,810	2,286
	Total	**15,072**	**26,453**	**15,872**

Threatened and Endangered Species (T&E)

Threatened and Endangered species or suitable habitat for this project pertains only to the California condor. Other T and E species were presented and dismissed for further analysis in Table 4 (List of Threatened, Endangered, Sensitive, MIS and Candidate Species).

Utah Prairie Dog (*Cynomys parvidens*) and California Condor (*Gymnogyps californianus*)

Utah Prairie Dog (*Cynomys parvidens*)

As stated above (Table 4), the project area lacks the suitable habitat needed for this species.

California Condor *(Gymnogyps californianus)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Implementation of the proposed action (mechanical and prescribed fire) would alter vegetation from the all action alternatives. These impacts would result in a decrease in some trees (live and dead) that condors could perch on; however, fire would also be creating more standing dead trees and open up some of the landscape for foraging. It is expected that opening parts of this landscape would increase the potential for condors to find and scavenge on carrion. The increased source of carrion would offset the reductions of potential perching habitat. In addition, the landscape provides abundant perching opportunities. These effects would displace condor use from one area to another within the same landscape as this landscape provides excellent perching habitat, and the proposed action will increase foraging potential. An indirect impact of this action that may result in more available food would be that with more openings, deer and elk hunter access could increase. With increased hunter success more potential for food could be available throughout the landscape.

This project lies south of I-70 and is therefore within the 10j experimental non-essential area for the California condor. The project area lacks the abundance of rock cliff habitat needed by this species; however, the area does contain large trees for perching. There have been no sightings at the present time or historical of this species on Monroe Mountain. Since this species does not utilize Monroe Mountain for any of it's life cyle (based on current knowledge) the writer of this document would determine the proposed project would have minimal to no affect on individuals or the viablitly of the species.

Utah Prairie dog and California condor will also be covered in the Biological Assessment.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no changes to the habitat quality and quantity other than those created by nature events such as from fire, wind events and insect killed

open areas. Because no California condor has been documented to occur on the Richfield Ranger District impacts from the No Action would be negligible and difficult to detect.

Since there would be no vegetation treatments under the No Action Alternative, direct adverse effects would not occur. Any effect discussed in this section may only occur if condor populations spread north and developed on the Forest. However, potential indirect effects may eventually occur from natural succession events as the area moves from early/mid serial species to late seral communities. With this change their would be an increase in roosting and perching habitat with decreases in foraging habitat other than those foraging areas associated with roads and road kill mammals. This would not likely decrease suitable habitat effectiveness to a degree that would be detectable. As succession progresses the quality of condor habitat over time would change as prey species associated with early serial species and dominated landscape would change as conifer species die. Conversely, as more aspen dominated landscapes are converted over time into more conifer dominated landscapes the diversity of prey species would change but only slightly as the primary species that condors are feeding upon use both aspen and conifer dominated landscapes.

The areas dominated by conifer would remain susceptible to large wildfire events. If a wildfire occurred it is likely that the intensity of the burn could not be managed and an added decrease in habitat effectiveness would occur to peraching and roosting habitat. This is because the wildfire would probably occur in the summertime when the acreage would be larger, without a mosaic pattern, and the severity would be higher with plant recovery and re-establishment extended over a longer period of time.

If the No Action Alternative was selected and the area left to succession there would be no direct impacts to California condor. However, indirect and cumulative impacts are realized with a no treatment action. The succession of the ecosystem that would occur under a no action management system would involve indirect and cumulative effects but these would occur over a relatively long period of time (20-50 years.) Impacts as a result of selecting the No Action alternative would not impact the species ability to occur on the Fishlake National Forest.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning.

Because no California condor has been documented to occur on the Richfield Ranger District, impacts from the “Action Alternatives” would be negligible and difficult to detect. Any effect discussed in this section may only occur if condor populations spread north and developed on the Forest.

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. While implementation actions would not likely impact the California condor, the effects of the treatments could impact the bird (if they migrated to the Fishlake National Forest (FNF)) and its habitat. The range of treatment acres between the alternatives will determine the amount of change in perching/roosting and foraging habitat. As described above, the primary species the California condor would prey upon would not be directly impacted by this action as the primary prey species use both conifer and early serial aspen communities for parts of their

life cycle. It is common for California condor to prey on the carcasses of un-recovered big game animals from hunting season or the parts of a harvested big game animal left from field dressing. Also included in this are fish that have either died or parts of fish that have been left behind after cleaning. They are also found utilizing the carcasses of dead livestock animals that have expired for unknown reasons on the summer range. As treatments would be conducted and big game animals attracted to them, a higher number of hunters would hunt treated areas to take advantage of higher concentrations of big game species. As a result, the potential for habitat enhancement by increasing foraging habitat for some potential prey species is higher with action alternatives than the No Action alternative. As a result, treatments to enhance the California condor occupancy are not crucial to manage for a sustainable population of condor on the Forest. Based on this analysis, implementation of the action alternatives would impact perching and roosting habitat in varying degrees but would not impact the species adversely by modifying any one of the primarily habitat components necessary for persistence of the species on the Fishlake National Forest . As more acres are treated more opportunities for carrion and prey would be made available to California condor.

Cumulative Effects:

Effects to the Condor over time and from the previous actions on Monroe Mountain will be minimal. Because there is little habitat features to support this species it is unlikely the mountain would support a viable population. Past, present and future habitat improvement projects would help provide opportunites in the form of prey. They depend on carrion (dead animal carcasses) for food. Prey would come in a slight increase of dead animals in the treatment areas. This increase could come from a higher number of wildlife and domestic animals being attracted to the site due to improved vegetative conditions. Animals may inadvertenly die there or be wounded from a hunter, not located and retrieved.

Section 5 of this report is the describes the cumulative effects area, it’s size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are “other” activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Sensitive Species

Sensitive wildlife species: (Table 4: List of Threatened, Endangered, Sensitive, MIS and Candidate Species), Bald eagle, Northern goshawk, Greater sage-grouse, Townsend’s big eared bat, Spotted bat, Three-toed woodpecker, and Flammulated owl. Suitable habitat does not occur in the project area for Bighorn sheep, Pygmy rabbit, and Peregrin falcon and therefore these three species will not be discussed further in this document. Bald Eagle, Northern goshawk, Greater sage-grouse, Townsend’s big eared bat, Spotted bat, Three-toed woodpecker and Flammulated owl will also be covered in the Biological Evaluation.

Bald Eagle *(Haliaeetus leucocephalus)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Bald eagles have been known to occur on the Fishlake National Forest during the late fall, early spring and winter months. During this time Bald eagles tend to concentrate wherever food is available, often around open water where fish and waterfowl can be caught. After the open water freezes, Bald eagles become more opportunistic and eat whatever is available. At this point Bald eagles generally move down to the foothills and valleys to feed on small mammals and carrion (Rodriguez 2008).

Utah hosts one of the largest state populations of wintering bald eagles. More than 1,200 bald eagles have been counted in Utah during recent years. About 3,000 to4,000 of the 13,000 bald eagles that winter in the lower 48 states occur west of the Rocky Mountains. Twenty-five to thirty percent of these western eagles spend the winter in Utah, indicating the significance of Utah's winter habitat (UDWR 2009). In 2009 the USFWS published a Post De-listing monitoring plan in the lower contiguous 48 states (USFWS 2009).The main threat to Bald eagles is habitat loss and disturbance from development of shoreline areas, recreation, logging, road building and mining (Spahr et al. 1991).

The proposed project would create some positive effects for this species and increase habitat effectiveness by creating more snags in the burned ares for perching, attracting more prey species to a newly treated area, and hunter opportunites would increase thus having the potential to have gut piles and unretrieved carcasses available for foraging.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no changes to the habitat quality and quantity other than those created by nature events such as from fire, wind events and insect killed open areas. Because very few Bald eagles occur on the Fishlake National Forest impacts from the No Action would be negligible and difficult to detect.

Since there would be no vegetation treatments under the No Action Alternative, direct adverse effects would not occur. However, potential indirect effects may eventually occur from natural succession events as the area moves from early/mid serial species to late seral communities. With this change their would be an increase in roosting and perching habitat with decreases in foraging habitat other than those foraging areas associated with roads and road kill mammals. This would not likely decrease suitable habitat effectiveness to a degree that would be detectable. As succession progressed the quality of Bald eagle habitat over time would change as prey species associated with early serial species and dominated landscape would change as conifer species die. Conversely, as aspen dominated landscapes are converted over time into more conifer dominated landscapes the diversity of prey species would change but only slightly as the primary species that eagles are feeding upon use both aspen and conifer dominated landscapes.

The areas dominated by conifer would remain susceptible to large wildfire events. If a wildfire occurred it is likely that the intensity of the burn could not be managed and an added decrease in

habitat effectiveness would occur to peraching and roosting habitat. This is because the wildfire would probably occur in the summertime when the acreage would be larger, without a mosaic pattern, and the severity would be higher with plant recovery and re-establishment extended over a longer period of time.

If the No Action Alternative was selected and the area left to succession there would be no direct impacts to Bald eagles. However, indirect and cumulative impacts are realized with a no treatment action. The succession of the ecosystem that would occur under a no action management system would involve indirect and cumulative effects but these would occur over a relatively long period of time (20-50 years). Impacts as a result of selecting the No Action alternative would not impact the species ability to occur on the Fishlake National Forest given the limited numbers and distribution of Bald eagles in the Monroe Mountain area.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning.

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. Since Bald eagles are seasonal visitors to Monroe Mountain it is expected that most mechanical and prescribed burn activities would be completed by early November when the first Bald eagle migrate to the mountain. While implementation actions would not likely impact the Bald eagle the effects of the treatments would impact the bird and its habitat. The range of treatment acres between the alternatives will determine the amount of change in perching/roosting and foraging habitat. As described above, the primary species the Bald eagle is foraging upon would not be directly impacted by this action as the primary prey species use both conifer and early serial aspen communities for parts of their life cycle. It is common for Bald eagles to prey on the carcasses of un-recovered big game animals from hunting season or the parts of a harvested big game animal left from field dressing. Also included in this are fish that have either died or parts of fish that have been left behind after cleaning. They are also found utilizing the carcasses of dead livestock animals that have expired for unknown reasons on the summer range. As treatments would be conducted and big game animals attracted to them, a higher number of hunters would hunt treated areas to take advantage of higher concentrations of big game species. As a result, the potential for habitat enhancement by increasing foraging habitat for some potential prey species is higher with action alternatives than the No Action alternative. However, as stated previously, Bald eagles are only late fall, winter and perhaps early spring inhabitants and impacts to the bird and its habitat. As a result, treatments to enhance the Bald eagle occupancy are not crucial to manage for a sustainable population of eagles on the Forest. Based on this analysis, implementation of the action alternatives would impact perching and roosting habitat in varying degrees but would not impacts the species adversely by modifying any one of the primarily habitat components necessary for persistence of the species on the Fishlake National Forest. As more acres are treated more opportunities for carrion and prey are made available to Bald eagles.

Cumulative Effects:

Effects to the Bald Eagle over time and from the previous actions on Monroe Mountain will be minimal. Bald eagles are known to use the mountain and the proposed project area seasonally.

They arrive in early November and persist in the area until late March. They depend on carrion (dead animal carcasses) for food, but also kill their own prey. As winter snows increase in depth at the higher elevations eagles generally migrate to lower altitudes where carrion and prey are present. Past, present and future habitat improvement projects would help provide opportunites in the form of prey. Prey in the form of an increase of dead animals in the treatment areas. This increase would come from a higher number of wildlife and domestic animals being attracted to the site due to improved vegetative conditions. Animals may inadvertenly die there or be wounded from a hunter, not located and retrieved.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Note: Though Golden eagles are not considerd "TES" by the Intermountain Region of the Forest Service; however, it may be worthy to note that they occupy some of the same habitat as Bald eagles and use Monroe Mountain in a similar way. The main differnce in life cycle terms is that Golden eagles can be residents to the area, but can also be seasonal migrants like Bald eagles. The action alternatives would be compliant with the Bald and Golden eagle Protection Act and the Migratory Bird Treaty Act and Executive Order 13186. See the discussion above to draw similarities for the Golden eagle; however, is only discussed here as a side note. Migratory birds are discussed further below.

Northern Goshawk *(Accipiter gentilis)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Prescribed fire, wildfire, and mechanical thinning activities that occur within Northern goshawk territories may create habitat disturbances that would likely cause abandonment if not carefully mitigated by following the habitat recommendations identified in the Fishlake Forest Plan and other sources of best available science such as Graham et al. 1999. Implementation of these best science practices are part of the actions identified for this project. If activities occur within nest areas (NA) and post fledgling family areas (PFAs), territory abandonment would likely occur if Forest Plan requirements were not followed. The displacement of adult and juvenile birds, if present, would likely result in mortality and impact the viability of this species. The District has developed alternatives and project design criteria that would minimize the chance of Northern goshawks being displaced because of project activities. Some project activities may remove or degrade potential foraging habitat in the short-term (5-15 years). However, the quality and quantity of potential foraging habitat would likely increase in select areas as aspen recovers following project implementation. The amount of habitat potentially impacted by project activities varies by alternative, and depends on the alternative selected, weather related events, use of the area by ungulates and other environmental factors. To understand which alternatives would impact the goshawk and its prey more or less it

is important to discuss some of the key habitat requirements and guidelines that have been established by researchers.

Important to the architectural structure of a goshawk territory (including both the NA and PFA) is the combination of an older class of forest type vegetation (mixed conifer-aspen) including tall mature trees with interlocking crowns, large trees, large down woody debris, snags (mix of structural snags), water, understory vegetation, and openings. All these structural components are crucial to the existence and persistence of goshawk. Security habitat from predators (as the Great-horned owl known to prey on goshawk chicks and adults on the Fishlake N.F.) comes in the form of a balance of the above mentioned components maintained in an undisturbed fashion to protect goshawk young and adults. Nesting habitat structure with open conditions allows for the predation of goshawks, and especially their nestlings, by great horned owls (*Bubo virginianus*) (Boal and Mannan 1994; Moore and Henny 1983; Woodbridge and Detrich 1994). Nestling mortality may increase during periods of low food availability (Moore and Henny 1983; Rohner and Doyle 1992; Woodbridge and Detrich 1994; Zachel 1985).

Another crucial aspect of managing for the goshawk is management of vegetation for the bird and its prey. Reynolds et al. 1992 and Graham et al. 1999 both discuss the importance of managing a balance of habitat for the goshawk and its prey. Goshawks prefer to forage in closed canopy forests with moderate tree densities as compared to young open forests (Squires and Reynolds 1997). Goshawks take prey from small openings, although they usually hunt these areas from perches near the edge (Younk and Bechard 1994b). Medium to large-sized birds (woodpeckers, robins, grouse, or jays) and mammals (ground and tree squirrels and hares) tend to dominate breeding season diets (Squires and Reynolds 1997).

In general, goshawks nest in mature to old forests with relatively large trees, high canopy closure (relative to surrounding areas), sparse ground cover and open understories. Nests are often located near the bottom of moderately steep slopes, close to water, and often adjacent to a canopy break (Squires and Reynolds 1997). Important internal components of forests in Utah include snags, multiple canopies, and down woody debris (Reynolds, et. al. 1994).

The key comparison element for evaluating how the alternatives affect northern goshawk is the amount of nesting habitat affected (# of acres of aspen, or spruce/fir treated) and prey base affected (# of acres of foraging communities treated).

The underlying concern with a project of this scale is how treatments in goshawk territories would impact their continued use and return back to the territory post treatment. The Richfield Ranger District, and especially Monroe Mountain, has the largest concentration of goshawk territories known on the Fishlake National Forest. Of the goshawk territories currently known on the District, 22 are on Monroe Mountain, and 18 are within the direct/indirect effects area for this proposed project. As nests are monitored on the District some are documented to have blown out of the tree and a nest no longer exists. A search is done for a replacement alternative nest and if found it is documented.

In a previous action on the Richfield Ranger District, in the Oldroyd-Monroe Meadows area on Monroe Mountain, a treatment within the Post Fledgling Area (PFA) occurred. Implementation

of the Forest Plan for Goshawk Management was implemented. These treatments were carefully evaluated prior to managing the area for hazardous fuels and it was determined that the risk of wildfire coming off the Fishlake National Forest to private lands was a substantial threat. Due to this threat an experimental treatment was developed to try and reduce fuels and manage for the bird. Treatments were implemented to reduce fuels near private land and a cabin. Although Forest Plan Guidelines were implemented, abandonment occurred and the pair has not been back to the area for the past two years. Being able to determine the exact cause and effect is difficult; however, it is the judgment of the Forest and district biologists that it was a direct result of the vegetation treatments and not applying our best knowledge to about the needs of the bird. Managing for bird persistence in the same area as summer cabins and private lands is difficult. As a result, thinning and burning treatments for this project in the Monroe area is a crucial component to the viability of the Northern goshawk population on the Fishlake National Forest. It is strongly recommended to not allow any treatments in NAs on Monroe Mountain.

A thinning in a PFA may be designed to help prevent the spread of wildfire to private property while maintaining the integrity of the territory (Forest Plan, Northern Goshawk Amendment, Guideline Z).

In Forest Plan direction for the Northern goshawk, forest vegetation structural stage classes are discussed and how they relate to preference by goshawk for nesting, post fledgling family areas, or rearing and teaching of young and foraging. Vegetation structural stage's (VSS) range from 1-6 (with 1 being smallest and 6 being largest). The VSS classes found on Monroe Mountain average in the "3" range with more in the 2, 3, and 4 range and with fewer 5s and 6s on the top end. We find that VSS 5 and VSS 6 trees found on Monroe Mountain are low in numbers. With this VSS class in limited supply so is nesting habitat for the goshawk. Therefore, care must be taken to retain the largest trees on the landscape.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct impacts on this species, and subsequently population numbers and viability of this species would remain intact.

Potential indirect effects may come due to natural succession events as the areas move from early/mid seral species to late seral communities. Portions of the analysis area would rotate from early/mid seral to late seral, while other areas into early seral. If a large scale high severity wildfire occurred this could impact habitat availability and effectiveness for the goshawk by reducing nesting and foraging habitat.

If no management is implemented the area through time would remain susceptible to a wildfire event where lighting could cause a fire that may be difficult to manage and impacts to key habitat components could occur. This could result in a wildfire that would be larger, without a mosaic pattern, and the severity would be higher and plant recovery and re-establishment would take longer. This type of large scale uncharacteristic wildfire could be stand replacing, which could result in large patches of even-age regeneration across the landscape of Monroe Mountain. If large blocks of suitable habitat were burned it would impact overall habitat effectiveness. If large blocks of aspen regeneration and recruitment occurred it could add to the diversity of the

landscape depending upon the location, size and configuration on the landscape. Wildfires on Monroe Mountain may not be detrimental to the goshawk and its prey. It would depend on the location of the fires and the proximity to nesting and PFA habitat. The uncertainty of wildfire in this landscape is difficult to predict and therefore impacts to this species and its prey from fire is speculation. However, science tells us that fire will occur but the size, severity and location is also an uncertainty.

Implementation of the No Action alternative will result in an undetermined amount of habitat effectiveness change in an undetermined area and therefore is not recommended for active management for this sensitive species and Management Indicator Species.

Effects of Alternatives 2-5 -- Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 50% treatment is proposed in all action alternatives (2-5).

Mature goshawks are known to hunt an area approximately 5,000 acres per territory foraging in a wide variety of forested habitat. Seral and stable aspen are found within their hunting territory. In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen in the proposed project alternative 2 proposes 51% of stable aspen for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10) (comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area).

There are approximately 10,461 acres of Post Fledgling Area goshawk habitat within the proposed project area. There are approximately 2,817 acres of Nest Replacement Area acres in the proposed project area. Habitat for goshawks would be affected in all alternatives due to the combined size of the foraging areas (5,000 acres for each territory); however an array of treatment options is proposed or not proposed within the different alternatives.

Goshawks are known to use a variety of habitats throughout their lifecycle. Removal of vegetation from a prescribed burn or mechanical thinning could have an indirect effect of decreasing foraging areas for an undetermined time period until it regrows back into suitable foraging habitat to support prey species. This could take 5-15 years or it could be greater than 100 years depending upon the location of the treatment and the species that inhabit the area. Goshawks are known to prey on a variety of mammals and birds such as; rabbits, squirrels, chipmunks, flickers, grouse, and jays. Burning would decrease habitat and populations of some

prey species (especially small mammals) as woody debris is burned and increase populations of others (such as jays or woodpeckers) as snags are created. The larger mammals are more advantageous for them to forage upon as they provide more energy for the effort. As stated above, it is difficult to determine how long suitable vegetation will take to regrow and provide habitat for prey. This can further be complicated as the area is managed for other resources such as domestic and wild ungulates. Ungulates can slow or suppress suitable habitat for prey species, as well as weather events and storm patterns.

Goshawks can breed successfully in forests where timber harvesting has occurred (Reynolds and others 1994; Woodbridge and Detrich 1994) but they appear to prefer stands of mature and over-mature trees for nesting and foraging (Bright-Smith and Mannan 1994). Also, occupancy of the nest stand has been positively associated with patch size (Woodbridge and Detrich 1994). However, the effects of reducing the number and size of mature trees on existing goshawk densities or productivity are unknown. Population models for species in fragmented forest landscapes suggest that sharp declines in viability can occur if habitat decreases over the long-term (Franklin and Forman 1987; Lamberson and others 1992). The removal of suitable nesting habitat through timber harvesting or other management activities can be a threat to the goshawk (McCarthy 1989).

Alternative 2 presents the least impacts to goshawk territories as it proposes no treatments in the NAs or PFAs of any goshawk territory (see Table 9 and Table 10 below). This alternative allows for treatments within the foraging area that will open small areas up to enhance habitat for prey and opens areas up for foraging by the goshawk. This alternative also allows for management of down woody debris, and snag retention, which is crucial to the goshawk and prey management. No impacts to viability as a result of Alternative 2 are expected.

Alternative 3 proposes no treatments in the NAs and treatments in the PFA that range from approximately 14-61% (two territories range in the single digit range because they are on the edge of proposed treatment areas). This alternative will open small areas up to enhance habitat for prey and open areas up for foraging by the goshawk. While it allows for treatments within the foraging areas similar to Alternative 2, it also allows treatments within 18 PFAs which will create open areas and make fledglings and adults vulnerable to predators. Opening up the PFAs will impact the persistence of these territories, and impact the overall viability of the population. Management of down woody debris, and snag retention, is also included which is crucial to the goshawk and prey management. Impacts from alternative 3 may affect the viability of the species.

Alternative 4 proposes treatments in the NAs that range from approximately 60-98% and treatments in PFAs that range from approximately 35-90% (two territories range in the single digit range because they are on the edge of proposed treatment areas). This alternative will open small areas up to enhance habitat for prey and open areas up for foraging by the goshawk. While it allows for treatments within the foraging areas similar to Alternative 2, it also allows treatments within NAs and PFAs which will create open areas making nesting adults and juveniles and also making fledglings and adults vulnerable to predators in the PFAs. Opening up the NAs and PFAs will impact the persistence of these territories, and impact the overall viability of the population. Management of down woody debris, and snag retention, is also included

which is crucial to the goshawk and prey management. Impacts from alternative 4 may affect the viability of the species.

Alternative 5 proposes no treatments in the NAs and light treatments in 2 PFAs that range from 30-34% in two territories. This alternative will open small areas up to enhance habitat for prey and open areas up for foraging by the goshawk. While it allows for treatments within the foraging areas similar to Alternative 2, it also allows treatments within 2 PFAs which will create open areas and make fledglings and adults vulnerable to predators. Opening up the two PFAs (30-34%) will impact the persistence of these territories, and impact the overall viability of the population. Management of down woody debris, and snag retention, is also included which is crucial to the goshawk and prey management.

Table 9 NRA	Alternative 1				Alternative 2				Alternative 3				Alternative 4				Alternative 5				
Nest Replace Areas (NRA)	Mechanical and Prescribed	Prescribed Burn - Mixed Burn Severity	Grand Total	% NRA Treated Alt 4	Mechanical and Prescribed	Prescribed Burn - Mixed Burn Severity	Grand Total	% NRA Treated Alt 4	Mechanical and Prescribed	Prescribed Burn - Mixed Burn Severity	Grand Total	% NRA Treated Alt 4	Mechanical and Prescribed	Prescribed Burn - Mixed Burn Severity	Grand Total	% NRA Treated Alt 4	Mechanical and Prescribed	Prescribed Burn - Mixed Burn Severity	Grand Total	Approx. NRA Acres	% NRA Treated Alt 5
Big Table North	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	178	0	178	98.3	0	0	0	181	0.0%
Big Table South	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	147	0	147	80.3	0	0	0	183	0.0%
Brindley Flat	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	119	0	119	59.2	0	0	0	201	0.0%
Cove Nest	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0	0	0	0	0	0.0%
Deer Spring	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	56	0	56	9.3	0	0	0	601	0.0%
Doe Hole	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	154	0	154	87.0	0	0	0	177	0.0%
Eagle Flat	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	178	0	178	90.8	0	0	0	196	0.0%
Hunters Flat	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	188	0	188	97.9	0	0	0	192	0.0%
Langdon East	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	152	0	152	84.4	0	0	0	180	0.0%
Langdon West	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	125	0	125	69.4	0	0	0	180	0.0%
Magelby	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	170	0	170	76.6	0	0	0	222	0.0%
Manning Creek	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	169	0	169	79.3	0	0	0	213	0.0%
Nielsen Canyon	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	119	0	119	58.9	0	0	0	202	0.0%
North Big Lake	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0	0	0	0	0	0.0%
Oldroyd	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	9	0	9	1.3	0	0	0	682	0.0%
Paxton	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	118	0	118	71.1	0	0	0	166	0.0%
Sherwood Forest	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	121	0	121	77.6	0	0	0	156	0.0%
Indian Ranch	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0	0	0	0	0	0.0%
Grand Total	0	0	0		0	0	0		0	0	0		2,003	0	2,003	53.7%	0	0	0	3,732	

Table 10 PFA	Alternative 1				Alternative 2				Alternative 3				Alternative 4				Alternative 5				
Post Fledgling Areas (PFA)	Mechanical and Prescribed	Prescribed Burn - Mixed Burn	Grand Total	% of PFA treated Alt 1	Mechanical and Prescribed	Prescribed Burn - Mixed Burn	Grand Total	% of PFA treated Alt 2	Mechanical and Prescribed	Prescribed Burn - Mixed Burn Severity	Grand Total	% of PFA treated Alt 3	Mechanical and Prescribed	Prescribed Burn - Mixed Burn Severity	Grand Total	% of PFA treated Alt 4	Mechanical and Prescribed	Prescribed Burn - Mixed Burn Severity	Grand Total	Approx total PFA Acres	% of PFA treated Alt 5
Big Table North	0	0	0	0.0%	0	0	0	0.0%	348	0	348	56.2	526	0	526	85.0	0	0	0	619	0.0%
Big Table South	0	0	0	0.0%	0	0	0	0.0%	287	0	287	50.7	434	0	434	76.7	0	0	0	566	0.0%
Brindley Flat	0	0	0	0.0%	0	0	0	0.0%	163	0	163	26.4	282	0	282	45.7	0	0	0	617	0.0%
Cove Nest	0	0	0	0.0%	0	0	0	0.0%	263	0	263	43.8	430	0	430	71.7	0	0	0	600	0.0%
Deer Spring	0	0	0	0.0%	0	0	0	0.0%	56	0	56	9.3	56	0	56	9.3	0	0	0	601	0.0%
Doe Hole	0	0	0	0.0%	0	0	0	0.0%	113	0	113	18.8	267	0	267	44.4	0	0	0	601	0.0%
Eagle Flat	0	0	0	0.0%	0	0	0	0.0%	378	0	378	61.2	556	0	556	90.0	0	0	0	618	0.0%
Hunters Flat	0	0	0	0.0%	0	0	0	0.0%	327	0	327	53.4	515	0	515	84.2	0	0	0	612	0.0%
Langdon East	0	0	0	0.0%	0	0	0	0.0%	294	0	294	49.6	446	0	446	75.2	0	0	0	593	0.0%
Langdon West	0	0	0	0.0%	0	0	0	0.0%	236	0	236	39.5	361	0	361	60.4	0	0	0	598	0.0%
Magelby	0	0	0	0.0%	0	0	0	0.0%	279	0	279	46.8	450	0	450	75.5	0	0	0	596	0.0%
Manning Creek	0	0	0	0.0%	0	0	0	0.0%	329	0	329	42.6	498	0	498	64.5	0	0	0	772	0.0%
Nielsen Canyon	0	0	0	0.0%	0	0	0	0.0%	184	0	184	29.9	302	0	302	49.0	184	0	184	616	29.9%
North Big Lake	0	0	0	0.0%	0	0	0	0.0%	278	0	278	47.2	445	0	445	75.6	0	0	0	589	0.0%
Oldroyd	0	0	0	0.0%	0	0	0	0.0%	9	0	9	1.3	9	0	9	1.3	0	0	0	682	0.0%
Paxton	0	0	0	0.0%	0	0	0	0.0%	196	0	196	33.8	314	0	314	54.1	196	0	196	580	33.8%
Sherwood Forest	0	0	0	0.0%	0	0	0	0.0%	88	0	88	14.6	210	0	210	34.9	0	0	0	601	0.0%
Indian Ranch	0	0	0	0.0%	0	0	0	0.0%	0	0	0	0.0	0	0	0	0.0		0	0	0	0.0%
Grand Total	0	0	0		0	0	0		3,828	0	3,828	36.6%	6,101	0	6,101	58.3%	380	0	380	10,461	3.6%

Table 9 and Table 10: Percent of Nest Replacement Area (Table 9) and Post Fledgling Area (Table 10) of goshawk territory affected by alternative.

Past treatments within PFAs have not only caused abandonment on the Fishlake but also on the Dixie National Forest to the South (Rodriguez 2014, personal conversation). Based on Fishlake data and observations from other goshawks biologists, not treating in the NAs for this project is important to the viability of the goshawk on Monroe Mountain and on the Fishlake National Forest. Treating within PFAs is generally not recommended in order to keep disturbance to a minimum. Tables 9 and 10 display the correlation between territories and treatment type by alternative.

Surveys conducted in 2014 revealed two new goshawk nests with associated NAs and PFAs; however, only one of the territories occurs within the boundaries of this project. This new territory will be referred to as the "Indian Ranch Territory". Approximately 310 acres of this territory occurs within the boundaries of this project. The nest was active in 2014 and successful in producing two fledglings. These 310 acres make up less than 1% of the project area. The majority of the 310 acres occur in stable aspen. To maintain habitat requirements and population viability, I recommend that no treatments occur in these 310 acres. These 310 acres could become part of the 40% non-treatment mosaic pattern that is required to remain to meet goshawk foraging guidelines. These 310 acres are discussed further in the Wildlife Biological Evaluation.

The following measures will be implemented on the Monroe Mountain project to ensure proper management is occurring and viability considered and met;

- "Monitoring requirements" (appendix CC) found within the goshawk amendment for the six forests in Utah discuss the following process:
- ID m-1--Question: Are known goshawk territories on national forests remaining occupies?
- Item to Measure: Goshawk territory occupancy at the forest level.
- Acceptable Range: Less than 20% decline in territory occupancy over a 3 year period.
- Measurement Frequency: Annually (report every 3 years)
- ID m-2—Question: Are mitigation measures (standards and guidelines) employed during vegetative management project implementation sufficient to prevent territory abandonment?
- Item to Measure: Goshawk territory occupancy following vegetative management treatments.
- Acceptable Range: No territory abandonment on projects where mitigation measures are used.
- Measurement Frequency: The first full breeding period following activity in all projects where pre-project surveys determined territory occupancy. (report annually)
- ID m-3—Question: Is habitat connectivity as represented by structural and species diversity and dispersion thereof, within and among 5th and 6th order watersheds (or equivalent ecological scale) being maintained?
- Item to Measure: Spatial dispersion patch size of mature and old forest groups within a 5th to 6th order watershed. Tree species composition mix within mature and old groups within a landscape.
- Acceptable Range: Approximately 40% of the coniferous and 30% of the aspen forested acres within a landscape are in VSS 5 and 6 classes. Seral species characteristic of the cover type are well represented VSS 5 and 6 classes.

- Measurement Frequency: Completion of each landscape assessment. (report every 5 years)
- Other sections of the monitoring matrix speak of monitoring long-term for down woody material and snags.

Northern Goshawk Conclusion

Maintaining adequate structural components within the NAs and PFAs of goshawk territories to ensure habitat effectiveness which encompasses the entire portion of their life cycle when they are on the forest is crucial to maintain viability. It is also important to follow recommendations in foraging habitat to manage for prey species habitat. These structural components referred to in the goshawk amendment will help maintain a prey base for the adults to utilize during mating and rearing season as well as for the fledglings when they are old enough to hunt for themselves within the territory. Alternatives 3, 4 and 5 do not allow enough of the habitat requirements to maintain this need. Alternative 2 would allow enough habitat requirements to be maintained. Alternatives 3, 4, and 5 may cause territory abandonment across the Monroe landscape. This abandonment may result in dispersion from Monroe Mountain to other mountain ranges or make the birds susceptible to predation. We then would move further away from our Forest Plan goal of a viable population across the forest.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to goshawk in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. All these types of disturbances can affect goshawk occupancy within their territory to some degree. As we move into the future for goshawk habitat management it is important to keep in mind Monroe Mountain currently provides prime habitat to foster the life cycle components needed to sustain a healthy population. The mountain has more goshawk territories per square mile than any other district on the Fishlake National Forest. A delicate balance is needed to provide current territorial features while planning for key habitat components in the future.

Section 5 of this report describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past, present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Greater Sage Grouse (*Centrocercus urophasianus*)

For a detailed description of the life history for this species refer to (Rodriquez, 2008).

Direct and Indirect Effects: The Greater sage grouse is a sagebrush obligate species because

sagebrush is essential to their survival and is used for food and cover throughout their entire life cycle. The proposed project analysis area does contain acres of sagebrush but they are not targeted for treatment. The proposed project is a "forest type" treatment. Traffic used in project implementation will transect through areas of suitable sagebrush habitat. A direct effect could occur if a grouse were hit by a vehicle in suitable habitat area as traffic traveled to and from the project areas during implementation. A remote population of sage-grouse does occur on the very south end of Monroe Mountain (approximately 5 miles south from where active treatments are proposed). No active treatments are proposed on the south end of Monroe Mountain. Also, there are several known leks and populations that occur in areas adjacent to Monroe Mountain on BLM and private land.

According to trend data, sage grouse numbers on Parker Mountain have been increasing since 1999 although numbers are fluctuating. In 2008, sage grouse numbers slightly dipped on leks for the Parker Mountain population; 930 males were observed on annually counted leks, which is slightly down from 936 in 2007 (UDWR, 2008). The UDWR expects sage grouse population numbers to increase because during the last 2 years they have discovered 9 new lek sites. Any lek sites that have birds on them for three consecutive years gets included in the trend data.

Also in a study conducted on the Parker Mountain, BYU research students combined with the Parker Mountain Adaptive Resource Management (PARM) Local Working Group to compare treatment types in sage grouse habitat. There treatments consisted of a control plot, Lawson Aerator, Dixie Harrow and Spike chemical treatment. They concluded that sage grouse preferred treated to non-treated sites (Dahlgren 2006). A FS-UDWR cooperative study was also conducted on the Hell's Hole sage grouse population at the south end of Monroe Mountain. Similar results to the Parker Mountain Study were documented (Kreitzer 2006).

Sage grouse surveys of the project area were conducted in birding routes in 2012, 2013 and 2014. No sage grouse were found as a result of these recent surveys. A single sage grouse was documented by a District Wildlife Technician in the late 90s within an area on the eastern bench in the central part of the mountain; however, no further individuals or groups have been documented to date. Approximately 44,187 (39,287 of Mountain Big Sage and 4,900 Silver Sage) acres of sage are found within the Cumulative Effects Area for the project (Forest Boundary). Not all of these 44,187 acres of sagebrush are considered suitable habitat for Greater sage grouse. Not all sagebrush is considered suitable because various sage types occur, densities vary, aspect varies, patch size varies, sagebrush understories vary, and geography varies. Since this project is designed to treat forest types (aspen, mixed conifer, spruce/fir) and no intentional treatment efforts are designed in sagebrush, no habitat or suitable habitat would be altered. As vehicles traveled through suitable sagebrush habitat and if sage grouse populations expanded to the project area, an individual grouse may get struck by a vehicle. This would be a direct effect. We are not aware of any grouse being hit by vehicles on the south end of the mountain where we have sage grouse. Indirect effects may occur if sagebrush habitat adjacent to the proposed forest treatment areas improved in habitat effectiveness. This may be due to some ungulate grazing pressure being re-distributed to the newly treated areas allowing sagebrush areas improve.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under Alternative, no adverse direct effects would be expected to the Greater sage grouse. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as sagebrush continues to increase in density causing the understory of grass and forbs to diminish resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create an even age forest succession and change the type of forest that exist today providing less optimum for Greater sage grouse foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area). The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section).

As noted in the discussion above this proposed treatment is designed for direct treatments in forested ecosystems, it is unlikely that many acres of sagebrush that contain sage-nester habitat

would be affected. Some direct minor impacts may occur to sagebrush as equipment is used to go along the edge of sagebrush meadows to transport equipment or personnel for treatment implementation. Indirectly, vehicles traveling through sage habitat to and from project areas may cause dust and an occasional direct impact with a vehicle. None of these impacts pose a threat to the integrity of the habitat or viability of the Greater sage grouse.

Cumulative Effects:

Past, present and future activities on Monroe Mountain in suitable sagebrush habitat for sage grouse are important to the Richfield Ranger District. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing, habitat treatments and private land development on Monroe Mountain.

Through the years acres of sagebrush have been mechanically treated, prescribed burned or burned from natural ignited wildfires. Past mechanical treatments in sagebrush have been carefully designed in a mosaic pattern and treated with tools that would thin sagebrush to meet wildlife habitat objectives. Large scale forestry projects may not produce any cumulative affect on sagegrouse.

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Townsend's Big-eared Bat *(Corynorhinus townsendii)* and Spotted Bat *(Euderma maculatum)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Population densities are poorly understood because these species are difficult to monitor (Rodriguez 2008). They are still only suspected to occur on the Richfield Ranger District at the present time. Surveys were conducted across the District at select locations in 1993 (Toone 1993). Surveys with an electronic bat detector were conducted in the project area during the 2014 field season. The electronic detector was deployed at two riparian areas within the project area. Final data collected was sent to Titley Scientific for species verification. A final report was created by Titley Scientific (Corben 2015) and submitted to the Richfield Ranger District. Seven species were confidently identified in the dataset. They are: Big Freetailed Bat (NYMA), Mexican Freetailed Bat (TABR), Hoary Bat (LACI), Big Brown Bat (EPFU), Silver-haired Bat (LANO), Long-eared Myotis (MYEV), Little Brown Bat (MYLU). There were five files from Site 2 which may have been from two further species. One of these might have been Pallid Bat (ANPA) and the other might have been Fringed Myotis (MYTH). At this point Townsend's Big-eared bat and Spotted bats have not been documented in or around the project area according to surveys. Understanding literature about these bats gives us the opportunity to take a hard look at the life cycle and distribution of these species. The main threat to these bat species is human

disturbance at roost or hibernacula sites, because they will abandon these sites if disturbed (Spahr et al. 1991). Direct effects would come in the form of a decrease of prey in the removal or burning of trees. Moths are in important part of their diet and forested areas provide foraging opportunities. Riparian areas inter-connected within the treatment areas would realize improvement and prey would increase for bats. Indirectly as the forest succession advanced over time insect prey for bats would improve.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species. Since there would be no vegetation treatments under Alternative 1, no adverse direct effects would be expected to Townsend's big-eared or spotted bats. As a potential unknown effect, the area would remain susceptible to a large wildfire. If fire could not be managed, a reduction of habitat effectiveness would occur. If habitat was altered and conifer trees burned this could impact foraging habitat quantity and distribution across the landscape. This could cause bats to move in location but is not likely to impact viability of the species.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres.

To date, studies assessing the impact of fire regimes on Spotted bats are not available. As Spotted bats tend to forage over open meadows and woodlands, some combination of silvicultural practices with prescribed fire to create open areas and maintain herbaceous plant diversity (and, presumably therefore, promote insect prey base diversity) may benefit this species (Schmidt 2003). Insect occurrence and density depend on adequate quantity, quality, proportions, configurations, and distribution of wet meadows and insect-supporting terrestrial vegetation,such as grasses and sedges in meadows and forest openings (Luce 2007).

No treatments will be conducted within open meadows of grasses or sagebrush. Minimal treatments are proposed for and would be conducted in riparian areas while no treatments would be conducted in bogs, or seeps where prey for bats may be disrupted.

This proposed treatment could have an effect on the habitat effectiveness of bats. Bats find moths and other important inscect prey species in conifer forests. As treatments are implemented bats would have to move to other non treated areas. This would compress the use with bats already existing in the non treated areas. Therefore, there could be a direct and indirect impact on this species in the short-term. This could cause bats to move in location but is not likely to impact viability of the species. However, a long-term benefit would be realized after the forest successional stages became more advanced.

Cumulative Effects:

Past, present and future activities on Monroe Mountain that would affect bat habitat are minmal. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing, habitat treatments and private land development on Monroe Mountain. Maintaining a balance of forested ecosytems, sage-grass and riparian habitat have helped provide good bat habitat on Monroe Mountain. There are ample small cliffs and outcrops for hibernating. A large scale forestry project will reduce the amount of insect prey available in the short term. Long-term positive affects will be added as riparian systems improve. Healthy young forests will provide a variety and abundance of insects.

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Three-toed Woodpecker *(Picoides tridactylus)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Three-toed woodpeckers are found on Monroe Mountain within the Engelmann spruce forest types. These are mainly found on the central and northern part of the mountain. We have noticed they follow the spruce bark beetle outbreaks on the mountain. Past mechanical forestry projects on Monroe Mountain in Engelmann spruce have implemented forest plan guidance by managing for snags in groups and clumps of snags for cavity dependent species including the Three-toed woodpecker. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirect effects would occur in the form of habitat being removed through thinning or burning. Trees removed or burned may contain nest cavities, prey, and cover for the woodpecker.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct impact to habitat for the Three-toed woodpecker.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. Wildfire would likely occur in the summertime when the acreage could be larger, without a mosaic pattern, and the severity could

be high and plant recovery and re-establishment would take longer. As this occurs, prey species abundance would decrease thus effecting Three-toed woodpeckers.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area).

The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section). If the full amount of these percentages were treated and the appropriate number of snags, as described in the Forest Plan were retained, Three-toed woodpecker populations would persist in the area and benefit from the insects associated with post-fire treatments.

Implementation of any of the action alternatives (2-5) will temporarily reduce Three-toed woodpecker habitat in the landscape. Because the landscape is not lacking snags, suitable habitat (snag habitat) will be present across the landscape over time. As with all landscapes dominated by dead trees, as these areas decay and turn into down woody debris, insect populations will be reduced and woodpecker populations will move and may decrease on the landscape. Implementation of these action alternatives may slow down the rapid progression of tree decay and allow woodpecker populations to be managed over a larger period of time. To minimize impacts from prescribed fire, as described in the EIS, no direct fire ignitions would occur during the nesting season (usually between May 15th and August 1st) in areas where cavity nesting birds such as Three-toed woodpeckers are found. Delaying any ignition until the late summer will allow cavity nesting birds to have completed their nesting, incubation, fledgling and dispersal portion of their life cycle for the season. The adults and young would be able to flee from dangerous conditions that fire may impose on them. To minimize impacts from mechanical treatments on cavity nesting birds found in a spruce-fir dominated forest type, thinning activities would usually commence after July 15. This timing would allow time for cavity nesting birds to complete their nesting and rearing season. Mechanical treatments provide the opportunity to selectively leave snags in groups or clumps throughout the site to provide a continuance of habitat features that are useable during and after the treatment. These design features provide protection (delayed timing of treatments in the season) of the nesting-rearing season while providing habitat features (leaving snags and clumps of trees and 40% non-treated forested throughout the project) needed for future viable populations on Monroe Mountain.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to Three-toed woodpecker in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Past spruce beetle outbreaks have provided a flush in prey for all woodpecker species on the mountain, but especially the Three-toed. Populations of Three-toed woodpeckers thrive in beetle infested areas. As these areas are harvested or natural beetle life cycles complete populations of woodpeckers may vary over time. Future fire treatments will attract woodpeckers for a few years as they scavenge for bugs under the bark of burned trees. Populations on Monroe Mountain are expected to persist, be viable, and fluctuate with natural insect cycles and habitat treatment.

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Flammulated Owl ***(Otus flammeolus)***

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: On the Richfield Ranger District Flammulated owls have been detected in Douglas fir stands that contain some mature spruce and a light mix of aspen. The proposed project area contains acres of spruce, sub-alpine fir, aspen and Douglas fir. Flammulated owl surveys to regional protocol were conducted in the project area in 2007, 2008, 2009, 2011 and 2014. Surveys for the 2014 field season were verified, analyzed and documented in the District database record and in GIS database at the end of the field season. At this time mapping occured to delineate (with our best judgment and ground knowledge) Douglas fir habitat that may be suitable for Flammulated owls. Based on these surveys, we have determined there are approximately 1,550 acres of Douglas fir dominated forest type on Monroe Mountain. Not all of these acres are found within areas proposed for treatments. To help minimize impacts to Flammulated owls, as described in chapter 2 of the EIS, no fire ignitions that would likely result in moderate to high fire severities in Douglas fir dominated areas would occur. Low severity fire in the Douglas fir dominated stands during the non-nesting season (usually before May 15 and after August 1) would be allowed. Very light "low severity" treatments of prescribed burning are possible to accomplish an understory type treatment while leaving over-story components intact (understanding that fire can have unpredictable actions we will be cautious to burn under uncertain conditions). Flammulated owls were detected each of the five years and were specific to Douglas fir habitat. Douglas fir habitat occurs within the project area mainly on the rims, and sharp ridgelines. The Douglas fir component of the spruce-fir mapped acres does not consist of a large quantity. It occurs in smaller acres and is patchy across the

landscape. Moths and small mammals are the primary prey for owls. Moths are directly associated with trees. Owl surveys were conducted along major roads and trails as well as on foot through suitable habitat. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirect effects would occur in the form of habitat being removed through thinning or burning. Trees removed or burned may contain cover for the Flammulated owl.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse impacts on population numbers for the Flammulated Owl.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow an indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. Wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment could take longer. This type of wildfire could be stand replacing on such large scale that it would create areas of even age forest succession and be different than the type of forest that exist today, which provides optimum Flammulated owl foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning.

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

Seral and stable aspen are found within their hunting territory. In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen in the proposed project alternative 2 proposes 51% for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area).

We estimate approximately 1,550 acres of Douglas fir are represented in the spruce-fir mix. Douglas fir habitat occurs within the project area mainly on the rims, and sharp ridgelines. The Douglas fir component of the spruce-fir mapped acres does not consist of a large quantity. It occurs in smaller acres and is patchy across the landscape. With the thinning treatments, the retention of large snags would occur where they are lacking in order to meet Forest Plan guidelines. Where available, stands would continue to maintain the number of snags required by the Forest Plan to support Flammulated owl nesting.

As conifer treatments occur around Douglas fir habitat, Flammulated owls would persist in the area and benefit from the insects associated with post-fire treatments. Treatment areas are designed to leave nesting habitat with an associated foraging area. No fire ignitions, that would likely result in moderate to high fire severities in the Douglas fir dominated areas, would occur as to preserve Flammulated owl habitat and populations on the mountain. Low severity fire in the Douglas fir dominated stands during the non-nesting season (usually before May 15th and after August 1st) would be allowed (refer to “low”, “medium” and “high” fire severity definitions in the EIS). By avoiding the Doug fir dominated stands with moderate and high fire severities, habitat effectiveness will be maintained and viable populations of owls will be retained on Monroe Mountain. From past fire experiences on Monroe Mountain it has been evident that it is hard to withhold fire from spreading into Doug fir stands. This is mainly due to Doug fir stands being surrounded by and inter-mingled with sub-alpine fir. This condition has caused fire in the past to transfer into Doug fir stands and affect owl habitat in some cases. The use of mechanical thinning treatments and/or control lines, as described in the EIS, and the use of low severity fire would help minimize impacts from prescribed fire. The use of mechanical thinning treatments and/or control lines and low severity fire would help maintain the existing Douglas fir stands and components needed for Flammulated owls to persist on the mountain.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to Flammulated owls in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Past timber projects have only affected small patches of Douglas fir habitat. Present Douglas fir patches found around the mountain commonly are used by Flammulated owl. Past and present conditions have left habitat effectiveness for owls in good condition. Future activities could play a role in how much habitat is disturbed or removed in the Douglas fir type. This would have an effect on the amount and quality of habitat that would remain for Flammulated owl.

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Management Indicator Species (MIS)

Rocky Mountain Elk *(Cervus elaphus)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Elk habitat occurs across the entire Fishlake National Forest and the project area. There are approximately 1,458,049 acres of potentially suitable habitat on the Fishlake National Forest. Within the Fishlake LRMP II-29, Table II-8B, the estimated population size of elk on the Fishlake National Forest was 2,000 head in 1986 when the LRMP was signed. Now the estimated population on Monroe according to UDWR as of winter 2014 is 1,250 (Table 11). Helicopter counts are collected on a three-year basis. As a result of habitat improvement projects across the Forest, these data show an increase since 1986 when the plan was signed. The Division of Wildlife Resources collects population data and monitors harvest levels and trends of all big game populations, such as elk.

Big game are economically important species; hunting demands are high and expected to continue. This area is managed as a trophy bull elk hunt with some variation of spike bull hunts being tried over the past 5 years. Numerous cow tags have been issued in recent years to keep the herd within the respective Herd Management Plan.

Elk can be found throughout the analysis area in spring, summer and fall periods of the year. The area provides ideal habitat for elk during all important life cycle periods except for winter. The lower elevation portions of the proposed project area are transitional range which is when big game animals spend time post winter and post summer.

Hiding cover is defined as vegetated areas where brush and trees are tall or dense enough to hide 90 percent of a deer or elk at 200 feet. Foraging habitat is defined as areas that provide an adequate level of browse and non-woody plants for food. Areas of conifer/aspen and solitary aspen communities are especially important for elk calving habitat. These areas can be found throughout the analysis area. Elk prefer habitats where they are least disturbed. Studies have shown that big game avoid areas up to half a mile on each side of a road. This distance depends on topography, vegetation, and vehicle use near the road. Avoidance of these roaded areas decreases the habitat effectiveness in providing for big game needs.

The proposed project area is located at higher elevations that support a majority of summer range conditions for elk. A good balance of forage to cover ratios mixed with randomly dispersed water sources make the area ideal habitat for elk calving and rearing, breeding, and foraging in preparation for winter months. A large portion of the proposed treatment area is in a 4B (Managed for MIS) management stategy according to the Fishlake Land and Resource Management Plan. Elk use the entire proposed treatment area. Some areas within the project area are utilized more based on specific habitat components unique to the life cycle of elk. Elk are an economically important species in most all states that have established elk herds. The Monroe elk herd has an important economic value to the local communities. Non-consumptive

use provides non hunters or non-permit holders the opportunity to travel to the mountain to view, photograph, listen to, and enjoy elk in a natural wild environment. The number of people that enjoy non-consumptive elk opportunites is greater than the consumptive user. Monroe Mountain Elk Unit is designated as a trophy bull unit where a person has to apply for a chance to draw one of approximatley 30-40 tags offered each year for a mature bull elk. In each case a tremendouse amount of money is spent in the local communities for gas, optical equipment, camera equipment, hunting equipment, camping equipment and all associated vehicle costs as well as many other associated costs. For this reason local public support is high to keep an abundant elk herd on the mountain. This support for elk by the public could be counter productive to the project if elk numbers need to be reduced to facilitate the success of aspen recruitment after treatments. It is well documented that elk are attracted to areas that have been burned or mechanically treated and aspen regeneration and recruitment is part of the management objective. Camera trap studies on Monroe Mountain verify elk, deer, cattle and sheep are attracted to aspen regeneration. Elk are new to the mountain in recent decades. They were not introduced to Monroe Mountain but established from neighboring units that had elk re-introduction in the early 1900s. The first elk sightings were in the early 1970s. The UDWR manages the population by limited entry bull hunts, spike only bull hunts, and cow hunts to keep the population within the elk plan level. Changes in hunt timing, location, and permit numbers per elk sex are recommened by the UDWR, presented through the public Regional Advisory Council Process and then made law on an annual basis through the Utah Wildlife Board. This process demonstrates that the Forest Service does not control hunted game species in the State of Utah.

Based on UDWR data current elk populations on Monroe Mountain have trended in the following way in Table 7:

In summary elk are a Management Indicator Species supported by the Fishlake LRMP, a locally important ecological species, a economically important species, a protected hunted population managed by the Utah Division of Wildlife Resources through a public process and through a cooperatively signed management plan.

The Monroe Mountain Working Group (MMWG) has developed a “Thresholds Document” and is recommending this document for inclusion in this project. It is designed to provide quantifiable browse thresholds and response options that could occur if browse thresholds are exceeded in treatment areas or if stable aspen stands don’t show improvement. This would provide protection of aspen regeneration from ungulate browsing and trigger mechanisms that could come into play if aspen browsing is occurring at unacceptable levels. Opportunities to monitor and manage successful aspen regeneration through the direction of the Thresholds Document would range from livestock use modification, big game hunts targeted at population reductions in target areas, wildlife hazing, wildlife fencing, and others (MMWG 2014). This document has received support from the local Regional Advisory Council and the State Wildlife Board

Table 7: Estimated elk population on Monroe Mountain Management Unit (UDWR)

YEAR	POPULATION ESTIMATE
1970's	Few elk sighted, 50 or less
1980's	Roughly 500 animals by end of 1980's
1982 (first hunt-10 permits)	---
1994 (first helicopter survey)	1,000
1997	809
2000	1,775
2003	1,300
2006	900
2009	1050
2013	1,300 (Modeled Population)
2014	1,250 (Modeled Population)

Current Monroe Elk Plan Objective = 1,800

Direct effects to elk may occur during the implementation period when burning operations may cause some individuals to be burned over. They would also be driven from their cover areas and need to re-located to adjacent areas. Indirectly, elk would compound use on other adjacent areas for cover and forage with other elk. This could cause an over use of forage when compounded by livestock.

Cumulative effects for elk will be considered on National Forest System Lands (excluding BLM, State, or private) across the entire Monroe Mountain Unit since elk are migratory leaving summer range, transition range, and end up on winter range from November through April (depending length of winter condition).

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse impacts to habitat for late serial species, or improved habitat effectiveness on population numbers or viability of this species.

Since there would be no vegetation treatments under Alternative 1, no decrease in immediate habitat effectiveness for elk would occur. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may create decreases in habitat effectiveness on the quality of elk habitat over time as the variety of vegetation species is reduced as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain suitable until an uncharacteristic event occurs. The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create areas of even age forest succession and be different than the type of forest that exist today. The balance of forage to cover ratios would likely affect usable elk habitat across the landscape of Monroe Mountain. This would cause elk to concentrate (on a short term basis 2-4 years) on other parts of the range which would compound effects to forage and space where other elk traditionally occupy.

This type of uncharacteristic wildfire could be stand replacing on such a large scale that it would create an even age forest succession and alter the type of forest that exist today providing optimum elk habitat across the landscape of Monroe Mountain. However, if this type of change occurred and the landscape had time to recover for a few years, elk would find the burned area attractive for forage consumption. A lack of cover for elk could be an issue.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

Seral and stable aspen are found within their spring, summer and fall life cycle areas. In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area).

Elk will calve in an aspen dominated forest type, but will soon train their offspring to use the

mixed-conifer and spruce-fir forest types as thermal and hiding cover. A balance of open meadows associated with cover (forested types) is an important combination for elk on the mountain.

Direct impacts for elk will occur when treatments occur. They will be displaced from their traditional summer ranges and have to combine with other elk in other summer range areas on the mountain. This could compress elk use in other areas; however, this would be short-term (<5 years) as the sudden response from treatments would improve and increase the summer forage for elk. Hiding cover would be affected to some extent, but with the percentages designed to be left for goshawk foraging areas (40%), ample cover should be maintained. Elk depend on a balance of forage to cover ratios to fulfill a balanced life cycle. As stated, as large acres of treatment occur, elk would be displaced to other areas where they would combine use with other elk. This would compound the forage use in the shared area making it problematic to maintain healthy aspen regeneration. A need to reduce elk numbers may be requested from the UDWR to minimize impacts to aspen regeneration. Once the treated areas begin to respond and have re-established a forage base, elk would return and utilize the area once again (<5 years). Indirect affects would be realized in other parts of the mountain as elk are dispersed from the treatments. Deer, cattle and sheep range may be impacted if dispersed elk use their normal summer ranges. However, this would be a short term issue as the treated areas offered ample opportunities for additional forage into the future. This cumulative response would mean a better summer range to raise young, and improve body condition for winter months.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to elk in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Some recent work has been done to clear cut, thin, or burn mixed conifer to stimulate aspen regeneration. Some of these recent treatments have caused a temporary shift in spring, summer and fall elk use in the treatment areas. Once the understory has re-established elk find the burned areas very attractive. They have to learn to balance cover areas. Cover areas would be island left un-burned in the mosaic pattern. These should be left unburned to allow a future balance of cover to forage. Hunters are attracted to newly burned areas because big game are attracted to these areas. Increased harvest success would occur in treated areas as well as an increase in wounding loss. Overall, and in the long-term of large scale treatments such as this proposal, as mosaic patterns are part of the design, big game animals are expected to thrive on the mountain.

Cumulative effects for elk will be considered on National Forest System Lands (excluding BLM, State, or private) across the entire Monroe Mountain Unit since elk are migratory leaving summer range, transition range, and end up on winter range from November through April (depending length of winter condition).

Section 5 of this report is the describes the cumulative effects area, it’s size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also

decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are “other” activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Mule Deer *(Odocoileus hemionus)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: The DWR collects post-season population data and monitors harvest levels and population trends of all big game species, such as mule deer. It should be noted that a hunting unit may be within approved herd unit objectives, and as a result of management strategies, population numbers may be reduced. The current and 5 year projected herd objective for Monroe Mountain is 8,000 deer. The unit is nearing herd unit objective (Table 12).

Hunting strategies in Utah are made through the Regional Advisory Council and Wildlife Board process. This process has been designed to involve the people in public meetings with a wide range of interests in Utah. Decisions for all hunting season bag limits and season dates are rendered based on political as well as biological input. This process demonstrates that the Forest Service does not control hunted game species in the State of Utah. Population fluctuations are the result of numerous influences including drought, cold winters, increased predation from large mammals, and habitat modifications and degradation. Although the numbers of young are recruited into the population are on a decline, the data show an increase in mature bucks into the population as well as an increase in buck to doe ratios.

The proposed project area is located at higher elevations that support summer range conditions for deer. A good balance of forage to cover ratios mixed with randomly dispersed water sources make the area ideal habitat for deer fawining and rearing, some deer rutting, and foraging in preparation for winter months.

A large portion of the proposed treatment area is in a 4B (managed for MIS) management stategy according to the Fishlake Land and Resource Management Plan. Cumulative effects for deer are discussed in the cumulative effects section.

According to UDWR data historical to current deer populations on Monroe Mountain are:

Table 12: Estimated deerpopulation on Monroe Mountain Management Unit (UDWR)

YEAR	BUCK HARVEST	POPULATION EST.
1938	356	2,700
1941	823	6,300
1950	815	6,300
1960	2,000	15,400
1970	1,600	12,300
1980	1,161	8,900
1992	871	6,700

2000	1,031	7,900
2010	252	4,900
2013		7,800
2014		7,300

Current Monroe Deer Plan Objective = 8,000

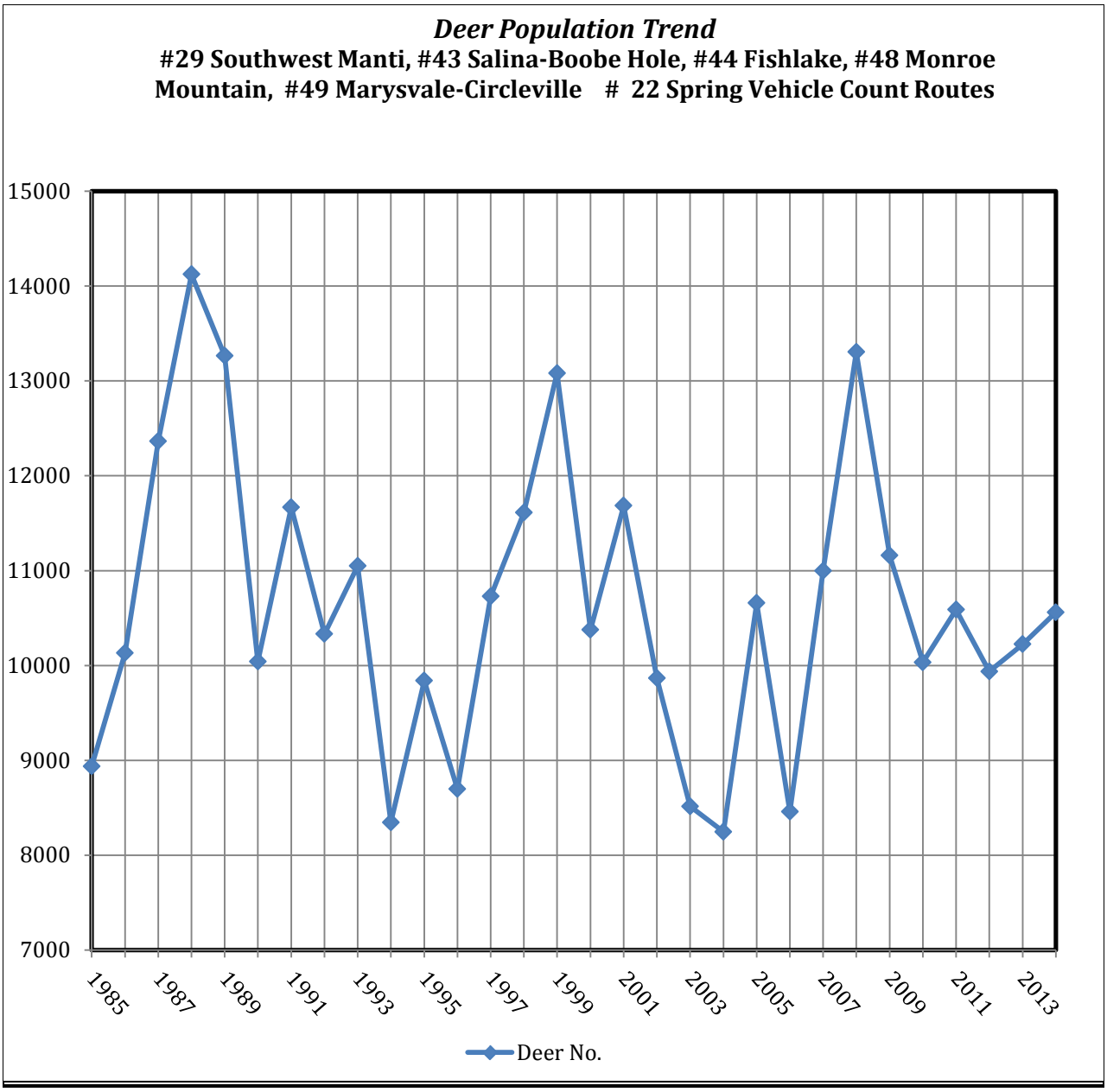

Chart 1: Deer trend data for Central Utah including Monroe Mountain (Greenwood 2014).

Chart 1 shows spring trend data of deer populations in Central Utah (Sevier, Piute, Wayne, So.

Sanpete). According to these data deer have peaked on an average of every 10 years.

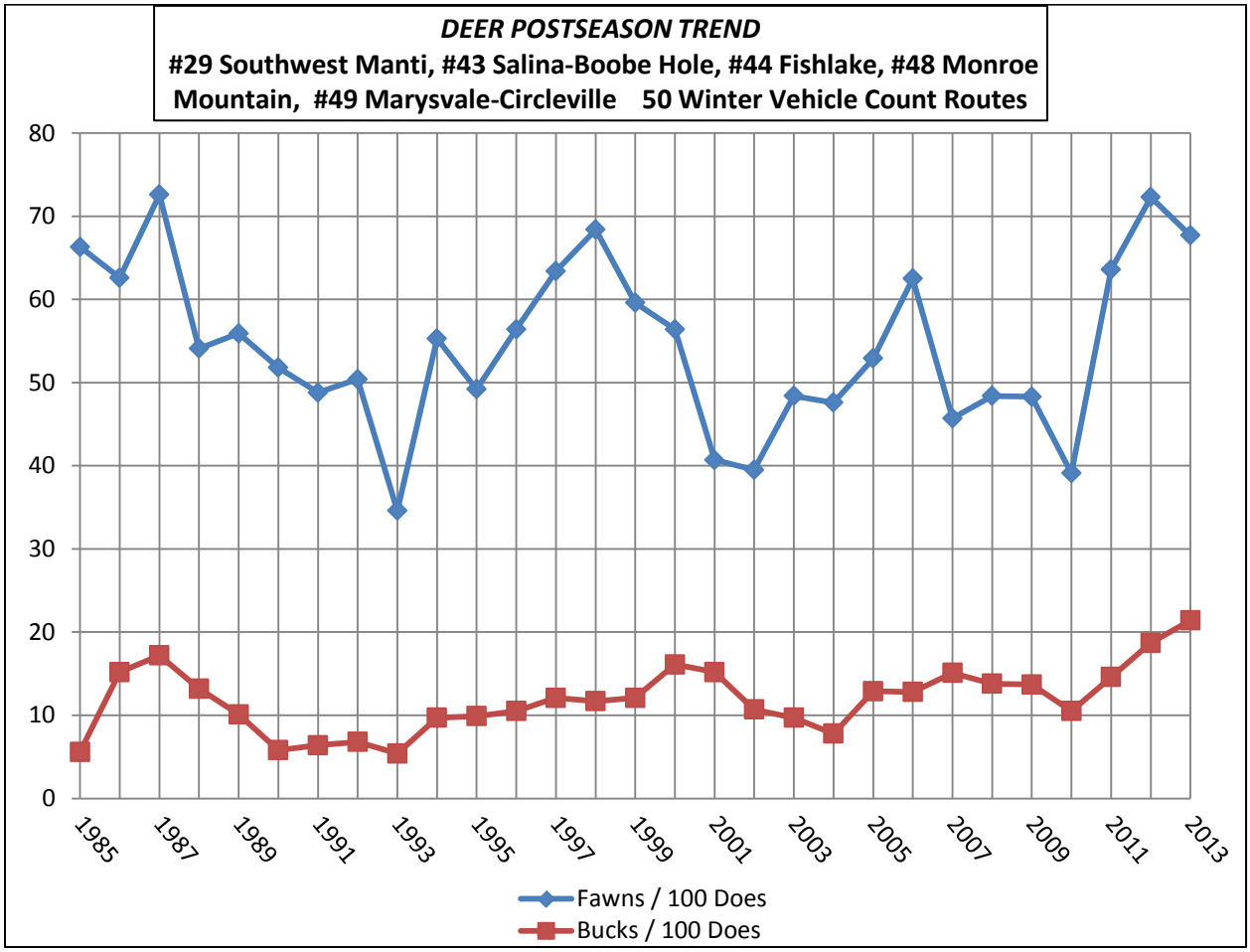

Chart 2: Deer post-season trend data for Central Utah including Monroe Mountain (Greenwood 2013).

Chart 2 shows post-season trend data of deer populations in Central Utah (Sevier, Piute, Wayne, So. Sanpete). This chart shows buck to doe ratios and fawn to doe ratios. Data shows that buck to doe ratios are at an almost 30 year peak as well as fawn to do ratios.

Annual deer monitoring data has been gathered by the UDWR, BLM and USFS. Charts 1 and 2 represent data gathered by the BLM and USFS. The need to gather deer (MIS) data by Federal agencies is connected to their respective land management plans.

Post season deer data is gathered during the rut period (mid November-December) and when deer have migrated from the higher elevations to “transition” and “winter range” areas. A more accurate count is obtained during this time when deer are more concentrated and the highest number of bucks are found with the doe and fawn groups. Since the proposed project is designed in the higher elveations of Monroe Mountain, which is considered summer range, no winter range areas should be affected by the project. The UDWR has mapped deer winter range habitat for Monroe Mountain which is diplayed on Figure 6:

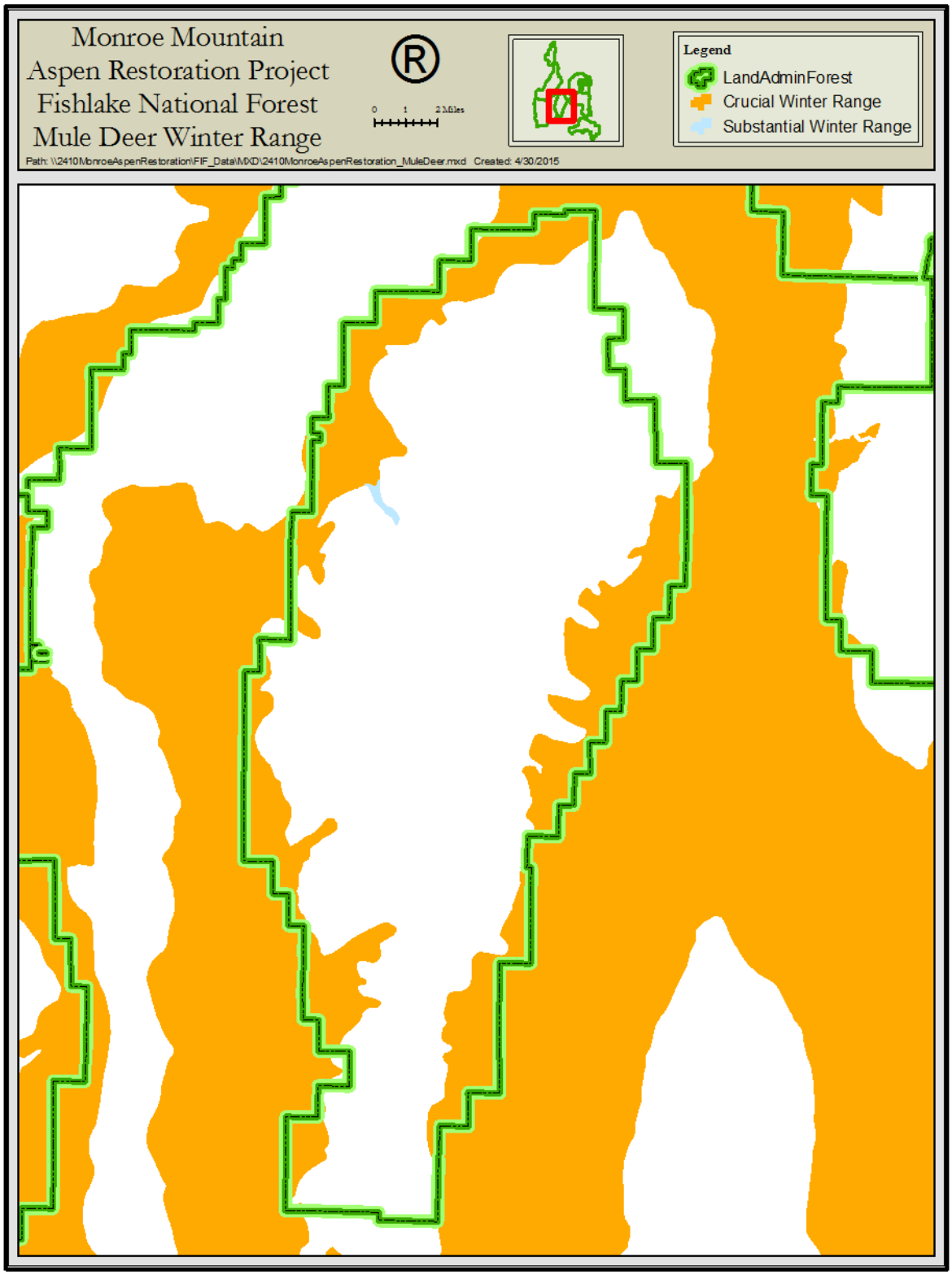

Figure 6: Map of Deer Winter Range for Monroe Mountain (UDWR database).

Direct effects to deer may occur during the implementation period when burning operations may cause some individuals to be burned over. They would also be driven from their cover areas and need to re-located to adjacent areas. Indirectly deer would compound use on other adjacent areas for cover and forage with other deer.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse impacts to habitat for late serial species, or improved habitat effectiveness on population numbers or viability of this species.

Since there would be no vegetation treatments under Alternative 1, no decrease in immediate habitat effectiveness for deer would occur. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may create decreases in habitat effectiveness on the quality of deer habitat over time as the variety of vegetation species is reduced as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain suitable until an uncharacteristic event occurs. The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of uncharacteristic wildfire could be stand replacing on a large scale that it could create areas of even age forest succession and be different than the type of forest that exist today. The balance of forage to cover ratios would likely affect usable deer across the landscape of Monroe Mountain. This would cause deer to concentrate (on a short term basis 2-4 years) on other parts of Monroe Mountain which would compound effects to forage and space where other deer traditionally occupy.

This type of wildfire could be stand replacing on a large scale that it would create an even age forest succession and alter the type of forest that exist today providing optimum deer habitat across the landscape of Monroe Mountain; however, if this type of change occurred and the landscape had time to recover for a few years, deer would find the burned area attractive for forage consumption. A lack of cover would become an issue with fewer trees per acre.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning.

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

Seral and stable aspen are found within their spring, summer and fall life cycle areas. In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area).

Deer will fawn in an aspen-mountain brush dominated forest type, but will soon train their offspring to use the aspen, mixed-conifer and spruce-fir forest types as thermal and hiding cover. A balance of open meadows associated with cover (forested types) is an important combination for deer on the mountain.

Direct impacts for deer will occur when treatments occur. Deer studies on Monroe Mountain indicate that most of the fawning occurs on the fringe areas of the Forest (Freeman, 2014). They will be displaced from their traditional summer ranges and have to combine with other deer in other summer range areas on the mountain. This could compress deer use in other areas. However, this would be short-term (<5 years) as the sudden response from treatments would improve and increase the summer forage for deer. Hiding cover would be affected to some extent, but with the percentages designed to be left for goshawk foraging areas (40%), ample cover should be maintained. Indirect affects would be realized in other parts of the mountain as deer are dispersed from the treatments. Elk, cattle and sheep range may be impacted if dispersed deer used their normal summer ranges. However, this would be a short term (<5 years) issue as the treated areas would offer ample opportunities for additional forage into the future. This cumulative response would mean a better summer range to raise young, and improve body condition for winter months.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Some recent work has been done to clear cut, thin, or burn mixed conifer to stimulate aspen regeneration. Some of these recent treatments have caused a temporary shift in spring, summer and fall deer use in the treatment areas. Once the understory has re-established deer find the burned areas very attractive. They have to learn to balance cover areas. Cover areas would be islands left un-burned in the mosaic pattern. These should be left unburned to allow a future balance of cover to forage. Hunters are attracted to newly burned areas because big game are attracted to these areas. Increased harvest success would occur in treated areas as well as an increase in wounding loss. Overall, and in the long-term of large scale treatments such as this proposal, as mosaic patterns are part of the design, big game animals are expected thrive on the mountain.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Cavity Nester Avian Group *(Hairy Woodpecker, Western Bluebird, Mountain Bluebird, Williamson's sapsucker)*

Hairy Woodpecker *(Picoides villosus)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Surveys for avian MIS have been conducted on the Fishlake National Forest (FNF) since the mid-1980s. Additional studies by "expert birders" were conducted on Monroe Mountain in 1994, 1998, 2002, 2011, 2012, and 2013. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. All other avian species that were detected during these surveys were also recorded while conducting birding routes. Eighty-seven different avian species have been identified within the proposed project area on Monroe Mountain. Other migratory birds are also undoubtedly found within the analysis area. A list of bird species documented on Monroe Mountain can be found in Table 9 and Appendix 1. In addition to these data, Utah State University has collected data across the Forest in aspen/conifer habitat types. Cavity nesting bird species were the focus of these efforts. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirect effects would occur in the form of habitat being removed through thinning or burning. Trees removed or burned may contain nest cavities, prey, and cover for the woodpecker.

In addition to these data, the BBS database (https://www.pwrc.usgs.gov/bbs/) displays a stable trend of Hairy woodpeckers in Utah (Chart 3). These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para 4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

Data used in this analysis comes from several sources. It has been collected on the Forest by Forest Service staff. Additional data sources include: BBS data and Nature Conservancy. The combination of these data demonstrates a stable population. On the Fishlake National Forest, a

large portion of forest habitats are potentially suitable and currently supply habitat for Hairy woodpeckers.

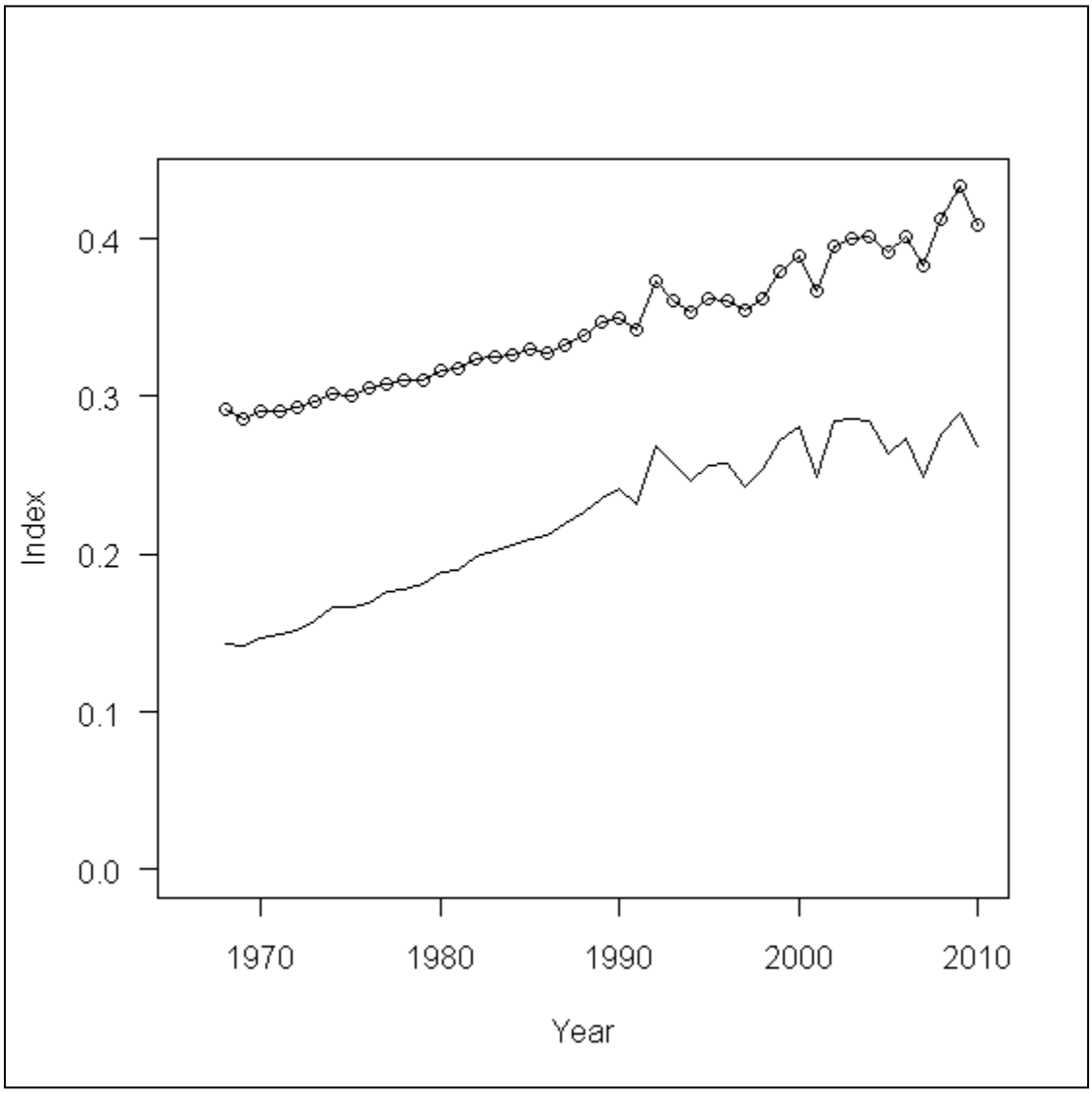

Chart 3: Hairy woodpecker trend in Utah (BBS and Nature Conservancy)

In 1994, 1998, 2001, 2002, 2011, 2012 and 2013 wildlife surveys specific to this project were conducted throughout the analysis area. Hairy woodpeckers were observed during these survey efforts within the analysis area. The survey data is located in the project record.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse effects on population numbers or viability of this species. Since there would be no vegetation treatments under Alternative 1, no adverse direct effects would be expected to the Hairy woodpecker. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have an effect on the quality of avian habitat over

time and on a variety of prey species as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. On the way to late successional stage forest conditions conifer encroachment into aspen forests would create a diversity of habitat components. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create areas of even age forest succession and be different than the type of forest that exist today, which provides optimum Hairy woodpecker foraging habitat across the landscape of Monroe Mountain. Woodpeckers are cyclic in nature and follow disturbance for foraging opportunities (see migratory bird section).

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area).

Cavity nesters use a range of aspen, mixed-conifer, and spruce fir to forage and develop cavities in trees for nesting. As Hairy woodpecker's are also dependent on aspen ecosystems on Monroe Mountain, treatments in the "Seral" and "Stable" aspen treatments of a large scale will affect the distribution and use by Hairy woodpeckers in the proposed treatment areas. Many avian species, including several species designated as Sensitive Species by Federal and state agencies, depend

on fire patterns for their dispersal and movements. Cavity-nesting birds, in particular, are often tied to fire-prone forests, and are responsive to fire and timber management activities (Saab, 2006). The effect to the group of cavity nesters will be directly related to the amount of trees thinned or burned in the proposed project area. Cavity nesters will be displaced, nest trees permanently damaged, and a few individuals may perish during implementation. The percentage of forested area that is required to be left unburned to meet the goshawk guidelines will cause a mosaic pattern of un-treated areas that displaced avian species will be able to use.

The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section). If the full amount of these percentages was treated and the Forest Plan standards related to snags was accomplished, the Hairy woodpecker populations would persist in the area and benefit from the insects associated with post-fire treatments.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Some recent work has been done to clear cut, thin, or burn mixed conifer to stimulate aspen regeneration. Some of these recent treatments have caused a displacement of use by avian species found within the previous treatment areas. Displacement of avian species in treatments will be long-term (20-50 years for some and short term (1-5) for others. Over time the treatment areas will range from an early succession forested ecosystem to a late successional forested ecosystem providing a variety of life cycle opportunities for different species of avian birds. As the forest re-develops different prey species, different tree species and age classes of trees will provide opportunities that will enhance species viability for cavity nesters.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Western Bluebird *(Sialia mexicana)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Data used in this analysis comes from several sources. It has been collected on the Forest by Forest Service staff. Additional data sources include: BBS data and Nature Conservancy. The combination of these data demonstrates a stable population. On the Fishlake National Forest, a large portion of forest habitats are potentially suitable and currently supply habitat for Western bluebird. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirect effects would occur in the form of habitat being

removed through thinning or burning. Trees removed or burned may contain nest cavities, prey, and cover for the Western bluebird.

In addition to these data, the BBS database (https://www.pwrc.usgs.gov/bbs/) displays an upward trend of Western bluebirds in Utah (Chart 4). These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

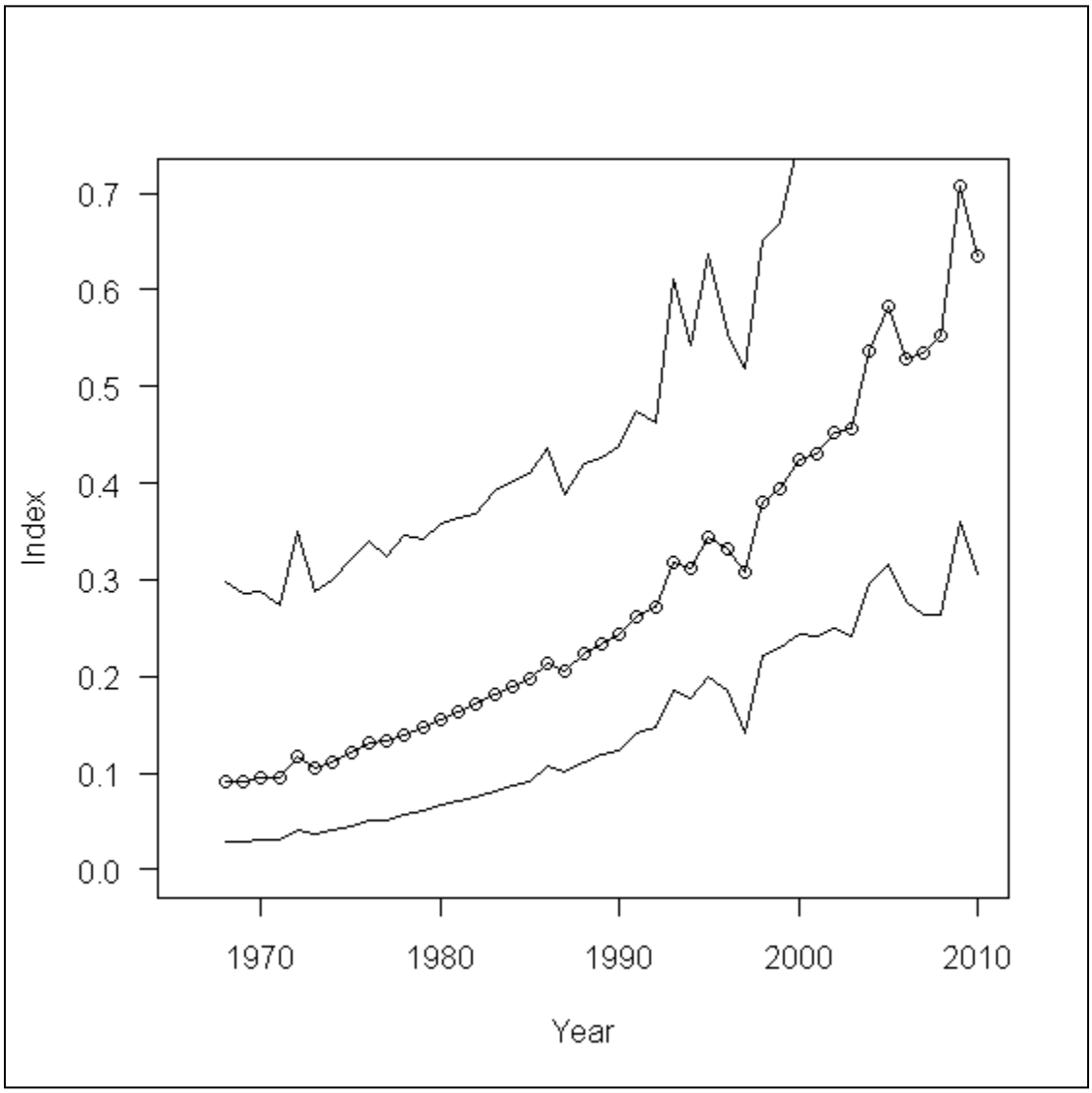

Chart 4: Western bluebird trend in Utah (BBS and Nature Conservancy)

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para

4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

Surveys for avian MIS have been conducted on the FNF since the mid-1980s. Additional studies by "expert birders" were conducted on Monroe Mountain in 1994, 1998, 2002, 2011, 2012, and 2013. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. All other avian species were also recorded while conducting survey routes. In addition to these data, Utah State University has collected data across the Forest in aspen/conifer habitat types. Cavity nesting bird species were the focus of these efforts. Trend studies continue in the area on an annual basis.

As a result of the data presented in this document, few locations have been monitored and additional monitoring sites should be identified. While the numbers collected on the Forest are somewhat static, data collected by the BBS indicate a sharp population increase in about 1985. Data presented by the Nature Conservancy demonstrate a "vulnerable" population in Utah. Considering all of the data presented in this document, as well as my professional judgment, this population is likely stable and viable across the Forest. Additional monitoring is needed to continue to evaluate the viability of this species. The Western bluebird in Utah has been ranked as "vulnerable".

In 2001, 2002 and 2013 wildlife surveys specific to this project were conducted throughout the analysis area. Western bluebirds were observed during these studies within the analysis area. The survey data is located in the project record. Eighty-seven different avian species have been identified within the proposed project area on Monroe Mountain. Other migratory birds are also undoubtedly found within the analysis area. A list of bird species documented on Monroe Mountain can be found in Table 9 and Appendix 1.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under this Alternative, no adverse direct effects would be expected to the Western bluebird. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. On the way to late successional stage forest conditions conifer encroachment into aspen forests would create a diversity of habitat components. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create areas of even age forest succession and be different than the type of forest that exist today, which provides optimum Western bluebird foraging habitat across the landscape of Monroe Mountain. Cavity nesters are cyclic in nature and follow disturbance for foraging opportunities (see migratory bird section).

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning.

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area).

Cavity nesters use a range of aspen, mixed-conifer, and spruce fir to forage and develop cavities in trees for nesting. As Western bluebirds are also dependent on aspen ecosystems on Monroe Mountain, treatments in the “Seral” and “Stable” aspen will also affect the distribution and use by Western bluebirds in the proposed treatment areas. Many avian species, including several species designated as Sensitive Species by Federal and state agencies, depend on fire patterns for their dispersal and movements. Cavity-nesting birds, in particular, are often tied to fire-prone forests, and are responsive to fire and timber management activities (Saab et. al. 2006). The effects to the group of cavity nesters will be directly related to the amount of trees thinned or burned in the proposed project area. Cavity nesters will be displaced, nest trees permanently damaged, and a few individuals may perish during implementation. The percentage of forested area that is required to be left unburned to meet the goshawk guidelines will cause a mosaic pattern of un-treated areas that displaced avian species will be able to use.

The proposed percentage treated is of the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section). If the full amount of these percentages was treated and the Forest Plan

standards related to snags was accomplished, the Western Bluebird populations would persist in the area and benefit from the insects associated with post-fire treatments.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Some recent work has been done to clear cut, thin, or burn mixed conifer to stimulate aspen regeneration. Some of these recent treatments have caused a displacement of use by avian species found within the previous treatment areas. Displacement of avian species in treatments will be long-term (20-50 years for some and short term (1-5) for others. Over time the treatment areas will range from an early succession forested ecosystem to a late successional forested ecosystem providing a variety of life cycle opportunities for different species of avian birds. As the forest re-develops different prey species, different tree species and age classes of trees will provide opportunities that will enhance species viability for cavity nesters.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Mountain Bluebird *(Sialia currucoides)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: The BBS database (https://www.pwrc.usgs.gov/bbs/) displays an upward stable trend of the mountain bluebirds in Utah (Chart 5). These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

Surveys for avian MIS have been conducted on the FNF since the mid-1980s. Additional studies by "expert birders" were conducted on Monroe Mountain in 1994, 1998, 2002, 2011, 2012, and 2013. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. All other avian species were also recorded while conducting survey routes. In addition to these data, Utah State University has collected data across the Forest in aspen/conifer habitat

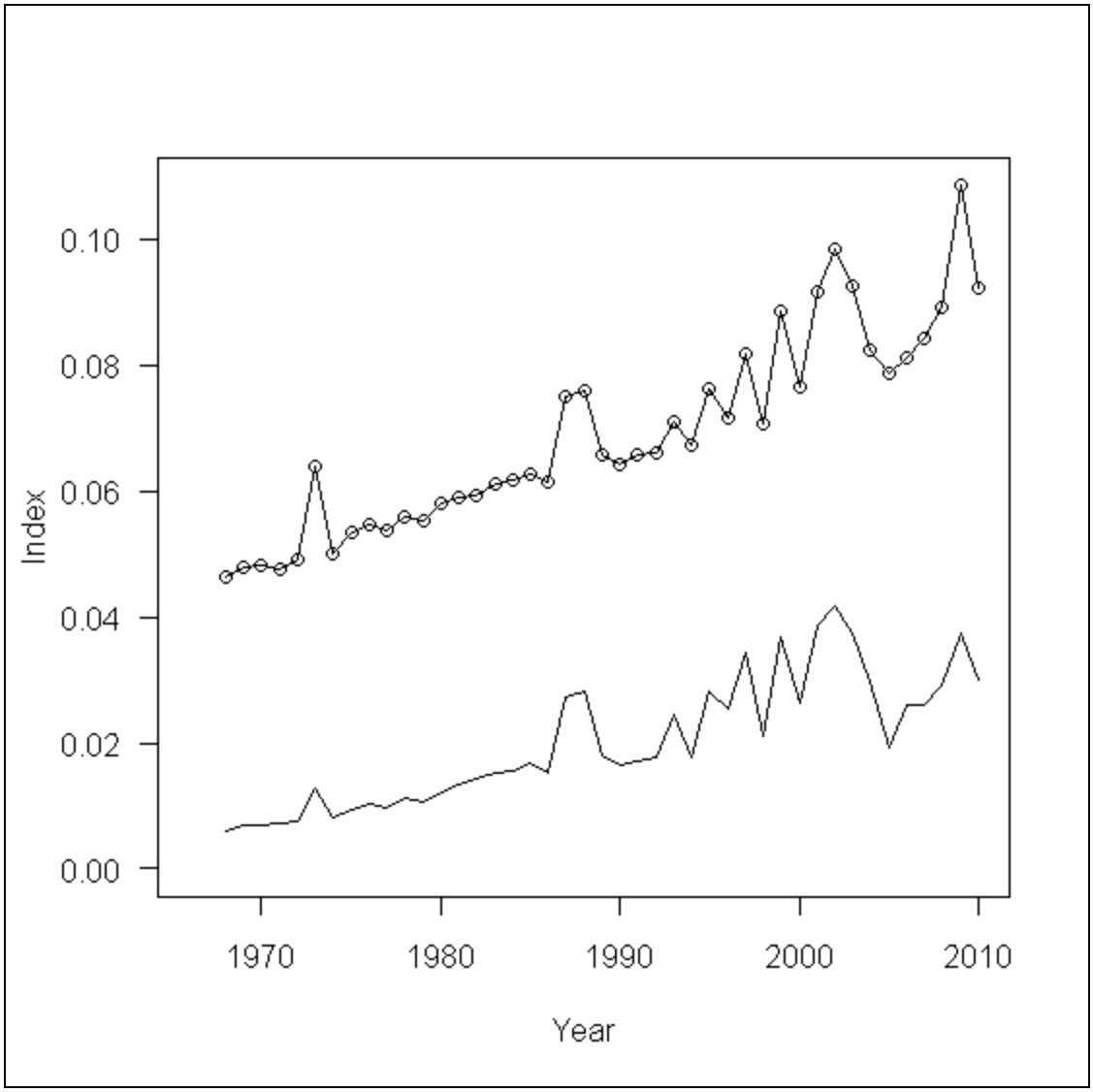

Chart 5: Mountain bluebird trend in Utah (BBS and Nature Conservancy)

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para 4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

types. Cavity nesting bird species were the focus of these efforts. Trend studies continue in the area on an annual basis.

Data used in this analysis comes from several sources. It has been collected on the Forest by Forest Service staff. Additional data sources include: BBS data and Nature Conservancy. The combination of these data demonstrates a stable population. On the Fishlake National Forest, a large portion of forest habitats are potentially suitable and currently supply habitat for Mountain bluebird.

As a result of these data collected over the past years, as well as data collected during BBS, and the Nature Conservancy data, the trend for this species is stable to slightly up on the Forest.

Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirect effects would occur in the form of habitat being removed through thinning or burning. Trees removed or burned may contain nest cavities, prey, and cover for the Mountain bluebird.

In 2011, 2012 and other years including 2013 wildlife surveys specific to this project were conducted throughout the analysis area. Mountain bluebirds were observed during these studies within the analysis area. The survey data is located in the project record.

Field surveys for MIS/TES wildlife species recorded sightings of various cavity-nesting bird species in the proposed project area. Information in the Life History paper (Rodriguez 2008) concludes that hairy woodpecker, western bluebird, and mountain bluebird species are stable and the populations are viable for the Fishlake NF and in the State of Utah. Eighty-seven different avian species have been identified within the proposed project area on Monroe Mountain. Other migratory birds are also undoubtedly found within the analysis area. A list of bird species documented on Monroe Mountain can be found in Table 9 and Appendix 1.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under this Alternative, no adverse direct effects would be expected to the Mountain bluebird. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. On the way to late successional stage forest conditions conifer encroachment into aspen forests would create a diversity of habitat components. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create areas of even age forest succession and be different than the type of forest that exist today, which provides

optimum Mountain bluebird foraging habitat across the landscape of Monroe Mountain. Cavity nesters are cyclic in nature and follow disturbance for foraging opportunities (see migratory bird section).

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area).

Cavity nesters use a range of aspen, mixed-conifer, and spruce fir to forage and develop cavities in trees for nesting. As Mountain bluebirds are also dependent on aspen ecosystems on Monroe Mountain, treatments in the “Seral” and “Stable” aspen will also affect the distribution and use by Mountain bluebirds in the proposed treatment areas. Many avian species, including several species designated as Sensitive Species by Federal and state agencies, depend on fire patterns for their dispersal and movements. Cavity-nesting birds, in particular, are often tied to fire-prone forests, and are responsive to fire and timber management activities (Saab, et. al. 2006). The effect to the group of cavity nesters will be directly related to the amount of trees thinned or burned in the proposed project area. Cavity nesters will be displaced, nest trees permanently damaged, and a few individuals may perish during implementation. The percentage of forested area that is required to be left unburned to meet the goshawk guidelines will cause a mosaic pattern of un-treated areas that displaced avian species will be able to use.

The proposed percentage treated is of the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section). If the full amount of these percentages was treated and the Forest Plan standards related to snags was accomplished, the Mountain Bluebird populations would persist in the area and benefit from the insects associated with post-fire treatments.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Some recent work has been done to clear cut, thin, or burn mixed conifer to stimulate aspen regeneration. Some of these recent treatments have caused a displacement of use by avian species found within the previous treatment areas. Displacement of avian species in treatments will be long-term (20-50 years for some and short term (1-5) for others. Over time the treatment areas will range from an early succession forested ecosystem to a late successional forested ecosystem providing a variety of life cycle opportunities for different species of avian birds. As the forest re-develops different prey species, different tree species and age classes of trees will provide opportunities that will enhance species viability for cavity nesters.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Williamson's sapsucker *(Sphyrapicus thyroideus)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Eighty-seven different avian species have been identified within the proposed project area on Monroe Mountain. Other migratory birds are also undoubtedly found within the analysis area. A list of bird species documented on Monroe Mountain can be found in Table 9 and Appendix 1.

Data used in this analysis comes from several sources. It has been collected on the Forest by Forest Service staff. Additional data sources include: BBS data and Nature Conservancy. The combination of these data demonstrates a stable population (Chart 6). On the Fishlake National Forest, a large portion of forest habitats are potentially suitable and currently supply habitat for Williamson's sapsucker. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirect effects would occur in the form of habitat being removed through thinning or burning. Trees removed or burned may contain nest cavities, prey, and cover for the Williamson's sapsucker.

In 1994, 1998, 2001, 2002, 2011, 2012 and 2013 wildlife surveys specific to this project were conducted throughout the analysis area. Williamson's sapsucker's were observed during these survey efforts within the analysis area. The survey data is located in the project record.

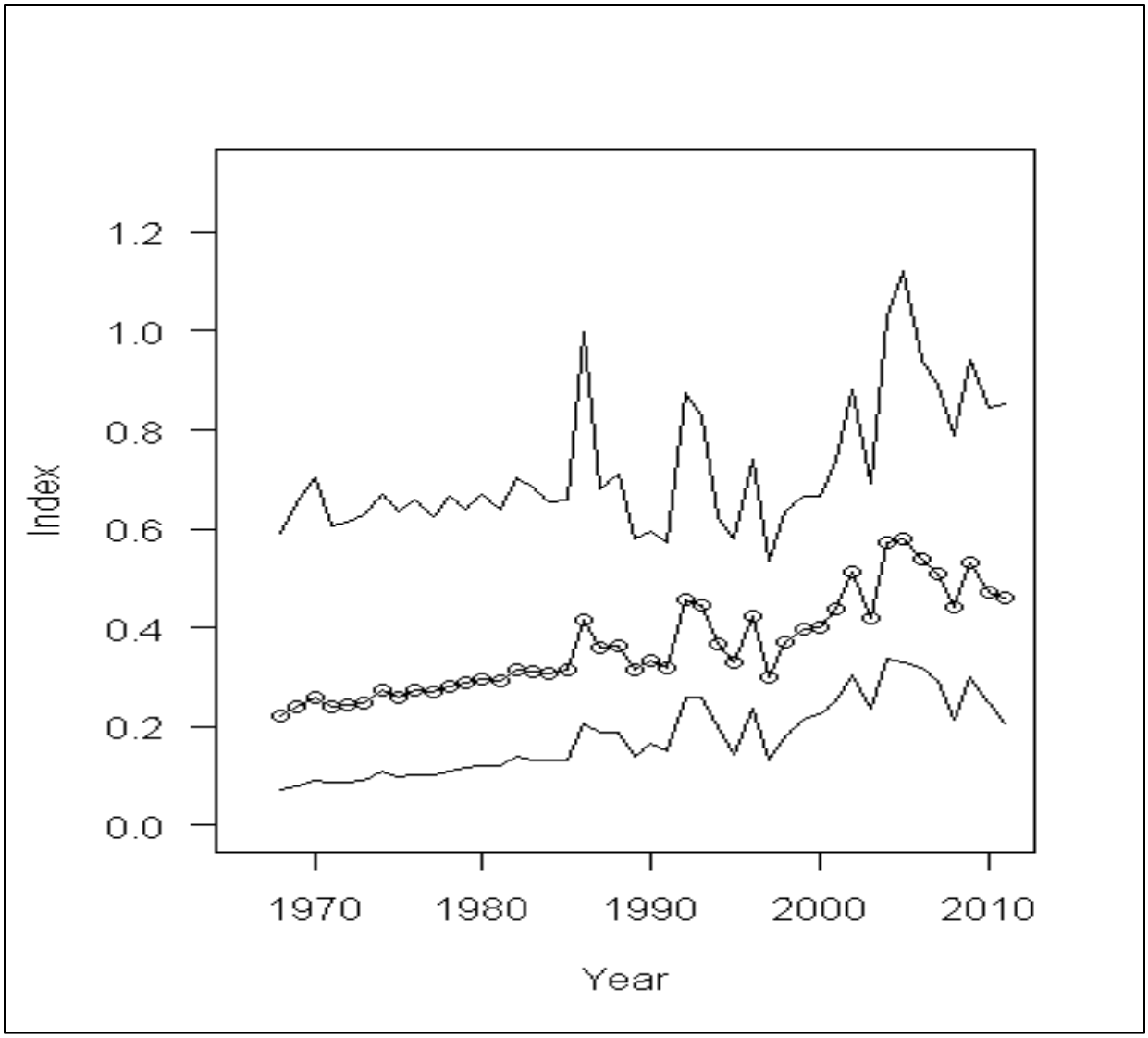

Chart 6: Williamsen's Sapsucker Trend Data (BBS and Nature Conservancy)

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para 4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under Alternative, no adverse direct effects would be expected to the Williamson's sapsucker. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. On the way to late successional stage forest conditions conifer encroachment into aspen forests would create a diversity of habitat components. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create areas of even age forest succession and be different than the type of forest that exist today, which provides optimum Williamson's sapsucker foraging habitat across the landscape of Monroe Mountain. Cavity nesters are cyclic in nature and follow disturbance for foraging opportunities (see migratory bird section).

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area).

Cavity nesters use a range of aspen, mixed-conifer, and spruce fir to forage and develop cavities

in trees for nesting. As Williamson's sapsuckers are also dependent on aspen ecosystems on Monroe Mountain, treatments in the "Seral" and "Stable" aspen will also affect the distribution and use by Williamson's sapsuckers in the proposed treatment areas. Many avian species, including several species designated as Sensitive Species by Federal and state agencies, depend on fire patterns for their dispersal and movements. Cavity-nesting birds, in particular, are often tied to fire-prone forests, and are responsive to fire and timber management activities (Saab et. al. 2006). The effect to the group of cavity nesters will be directly related to the amount of trees thinned or burned in the proposed project area. Cavity nesters will be displaced, nest trees permanently damaged, and a few individuals may perish during implementation. The percentage of forested area that is required to be left unburned to meet the goshawk guidelines will cause a mosaic pattern of un-treated areas that displaced avian species will be able to use.

The proposed percentage treated is of the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section). If the full amount of these percentages was treated and the Forest Plan standards related to snags was accomplished, the Williamson's sapsucker populations would persist in the area and benefit from the insects associated with post-fire treatments.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Some recent work has been done to clear cut, thin, or burn mixed conifer to stimulate aspen regeneration. Some of these recent treatments have caused a displacement of use by avian species found within the previous treatment areas. Displacement of avian species in treatments will be long-term (20-50 years for some and short term (1-5) for others. Over time the treatment areas will range from an early succession forested ecosystem to a late successional forested ecosystem providing a variety of life cycle opportunities for different species of avian birds. As the forest re-develops different prey species, different tree species and age classes of trees will provide opportunities that will enhance species viability for cavity nesters.
Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Riparian Avian Group (Lincoln's Sparrow, Yellow Warbler, MacGillivray's Warbler, Song Sparrow)

Lincoln's Sparrow (*Melospiza lincolnii*)

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Data used in this analysis comes from several sources. It has been collected on the Forest by Forest Service staff. Additional data sources include: BBS data and Nature Conservancy. The combination of these data demonstrates a stable population (Chart 7). On the Fishlake National Forest, a large portion of forest habitats are potentially suitable and currently supply habitat for Lincoln's sparrow. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirectly riparian bird would realize positive benefits from the increase of insects in the area after the thinning and burning. Flowering plants and young vegetation would be improved following treatments. This would help attract insects in the immediate area for riparian avian species.

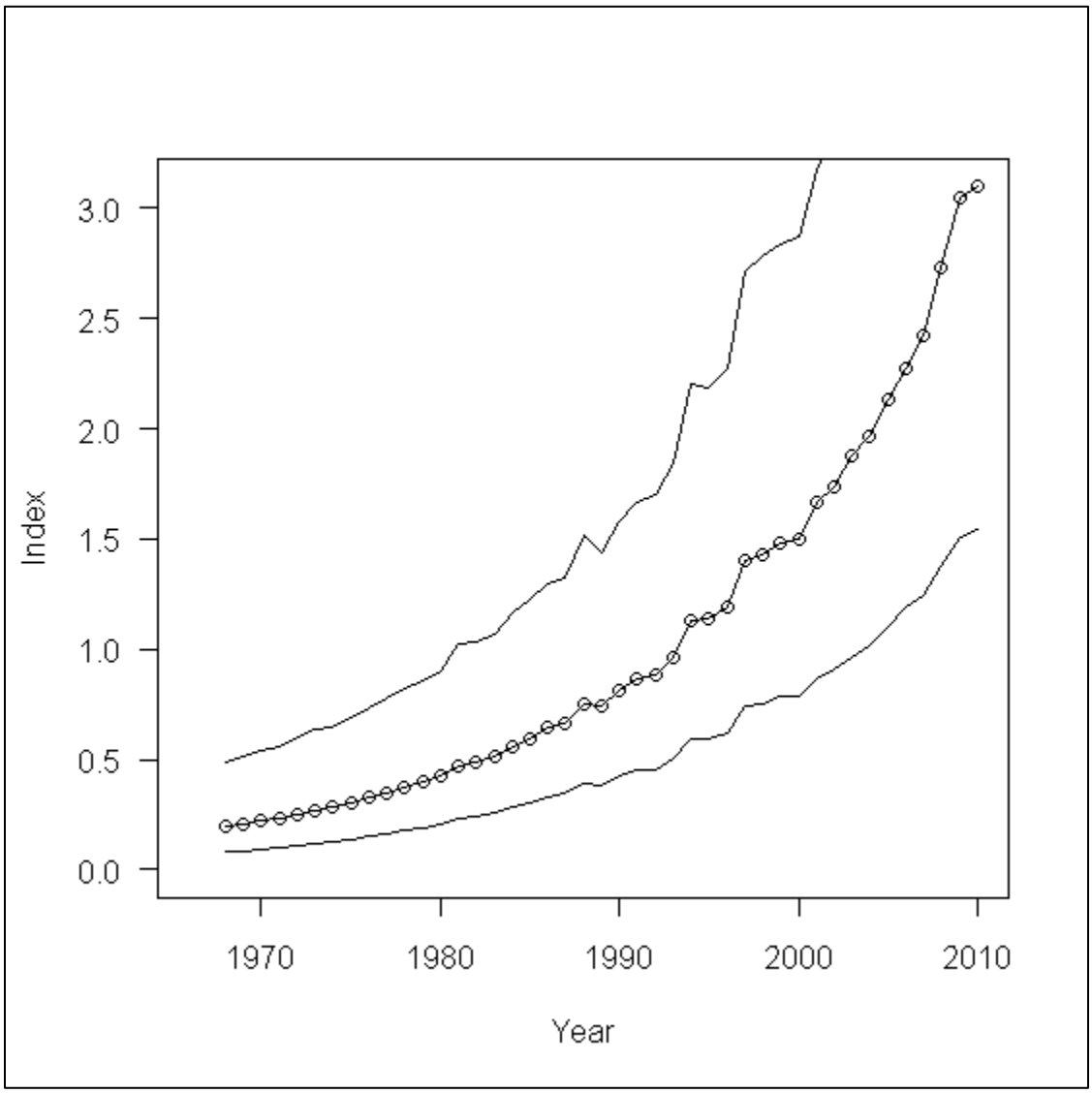

Chart 7: Lincoln's Sparrow Trend in Utah (BBS and Nature Conservancy)

(Chart “Index” note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para 4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

Surveys for avian MIS have been conducted on the FNF since the mid-1980s. Additional studies by "expert birders" were conducted on Monroe Mountain in 1994, 1998, 2002, 2011, 2012, and 2013. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. The survey data is located in the project record.

Field surveys for MIS/TES wildlife species recorded sightings of various riparian-nesting bird species in the proposed project area. Information in the Life History paper (Rodriguez 2008) concludes that Lincoln’s Sparrow, Yellow Warbler, MacGillivray’s Warbler, Song Sparrow species are stable and the populations are viable for the Fishlake NF and in the State of Utah. Riparian habitat within the project area is a very important part of the ecosystem on Monroe Mountain. Careful consideration has been taken to create design features to help minimize impacts to riparian habitat. Design features specific to riparian areas, boreal toads, and Bonneville cutthroat trout are included in chapter 2 of the EIS. These riparian related design features are expected to also indirectly benefit and help minimize impacts to Lincoln’s Sparrow, Yellow Warbler, MacGillivray’s Warbler, and Song Sparrow. Acres of designated riparian habitat on Monroe Mountain as a whole are 1.7 percent (approximately 2,915 acres) (Figure 5). Not all of these 2,915 acres occur where active treatments are proposed. Eighty-seven different avian species have been identified within the proposed project area on Monroe Mountain. Other migratory birds are also undoubtedly found within the analysis area. A list of bird species documented on Monroe Mountain can be found in Table 9 and Appendix 1.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under this Alternative, no adverse direct effects would be expected to the Lincoln’s sparrow. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create an even age forest succession and change the type of forest that exist today providing less than optimum for Lincoln's sparrow foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning.

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area). The proposed percentage treated is the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section).

Since there are a minimum amount of riparian treatments proposed, it is assumed that individual avian riparian wildlife species may be directly impacted from such treatments. However, indirectly as the upland forested areas are treated minor increase water flows would be realized in the immediate downstream area (Campbell 2014 personal communication) (Solt 2014 personal communication). Seeps, bogs, and springs in the treatment zone, may see an increased water yield in the short-term (5- 10 years) which would enhance habitat for riparian birds and their prey. This reaction would improve localized riparian habitat. As aspen trees with their associated understories re-established in the treatment areas any increased water yield would be minimized over time. Since there would be such a minor amount of riparian area treated in the proposed project, and considering the riparian related design features, acreage affects to this species will not cause a downward trend in the local population or affect the viability of the Lincoln's Sparrow.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-

seeing and private land development, on Monroe Mountain. Over time the treatment areas will range from an early succession forested ecosystem to a late successional forested ecosystem providing a variety of life cycle opportunities for different species of avian birds. As the forest re-develops different prey species, different tree species and age classes of trees will provide opportunities that will enhance species viability for avian species. Riparian areas will have minimal impact during implementation and over time riparian areas should improve as wild and domestic ungulate animals find new forage in the treated areas. This will help disperse grazing pressure from riparian areas to some degree.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Yellow Warbler (*Dendroica petechial*)

For a detailed description of the life history for this species refer to (Rodriguez 2008).
Direct and Indirect Effects: Data used in this analysis comes from several sources. It has been collected on the Forest by Forest Service staff. Additional data sources include: BBS data and Nature Conservancy. The combination of these data demonstrates a stable population (Chart 8). On the Fishlake National Forest, a large portion of forest habitats are potentially suitable and currently supply habitat for Yellow warbler. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirectly riparian bird would realize positive benefits from the increase of insects in the area after the thinning and burning. Flowering plants and young vegetation would be improved following treatments. This would help attract insects in the immediate area for riparian avian species.

In 1994, 1998, 2001, 2002, 2011, 2012 and 2013 wildlife surveys specific to this project were conducted throughout the analysis area. Yellow warbler's were observed during these survey efforts within the analysis area. The survey data is located in the project record.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para 4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

Surveys for avian MIS have been conducted on the FNF since the mid-1980s. Additional studies by "expert birders" were conducted on Monroe Mountain in 1994, 1998, 2002, 2011, 2012, and 2013. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. The survey data is located in the project record.

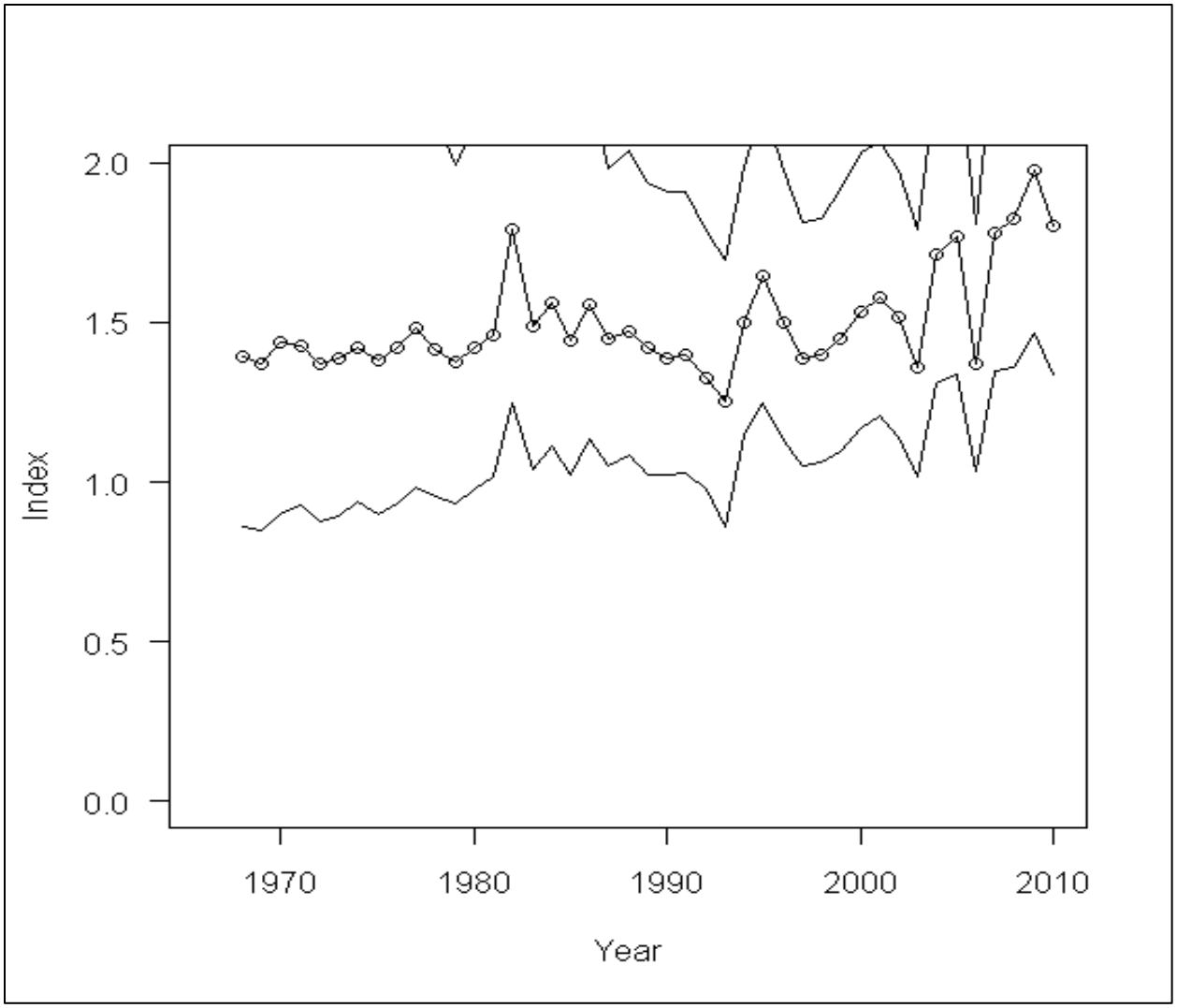

Chart 8: Yellow Warbler Trend in Utah (BBS and Nature Conservancy)

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

Field surveys for MIS/TES wildlife species recorded sightings of various riparian-nesting bird species in the proposed project area. Information in the Life History paper (Rodriguez 2008) concludes that Lincoln's Sparrow, Yellow Warbler, MacGillivray's Warbler, Song Sparrow species are stable and the populations are viable for the Fishlake NF and in the State of Utah. Riparian habitat within the project area is considered a very important part of the ecosystem on Monroe Mountain. Careful consideration has been taken to create design features to help minimize impacts to riparian habitat. Design features specific to riparian areas, boreal toads, and Bonneville cutthroat trout are included in chapter 2 of the EIS. These riparian related design features are expected to also indirectly benefit and help minimize impacts to Lincoln's Sparrow, Yellow Warbler, MacGillivray's Warbler, and Song Sparrow. Acres of designated riparian habitat on Monroe Mountain as a whole are 1.7 percent (approximately 2,915 acres) (Figure 5).

Not all of these 2,915 acres occur where active treatments are proposed. Eighty-seven different avian species have been identified within the proposed project area on Monroe Mountain. Other migratory birds are also undoubtedly found within the analysis area. A list of bird species documented on Monroe Mountain can be found in Table 9 and Appendix 1.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under this Alternative, no adverse direct effects would be expected to the Yellow Warbler. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create an even age forest succession and change the type of forest that exist today providing less than optimum for Yellow Warbler foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning.

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed

for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area). The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section).

Since there are a minimum amount of riparian treatments proposed, it is assumed that individual avian riparian wildlife species may be directly impacted from such treatments. However, indirectly as the upland forested areas are treated minor increase water flows would be realized in the immediate downstream area (Campbell 2014 personal communication) (Solt 2014 personal communication). Seeps, bogs, and springs in the treatment zone, may see an increased water yield in the short-term (5- 10 years) which would enhance habitat for riparian birds and their prey. This reaction would improve localized riparian habitat. As aspen trees with their associated understories re-established in the treatment areas any increased water yield would be minimized over time. Since there would be such a minor amount of riparian area treated in the proposed project, and considering the riparian related design features, acreage affects to this species will not cause a downward trend in the local population or affect the viability of the Yellow Warbler.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. Over time the treatment areas will range from an early succession forested ecosystem to a late successional forested ecosystem providing a variety of life cycle opportunities for different species of avian birds. As the forest re-develops different prey species, different tree species and age classes of trees will provide opportunities that will enhance species viability for avian species. Riparian areas will have minimal impact during implementation and over time riparian areas should improve as wild and domestic ungulate animals find new forage in the treated areas. This will help disperse grazing pressure from riparian areas to some degree.

Section 5 of this report is the describes the cumulative effects area, it’s size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are “other” activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

MacGillivray’s Warbler (*Oporornis tolmiei*)

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Data used in this analysis comes from several sources. It has been collected on the Forest by Forest Service staff. Additional data sources include: BBS data and Nature Conservancy. The combination of these data demonstrates a stable population (Chart 9).

On the Fishlake National Forest, a large portion of forest habitats are potentially suitable and currently supply habitat for MacGillivray's Warbler. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirectly riparian bird would realize positive benefits from the increase of insects in the area after the thinning and burning. Flowering plants and young vegetation would be improved following treatments. This would help attract insects in the immediate area for riparian avian species.

In 1994, 1998, 2001, 2002, 2011, 2012 and 2013 wildlife surveys specific to this project were conducted throughout the analysis area. MacGillivray's warbler's were observed during these survey efforts within the analysis area. The survey data is located in the project record.

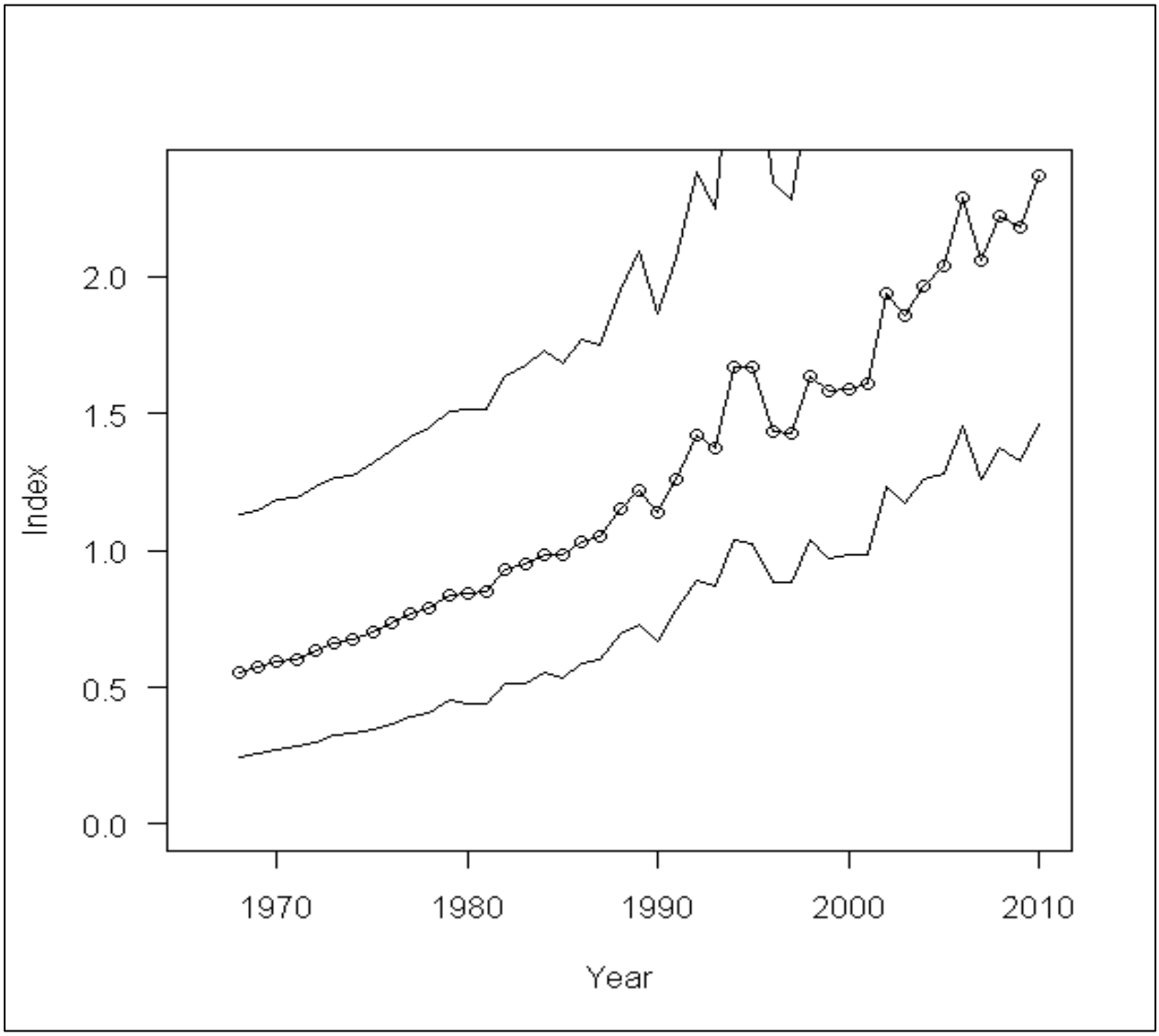

Chart 9: MacGillivray's Warbler Trend in Utah (BBS and Nature Conservancy)

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para 4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

Surveys for avian MIS have been conducted on the FNF since the mid-1980s. Additional studies by "expert birders" were conducted on Monroe Mountain in 1994, 1998, 2002, 2011, 2012, and 2013. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. The survey data is located in the project record.

Field surveys for MIS/TES wildlife species recorded sightings of various riparian-nesting bird species in the proposed project area. Information in the Life History paper (Rodriguez 2008) concludes that Lincoln's Sparrow, Yellow Warbler, MacGillivray's Warbler, Song Sparrow species are stable and the populations are viable for the Fishlake NF and in the State of Utah. Riparian habitat within the project area is considered a very important part of the ecosystem on Monroe Mountain. Careful consideration has been taken to create design features to help minimize impacts to riparian habitat. Design features specific to riparian areas, boreal toads, and Bonneville cutthroat trout are included in chapter 2 of the EIS. These riparian related design features are expected to also indirectly benefit and help minimize impacts to Lincoln's Sparrow, Yellow Warbler, MacGillivray's Warbler, and Song Sparrow. Acres of designated riparian habitat on Monroe Mountain as a whole are 1.7 percent (approximately 2,915 acres) (Figure 5). Not all of these 2,915 acres occur where active treatments are proposed. Eighty-seven different avian species have been identified within the proposed project area on Monroe Mountain. Other migratory birds are also undoubtedly found within the analysis area. A list of bird species documented on Monroe Mountain can be found in Table 9 and Appendix 1.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under this Alternative, no adverse direct effects would be expected to the MacGillivray's warbler. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as aspen continues to expand into aspen communities resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on such a large scale that it would create an even age forest succession and change the type of forest that exist today providing optimum MacGillivray's warbler foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning.

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area). The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section).

Since there are a minimum amount of riparian treatments proposed, it is assumed that individual avian riparian wildlife species may be directly impacted from such treatments. However, indirectly as the upland forested areas are treated minor increase water flows would be realized in the immediate downstream area (Campbell 2014 personal communication) (Solt 2014 personal communication). Seeps, bogs, and springs in the treatment zone, may see an increased water yield in the short-term (5- 10 years) which would enhance habitat for riparian birds and their prey. This reaction would improve localized riparian habitat. As aspen trees with their associated understories re-established in the treatment areas any increased water yield would be minimized over time. Since there would be such a minor amount of riparian area treated in the proposed project, and considering the riparian related design features, acreage affects to this species will not cause a downward trend in the local population or affect the viability of the MacGillivray's Warbler.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-

seeing and private land development, on Monroe Mountain. Over time the treatment areas will range from an early succession forested ecosystem to a late successional forested ecosystem providing a variety of life cycle opportunities for different species of avian birds. As the forest re-develops different prey species, different tree species and age classes of trees will provide opportunities that will enhance species viability for avian species. Riparian areas will have minimal impact during implementation and over time riparian areas should improve as wild and domestic ungulate animals find new forage in the treated areas. This will help disperse grazing pressure from riparian areas to some degree.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Song Sparrow (*Melospiza melodia*)

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: Data used in this analysis comes from several sources. It has been collected on the Forest by Forest Service staff. Additional data sources include: BBS data and Nature Conservancy. The combination of these data demonstrates a stable population (Chart 10). On the Fishlake National Forest, a large portion of forest habitats are potentially suitable and currently supply habitat for Song Sparrow. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirectly riparian bird would realize positive benefits from the increase of insects in the area after the thinning and burning. Flowering plants and young vegetation would be improved following treatments. This would help attract insects in the immediate area for riparian avian species.

In 1994, 1998, 2001, 2002, 2011, 2012 and 2013 wildlife surveys specific to this project were conducted throughout the analysis area. Song sparrow's were observed during these survey efforts within the analysis area. The survey data is located in the project record.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para 4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

Surveys for avian MIS have been conducted on the FNF since the mid-1980s. Additional studies by "expert birders" were conducted on Monroe Mountain in 1994, 1998, 2002, 2011, 2012, and 2013. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. The survey data is located in the project record.

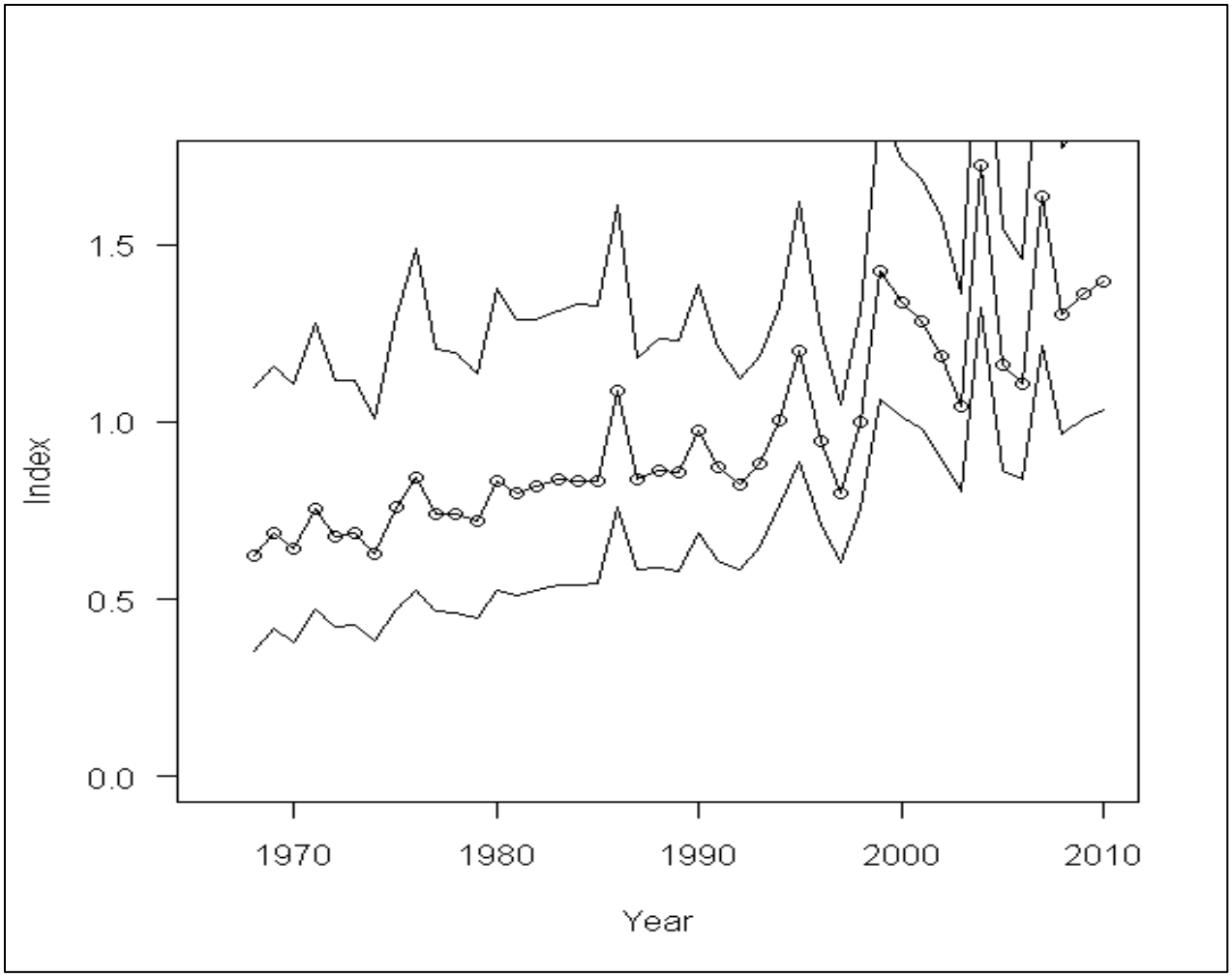

Chart 10: Song Sparrow Trend in Utah (BBS and Nature Conservancy)

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

Field surveys for MIS/TES wildlife species recorded sightings of various riparian-nesting bird species in the proposed project area. Information in the Life History paper (Rodriguez 2008) concludes that Lincoln's Sparrow, Yellow Warbler, MacGillivray's Warbler, Song Sparrow species are stable and the populations are viable for the Fishlake NF and in the State of Utah. Riparian habitat within the project area is considered a very important part of the ecosystem on Monroe Mountain. Careful consideration has been taken to create design features to help minimize impacts to riparian habitat. Design features specific to riparian areas, boreal toads, and Bonneville cutthroat trout are included in chapter 2 of the EIS. These riparian related design features are expected to also indirectly benefit and help minimize impacts to Lincoln's Sparrow, Yellow Warbler, MacGillivray's Warbler, and Song Sparrow. Acres of designated riparian habitat on Monroe Mountain as a whole are 1.7 percent (approximately 2,915 acres) (Figure 5). Not all of these 2,915 acres occur where active treatments are proposed. Eighty-seven different avian species have been identified within the proposed project area on Monroe Mountain. Other

migratory birds are also undoubtedly found within the analysis area. A list of bird species documented on Monroe Mountain can be found in Table 9 and Appendix 1.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under this Alternative, no adverse direct effects would be expected to the Song sparrow. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as aspen continues to expand into aspen communities resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on such a large scale that it would create an even age forest succession and change the type of forest that exist today providing optimum Song sparrow foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a

comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area). The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section).

Since there are a minimum amount of riparian treatments proposed, it is assumed that individual avian riparian wildlife species may be directly impacted from such treatments. However, indirectly as the upland forested areas are treated minor increase water flows would be realized in the immediate downstream area (Campbell 2014 personal communication) (Solt 2014 personal communication). Seeps, bogs, and springs in the treatment zone, may see an increased water yield in the short-term (5- 10 years) which would enhance habitat for riparian birds and their prey. This reaction would improve localized riparian habitat. As aspen trees with their associated understories re-established in the treatment areas any increased water yield would be minimized over time. Since there would be such a minor amount of riparian area treated in the proposed project, and considering the riparian related design features, acreage affects to this species will not cause a downward trend in the local population or affect the viability of the Song Sparrow.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. Over time the treatment areas will range from an early succession forested ecosystem to a late successional forested ecosystem providing a variety of life cycle opportunities for different species of avian birds. As the forest re-develops different prey species, different tree species and age classes of trees will provide opportunities that will enhance species viability for avian species. Riparian areas will have minimal impact during implementation and over time riparian areas should improve as wild and domestic ungulate animals find new forage in the treated areas. This will help disperse grazing pressure from riparian areas to some degree.

Section 5 of this report is the describes the cumulative effects area, it’s size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are “other” activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

SAGEBRUSH OBLIGATE SPECIES (Brewer’s Sparrow, Sage Thrasher, and Vesper Sparrow)

Brewer’s Sparrow *(Spizella breweri)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: In addition to these data, the BBS database (https://www.pwrc.usgs.gov/bbs/) displays an upward trend of Brewer's sparrows in Utah (Chart

11). These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest. As vehicles traveled through suitable sagebrush habitat an individual sage nesting bird may get struck by a vehicle. This would be a direct effect. Indirect effects may occur if sagebrush habitat adjacent to the proposed forest treatment areas improved in habitat effectiveness. This may be due to some ungulate grazing pressure being re-distributed to the newly treated areas and taking some pressure off the sagebrush habitat.

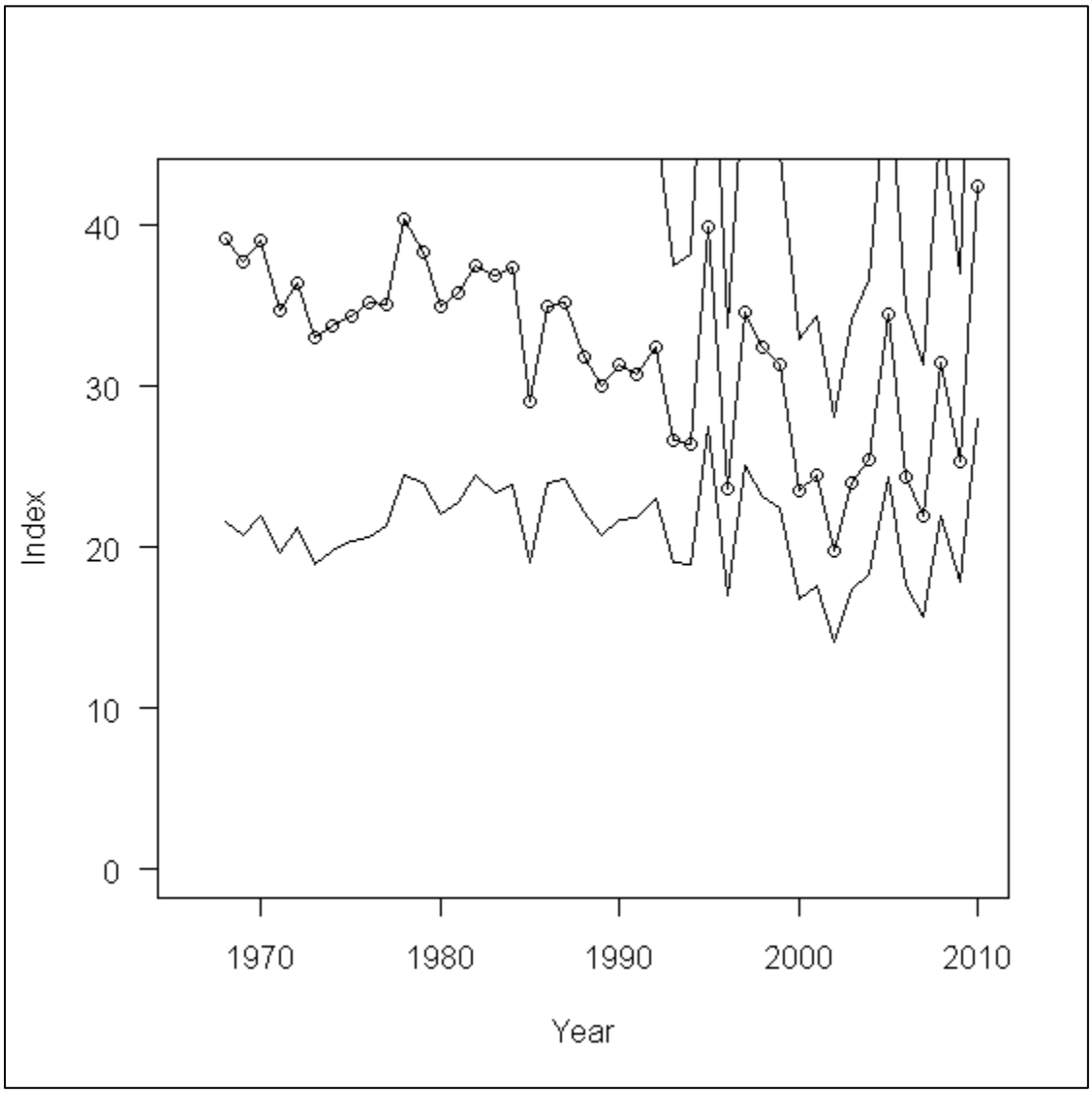

Chart 11. Brewer's sparrow trend in (Utah BBS)

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para 4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

In 1994, 1998, 2001, 2002, 2011, 2012 and 2013 wildlife surveys specific were conducted throughout the analysis area. These surveys have targeted cavity nesting, riparian, and sage nesting species. All other avian species were also recorded while conducting these surveys. Richfield Ranger District conducts trend surveys on specific routes as well as proposed project specific surveys for MIS birds.

As a result of these data collected over the past years, this species has increased in overall presence along transects across the Forest. While these numbers are increasing, they are few. We document this species in transects through sagebrush habitat across the Monroe Mountain landscape. We find common occurrences of this species that indicate a viable population on Monroe Mountain. The data from the BBS and the Nature Conservancy, which display an upward and an "apparently secure" rating. These data indicate the trend of this species across the Fishlake National Forest is stable to slightly up and is viable. Brewer's sparrows were observed during these studies within the analysis area found in abundance. The survey data is located in the project record.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under Alternative, no adverse direct effects would be expected to the Brewer's Sparrow. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as sagebrush continues to increase in density causing the understory of grass and forbs to diminish resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create an even age forest succession and change the type of forest that exist today providing less than optimum for Brewer's Sparrow foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is

proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area). The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section).

As noted in the discussion above this proposed treatment is designed for direct treatments in forested ecosystems, it is unlikely that many acres of sagebrush that contain sage-nester habitat would be affected. Some direct minor impacts may occur to sagebrush as equipment is used to go along the edge of sagebrush meadows to transport equipment or personnel for treatment implementation. Indirectly, vehicles traveling through sage habitat to and from project areas may cause dust and an occasional direct impact with a vehicle. None of these impacts pose a threat to the integrity of the habitat or viability of the Brewer's Sparrow.

Cumulative Effects:

Sage nesters have experienced good habitat conditions in the past and are currently in good shape across the mountain. Sagebrush treatments have been monitored for trend as well as non-treated areas of sagebrush. Data gathered on the District for trend will help us monitor avian species over time. Cumulative effects from this proposed project are minimal if not un-measurable because the treatments are designed to target forest systems and not sagebrush.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Vesper Sparrow *(Pooecetes gramineus)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

In addition to these data, the BBS database (https://www.pwrc.usgs.gov/bbs/) displays a slight upward trend of vesper sparrows in Utah (Chart 12). These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest. As vehicles traveled through suitable sagebrush habitat an individual sage nesting bird may get struck by a vehicle. This would be a direct effect.

Indirect effects may occur if sagebrush habitat adjacent to the proposed forest treatment areas improved in habitat effectiveness. This may be due to some ungulate grazing pressure being re-distributed to the newly treated areas and taking pressure off the sagebrush habitat.

In 1994, 1998, 2001, 2002, 2011, 2012 and 2013 wildlife surveys specific to this project were conducted throughout the analysis area. Vesper sparrows were observed during these survey efforts within the analysis area. Vesper Sparrows are commonly seen on Monroe Mountain. The survey data is located in the project record.

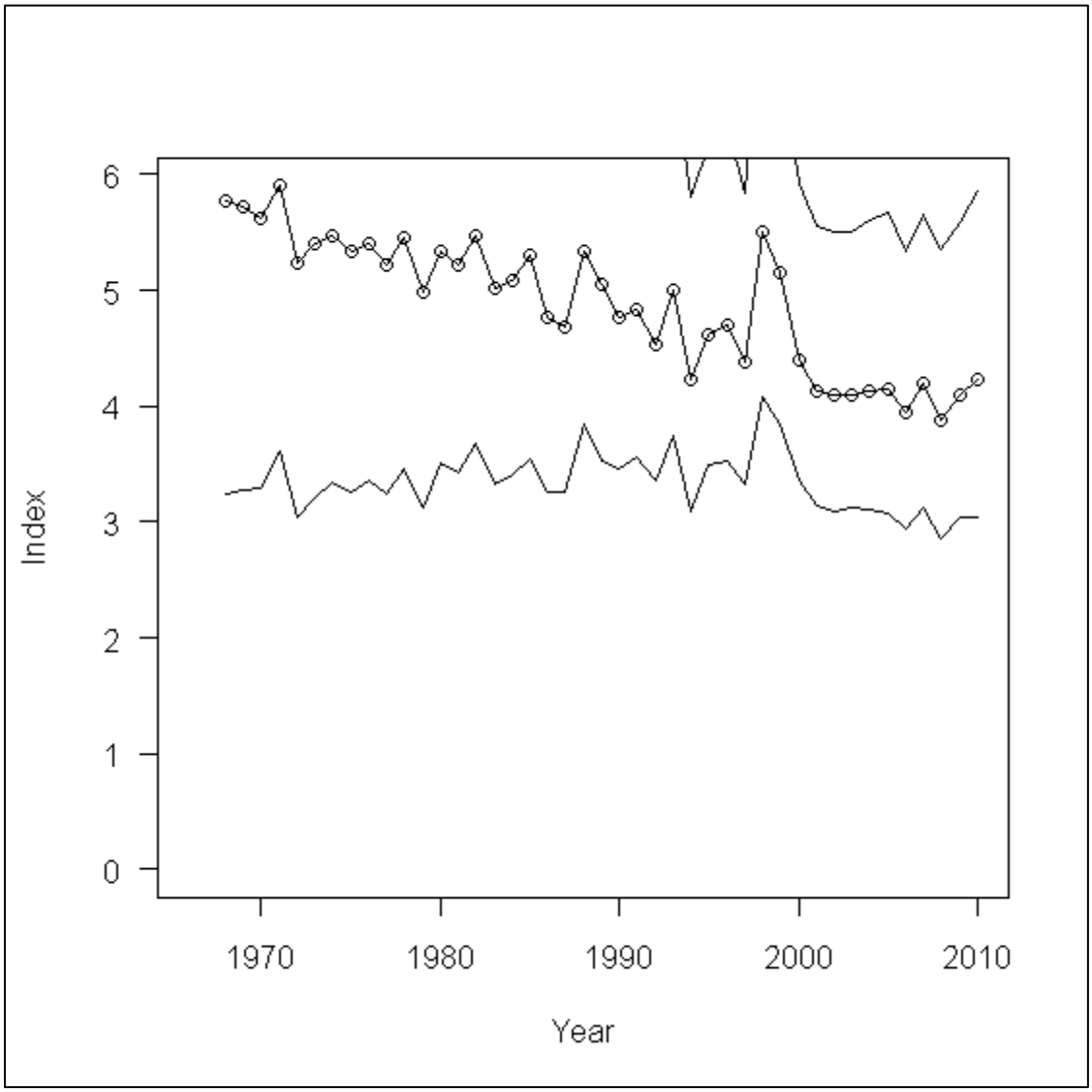

Chart 12. Vesper sparrow trend in Utah

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para

4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

The survey data is located in the project record.

Information in the Life History paper (Rodriguez 2008) concludes that Brewer's sparrow and vesper sparrow species are stable or in a slight upward trend, and these populations are viable for the Fishlake NF and in the State of Utah.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under Alternative, no adverse direct effects would be expected to the Vesper Sparrow. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as sagebrush continues to increase in density causing the understory of grass and forbs to diminish resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create an even age forest succession and change the type of forest that exist today providing less than optimum for Vesper Sparrow foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2,

51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area). The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section).

As noted in the discussion above this proposed treatment is designed for direct treatments in forested ecosystems, it is unlikely that many acres of sagebrush that contain sage-nester habitat would be affected. Some direct minor impacts may occur to sagebrush as equipment is used to go along the edge of sagebrush meadows to transport equipment or personnel for treatment implementation. Indirectly, vehicles traveling through sage habitat to and from project areas may cause dust and an occasional direct impact with a vehicle. None of these impacts pose a threat to the integrity of the habitat or viability of the Vesper Sparrow.

Cumulative Effects:

Sage nesters have experienced good habitat conditions in the past and are currently in good shape across the mountain. Sagebrush treatments have been monitored for trend as well as non-treated areas of sagebrush. Data gathered on the District for trend will help us monitor avian species over time. Cumulative effects from this proposed project are minimal if not un-measurable because the treatments are designed to target forest systems and not sagebrush.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Sage Thrasher *(Oreoscoptes montanus)*

For a detailed description of the life history for this species refer to (Rodriguez 2008).

Direct and Indirect Effects: In addition to these data, the BBS database (https://www.pwrc.usgs.gov/bbs/) displays a recently slight upward trend of Sage thrasher in Utah (Chart 13). These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest. As vehicles traveled through suitable sagebrush habitat an individual sage nesting bird may get struck by a vehicle. This would be a direct effect. Indirect effects may occur if sagebrush habitat adjacent to the proposed forest treatment areas improved in habitat effectiveness. This may be due to some ungulate grazing pressure being re-distributed to the newly treated areas and taking some pressure off the sagebrush habitat. .

In 1994, 1998, 2001, 2002, 2011, 2012 and 2013 wildlife surveys specific to this project were conducted throughout the analysis area. Sage thrashers were observed during these survey efforts within the CEA area. Survey data is located in the project record.

Sage thrashers have been detected on the southern end of Monroe Mountain in the Hell's Hole area. Jim Parrish, UDWR and Richard Wilkinson, USFS conducted the surveys.

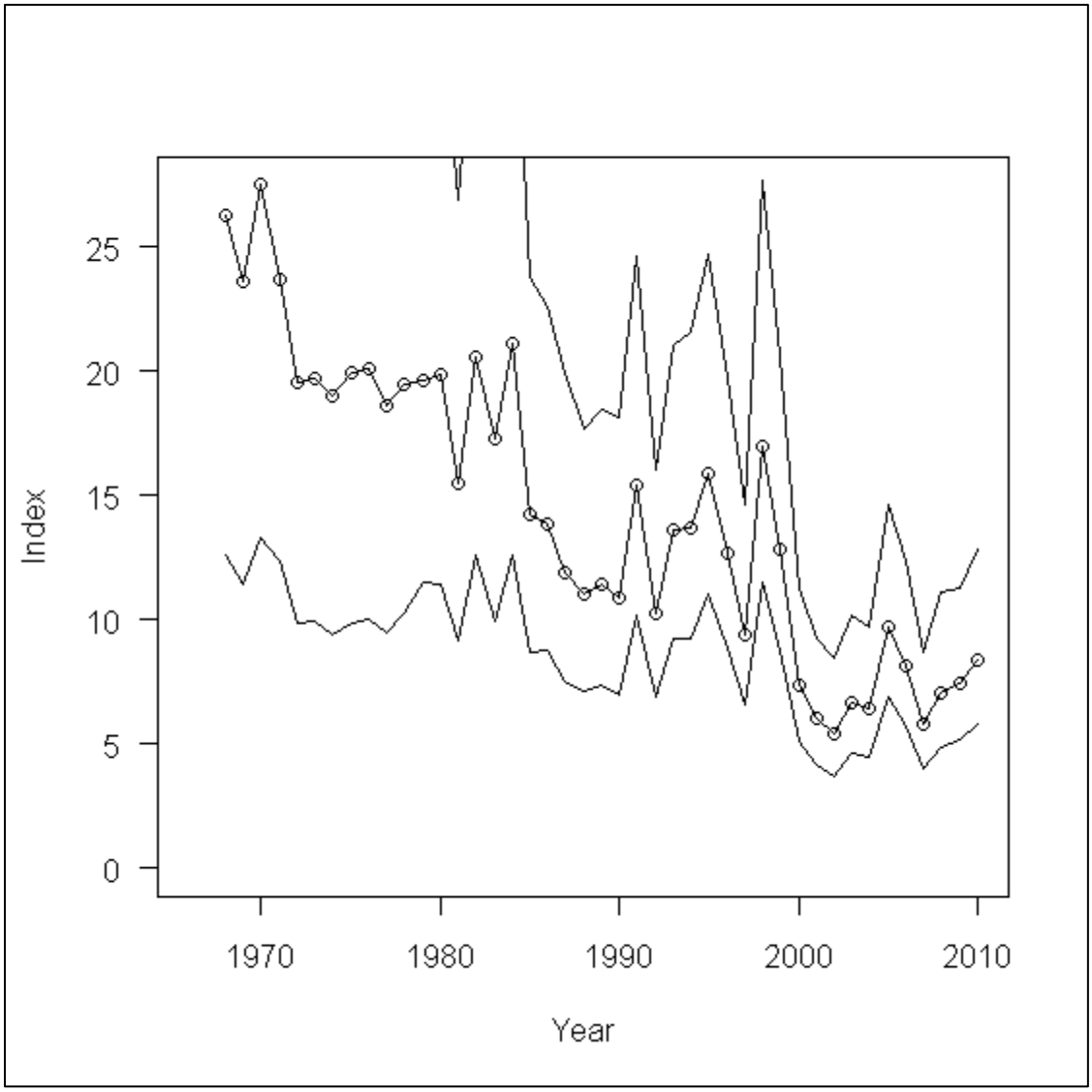

Chart 13. Sage Thrasher Trend in Utah (BBS)

(Chart "Index" note**:** Hierarchical-model estimates of total percentage change from 1968 (Index) are shown as lines with year markers, and credible intervals are shown as lines.

The indexes are relative abundance estimates for all years, estimated as yearly predicted abundances from the hierarchical model analysis. See (Sauer and Link, 2011, p. 89, col 2, para 4) for a precise definition of the indexes and an explanation of how the index modeling was compiled.

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of this species.

Since there would be no vegetation treatments under Alternative, no adverse direct effects would be expected to the Sage Thrasher. Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as sagebrush continues to increase in density causing the understory of grass and forbs to diminish resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create an even age forest succession and change the type of forest that exist today providing less than optimum for Sage Thrasher foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area). The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section).

As noted in the discussion above this proposed treatment is designed for direct treatments in forested ecosystems, it is unlikely that many acres of sagebrush that contain sage-nester habitat

would be affected. Some direct minor impacts may occur to sagebrush as equipment is used to go along the edge of sagebrush meadows to transport equipment or personnel for treatment implementation. Indirectly, vehicles traveling through sage habitat to and from project areas may cause dust and an occasional direct impact with a vehicle. None of these impacts pose a threat to the integrity of the habitat or viability of the Sage Thrasher.

Cumulative Effects:

Sage nesters have experienced good habitat conditions in the past and are currently in good shape across the mountain. Sagebrush treatments have been monitored for trend as well as non-treated areas of sagebrush. Data gathered on the District for trend will help us monitor avian species over time. Cumulative effects from this proposed project are minimal if not un-measurable because the treatments are designed to target forest systems and not sagebrush.

Section 5 of this report is the describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Migratory Birds

The Migratory Bird Treaty Act of 1918 decreed that all migratory birds and their parts are fully protected. This Act is the domestic law that affirms, or implements, the United States commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protected selected species of birds that are common to both countries (i.e., they occur in both countries at some point during their annual life cycle).

Under the Migratory Bird Treaty Act, it is unlawful to take, kill, or possess migratory birds, their parts, nests, or eggs. Take is defined (50 CFR 10.12) as to pursue, hunt, shoot wound, kill, trap, capture, or collect, or to attempt to pursue, hunt shoot, wound, kill, trap, capture, or collect.

Human intrusion, the mere presence of people in the environment, has become a dominant form of disturbance in many landscapes. Some forms of intrusion from recreationalists and other groups occur repeatedly and can seriously alter avian reproduction, survival, and habitat use. Accordingly, repeated intrusion has the potential to cause impacts that accumulate through time and that are manifested as progressive declines in avian richness and abundance (Riffell 1996).

One of the reasons Management Indicator Species (MIS) were identified was that these species would be representative of other species (Forest Plan II-28 through 31). MIS were selected to reflect the impacts of different management activities on wildlife. This concept can be applied to migratory birds since many MIS identified species are also migratory birds.
As vehicles traveled through suitable sagebrush habitat an individual sage nesting bird may get struck by a vehicle. This would be a direct effect. Indirect effects may occur if sagebrush

habitat adjacent to the proposed forest treatment areas improved in habitat effectiveness. This may be due to some ungulate grazing pressure being re-distributed to the newly treated areas.

Generally, forest structure and avian communities change rapidly after fire, depending on the severity of (Kotliar et al. 2002). Fire creates nesting and foraging habitat for birds by different mechanisms, but the process depends on pre-fire conditions, such as vegetation types, crown closure, and climate (Kotliar et al. 2002). During a fire, if soil temperatures stay below 175 °C, nutrient releases enhance plant growth and vigor (Agee 1993). This regrowth often leads to increased abundance of flowers, seeds, and insects, which brings in aerial insectivores, nectarivores, and seed eaters (Kotliar et al. 2002). Fire also creates logs and standing dead and dying trees that are susceptible to attack by bark (Scolytidae) and wood-boring (Cerambycidae and Buprestidae) beetles (Werner 2002), primary food sources for many woodpeckers. Large diameter (generally >23 cm diameter (http://www.rmrs.nau.edu/lab/ 4251/birdsnburns) at breast height [d.b.h.]) snags, trees with decay, and downed logs are particularly important because they are relatively easy for woodpeckers to excavate and they provide roosting, nesting, and foraging habitat for a variety of wildlife (Bull et al. 1997, Hall et al. 1997, Kreisel and Stein 1999, Scott 1979, Szaro et al. 1988). Snags, trees with decay, and downed logs are particularly important because they are relatively easy for woodpeckers to excavate and they provide roosting, nesting, and foraging habitat for a variety of wildlife (Bull et al. 1997, Hall et al. 1997, Kreisel and Stein 1999, Scott 1979, Szaro et al. 1988). Recently burned forests might also reduce populations of nest predators (Saab and Vierling 2001) such as tree squirrels (*Tamiasciurus* spp.) and weasels (*Mustela* spp.) because their habitats are altered or eliminated. Having fewer predators soon after fires likely allows for higher reproductive success and productivity of cavity-nesting birds (Saab and Vierling 2001).

Maintenance and recruitment of snags >23 cm d.b.h. is particularly important because these snags have greater longevity and provide wildlife habitat for a longer period than smaller snags (Chambers and Mast 2005, Russell et al. 2006). Additionally, retention of large diameter trees and snags is necessary for population persistence of cavity-nesting birds because these forest components are used disproportionately more for nesting and foraging than smaller trees and snags (Bull et al. 1997, Li and Martin 1991, Raphael and White, 1984). Large, older live trees also eventually provide dead wood substrates when they succumb to lightning strikes, beetle infestations, pathogens, or some combination thereof (Boucher et al. 2000). These trees are often referred to as “spike tops” or “living snags” because the tops and other portions of the trees are dead and provide opportunities for cavity excavation. In post fire habitats, management practices that retain dense stands of snags will also promote the longer term persistence of suitable nesting snags for cavity-nesting birds (Russell et al. 2006). Retention of snags <23 cm d.b.h. is also important because they provide valuable foraging substrate as well (Covert-Bratland et al. 2006).

Another important habitat element for wildlife is downed wood. Maintenance of large, downed wood is important ecologically because these structures provide foraging habitat, thermal cover, and concealment for many sensitive wildlife taxa, including reptiles, amphibians, mammals, and birds (Bull et al. 1997, Converse et al. 2006, Szaro et al. 1988). Downed wood can be consumed by low-severity burns depending on wood moistures and the timing of fires (Brown et al. 1985). If maintenance of downed wood is a management objective, seasonality of prescribed burning

should be considered for times when moisture contents are higher and fire severity effects are lower (Thies et al. 2005).

The effect of fire on birds can be beneficial, neutral, mixed, or adverse depending on the species, length of time since fire, and burn severity. Generalizing the effect of fire on birds in western forests is challenging: short-term responses may differ from long-term responses, responses by resident bird species may differ from migratory species, and effects observed at the stand scale may differ from those at the regional or landscape scale. Also, fire that benefits one species may harm another. Ultimately, managing for particular fire conditions—including wildland fire, prescribed fire, or fire exclusion entails ecological tradeoffs among selected wildlife species and habitats (Saab 2007). The effects from thinning trees will create similar mixed effects on migratory birds.

Surveys for migratory birds on the Richfield Ranger District have been conducted and supervised by the same individual since the mid 90s up through the current season. Permanent routes were established and surveyed on a regular basis to establish “trend over time”. Survey’s specific to areas that are of special interest for proposed projects requiring full environmental analysis or specific habitat types that are of special interest that may target a particular species of concern. As our expert birder and his crew survey areas specific to NEPA requirements, regional protocols are used to gather data for target species. Surveys for migratory birds were conducted in conjunction with goshawk protocol surveys in forested areas. Migratory birds, MIS birds, mammals, were documented as grid transects were surveyed. There are many migratory bird species that inhabit the analysis area for a portion of their life cycle. Some birds that are MIS bird species are also migratory birds. These include: Mountain bluebird, Western bluebird, Brewer’s sparrow, Lincoln sparrow, Song sparrow, Vesper sparrow, Yellow warbler, and Hairy woodpecker. Eighty-seven different avian species have been identified within the proposed project area on Monroe Mountain. Other migratory birds inhabit parts of the analysis are for part of their life cycle. A list of bird species documented on Monroe Mountain can be located in Table 9 and Appendix 1.

Table 9: Avian species documented within the proposed project area (1994-2013).

1	American Coot
2	American Kestrel
3	American Robin
4	Bald Eagle
5	Belted Kingfisher
6	Black billed Magpie
7	Black capped Chickadee
8	Black chinned Hummingbird
9	Black crowned night Heron
10	Black headed Grosbeak
11	Brewer's Sparrow
12	Broad tailed Hummingbird
13	Brown Creeper
14	Brown headed Cowbird

15	Cassin's Finch
16	Chipping Sparrow
17	Clark's Nutcracker
18	Common Nighthawk
19	Common Raven
20	Cooper's Hawk
21	Cordilleran Flycatcher
22	Dark eyed Junco
23	Downy Woodpecker
24	Dusky Flycatcher
25	Dusky Grouse
26	Flammulated Owl
27	Fox Sparrow
28	Golden Eagle
29	Great blue Heron
30	Great horned Owl
31	Green tailed Towhee
32	Green winged Teal
33	Hairy Woodpecker
34	Hermit Thrush
35	House Finch
36	House Wren
37	Lazuli Bunting
38	Lincoln's Sparrow
39	Long eared Owl
40	MacGillivray’s Warbler
41	Mallard
42	Merlin
43	Mountain Bluebird
44	Mountain Chickadee
45	Mourning Dove
46	Northern Flicker
47	Northern Goshawk
48	Northern Harrier
49	Northern pygmy Owl
50	Northern roughed winged Swallow
51	Olive sided Flycatcher
52	Pine Siskin
53	Plumberous Vireo
54	Red breasted Nuthatch
55	Red Crossbill
56	Red napped Sapsucker
57	Red tailed Hawk
58	Red winged Blackbird
59	Rock Wren

60	Ruby crowned Kinglet
61	Ruffed Grouse
62	Rufus Hummingbird
63	Sage Grouse
64	Sage Thrasher
65	Sharp shinned Hawk
66	Song Sparrow
67	Spotted Sandpiper
68	Spotted Towhee
69	Steller's Jay
70	Three toed Woodpecker
71	Townsend's Solitaire
72	Tree Swallow
73	Turkey Vulture
74	Vesper Sparrow
75	Violet green Swallow
76	Virginia's Warbler
77	Warbling Vireo
78	Western Scrub Jay
79	Western Tanager
80	Western wood Pewee
81	White breasted Nuthatch
82	White crowned Sparrow
83	White throated Swift
84	Wild Turkey
85	Willow Flycatcher
86	Yellow rumped Warbler
87	Yellow Warbler

Note: Other migratory birds are also undoubtedly found within the analysis area.
Direct and Indirect Effects: Avian studies on the Fishlake National Forest conducted by the Richfield Ranger District Wildlife Staff from 1990 to 2014 result in 136 different species (87 of which were located in the proposed project area). See Appendix 1 the General Bird List on the Fishlake National Forest from 1990 to 2014. Data have been collected by expert birders and UDWR avian specialists. We feel we have taken a hard look at the avian species and their respective habitat within Forest System lands on the Richfield Ranger District.

The key comparison element for evaluating how the alternatives affect migratory bird species is the amount of habitat affected (# of acres treated).

Effects of Alternative 1 - No Action

If the No Action Alternative were selected there would be no direct adverse or improved beneficial effects on population numbers or viability of these species.

Since there would be no vegetation treatments under Alternative, no adverse direct effects would be expected to migratory birds. Potential indirect effects may come from natural succession

events as the areas move from early/mid seral species to late seral communities. This may have a negative effect on the quality of avian habitat over time and on a variety of prey species as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

Potential indirect effects may come from natural succession events as the areas move from early/mid seral species to late seral communities. This may allow indirect affect such as the reduction of habitat effectiveness as snags age and blow over and turn into down woody debris. Over time, as these landscapes continue to mature, prey species abundance would decrease as conifer continues to expand into aspen communities resulting in a lack of habitat diversity.

The area would likely remain susceptible to wildfire. A wildfire would likely occur during the summer months when the area impacted could be larger, without a broken mosaic pattern. In addition, the severity could be high and plant recovery and re-establishment may take longer. This type of wildfire could be stand replacing on a large scale that it would create an even age forest succession and change the type of forest that exist today providing less than optimum migratory bird foraging habitat across the landscape of Monroe Mountain.

Effects of Alternatives 2-5 - Mechanical treatments and/or prescribed burning

Alternatives 2, 3, 4, and 5 all consist of a combination of mechanical forestry practices and prescribed fire. Mechanical treatments and/or prescribed burning proposed range from 27,981-36,300 acres. The total number of acres of conifer bearing acres is 18,877. Of these acres a mix of spruce and firs are combined. In Alternative 2, 30% of spruce-fir is proposed for treatment, in Alternative 3, 37% of spruce-fir is proposed for treatment, in Alternative 4, 44% of spruce-fir is proposed for treatment, and in Alternative 5, 36% of spruce-fir is proposed for treatment. Of mixed-conifer acres in the proposed area 30-44% treatment is proposed through the action alternatives (2-5) (percentages taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type).

In alternative 2, 39% of seral aspen is proposed for treatment, in alternative 3, 48% of seral aspen is proposed for treatment , in alternative 4, 55% of seral aspen is proposed for treatment and in alternative 5, 44% of seral aspen is proposed for treatment. As for stable aspen, in alternative 2, 51% of stable aspen is proposed for treatment, in alternative 3, 56% of stable aspen is proposed for treatment, in alternative 4, 60% of stable aspen is proposed for treatment and in alternative 5, 55% of stable aspen is proposed for treatment (percentage taken from spreadsheet Table 10, a comparison of the proposed treatment acres by forest type against the total acres of forest type in the Analysis Area). The proposed percentage treated is from the Vegetative Analysis Area as a whole (see Table 10-in migratory bird section).

Direct effects to migratory birds will be limited to forest dwelling and forest foraging species. Anytime fire or mechanical treatments occur in a forested landscape there is a risk for some direct impacts to individual birds. Design features and timing of implementation are important to minimize these effects. For example, as described in chapter 2 of the EIS, prescribed burning would usually not occur from May 15 through August 1st in the spruce/fir dominated areas, unless site specific surveys indicate that the species does not occur in the area. Avoiding the dates between the May 15 through August 1 timeframe will allow cavity nesting birds to

complete their nesting, incubation, fledgling and dispersal portion of their life cycle for the season. The adults and young would be able to flee from dangerous conditions that fire may impose on them. To minimize impacts from mechanical treatments on cavity nesting birds found in a spruce-fir dominated forest type, thinning activities would usually commence after July 15 unless site specific surveys indicate that the species does not occur in the area. This timing would allow time for cavity nesting birds to complete their nesting and rearing season. Mechanical treatments provide the opportunity to selectively leave snags in groups or clumps throughout the site to provide a continuance of habitat features that are useable during and after the treatment. These design features provide protection (delayed timing of treatments in the season) of the nesting-rearing season while providing habitat features (leaving snags and clumps of trees and 40% non-treated forested areas throughout the project) needed for future viable populations on Monroe Mountain. Indirect effects may occur to migratory birds during implementation and post treatment from dust, prey availability immediately after treatment, collision and short-term (5-10 years) nest site availability. Enhancing habitat effectiveness would occur overtime as primary succession became established and habitat diversity increased.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to deer in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Some recent work has been done to clear cut, thin, or burn mixed conifer to stimulate aspen regeneration. Some of these recent treatments have caused a displacement of use by avian species found within the previous treatment areas. Displacement of avian species in treatments will be long-term (20-50 years for some and short term (1-5) for others. Over time the treatment areas will range from an early succession forested ecosystem to a late successional forested ecosystem providing a variety of life cycle opportunities for different species of avian birds. As the forest re-develops different prey species, different tree species and age classes of trees will provide opportunities that will enhance species viability for cavity nesters. Many other migratory birds use the forest types that are proposed for treatment. As an area is treated and has time to recover migratory birds will find added prey and nesting opportunities.

Section 5 of this report describes the cumulative effects area, it’s size, relationship with the actual analysis area and the rational behind the selection of the boundaries. This section also decscribes past, present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are “other” activities that have been known to or do occur in the Monroe Mountain landscape. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Table 10: Vegetation affected by alternatives, percentage and acres treated compared to the analysis area.

Compare Analysis Area to Forested Type	Mechanical & Associated Slash Burning and Prescribed Fire - Mixed Burn Severities Factoring 60% of the Acres Get Burned	Total Analysis Area Acres	% of Analysis Area Proposed
Mixed Conifer----Alt. 2	2,607	5,220	49.9
Seral Aspen	12,241	31,129	39.3
Stable Aspen	8,820	17,009	51.9
Spruce-Fir	4,313	14,392	30.0
TOTAL	**27,981**	**67,750**	**41.3**
Mixed Conifer---Alt. 3	2,605	5,220	49.9
Seral Aspen	15,013	31,129	48.2
Stable Aspen	9,497	17,009	55.8
Spruce-Fir	5,348	14,392	37.2
TOTAL	**32,461**	**67,750**	**47.9**
Mixed Conifer---Alt. 4	2,609	5,220	50.0
Seral Aspen	17,150	31,129	55.1
Stable Aspen	10,146	17,009	59.7
Spruce-Fir	6,394	14,392	44.4
TOTAL	**36,300**	**67,750**	**53.6**
Mixed Conifer---Alt.5	2,605	5,220	49.9
Seral Aspen	13,742	31,129	44.1
Stable Aspen	9,406	17,009	55.3
Spruce-Fir	5,191	14,392	36.1
TOTAL	**30,944**	**67,750**	**45.7**

Discussion:

No loss of long-term (10 years plus) viability to migratory bird species is anticipated for the following reasons:

1) The vegetation treatments would be implemented in a mosaic pattern where 60% of the acres would be treated (27,981-36,300acres) within a 67,750-acre analysis area.
2) A prescribed burn would improve the foraging habitat for many of these species and nesting habitat for some species.
3) Fire would create a mosaic pattern of early seral plant species that would help create size, age, and species diversity important in maintaining functioning ecosystems and create or maintain habitat for various types of migratory birds.
4) No direct fire ignitions would occur during the nesting season (usually between May 15th and August 1st) in areas where cavity nesting birds such as Three-toed woodpeckers are found. Prescribed fire treatments that occur outside of the nesting season would have a beneficial effect on migratory birds by not interfering with breeding, nesting, and fledgling activities. Mechanical treatments would generally occur after July 15. (See "Effects of Alternatives 2-5" section for more information).
5) Snags would be left according to the forest plan guidelines and in clumps for species specific requirements (woodpeckers).
6) There are no adverse cumulative effects of this project on migratory birds (see cumulative effects section).
7) To help minimize impacts to migratory birds, coordination with the USFWS would occur as special circumstances arise.

Yellow-billed Cuckoo (Coccyzus americanus)

Dismissed for further analysis in Table 4. The project area is out of the elevational range and habitat type for Yellow-billed Cuckoos.

CUMULATIVE EFFECTS AREA

A cumulative effect analysis was presented on a species by species basis in sections 3 and 4 of this document. This section describes past, present and reasonably foreseeable vegetative treatments or disturbances as well as the size and rational for the area chosen for the CEA. The cumulative effects analysis area (CEA) consists of the area identified on the CEA map (Figure 5). This area was identified based on the species being evaluated in this report and also on their expected use during their presence of the analysis area. Wildlife are not stationary by nature or necessity. The CEA was chosen larger (175,706) than the analysis area (67,750) to provide a reasonable area where the species considered may use. The CEA includes known or predicted spring, summer, and/or fall use by the species analyzed within this document. The CEA consist of National Forest System lands as well as private or state lands within the USFS boundary of Monroe Mountain. Many species migrate from NFS lands in winter months to lands adjacent to the mountain or migrate to milder climates great distances from Monroe Mountain. For this reason we only include the FS border of Monroe Mountain.

Over the years many natural fires, prescribed fires, or mechanical treatments have occurred on Monroe Mountain with the intent to restore or enhance ecosystems. Most of those occurrences have been recorded as they have occurred and are found in this section.
The past, present and reasonable foreseeable future actions include: (Some of these actions were summarized from Table 11 below)

- Approximately 1,962 acres of brush-saw fuels reduction work on Monroe Mountain.
- Approximately 6,194 acres of Dixie Harrow work on Monroe Mountain.
- Approximately 5,774 acres of mechanical harvest on Monroe Mountain.
- Approximately 19,774 acres of prescribed fire on Monroe Mountain.
- Approximately 12,895 acres being burned by wildfire on Monroe Mountain.
- Approximately 2,077 acres of tree planting on Monroe Mountain.
- Personal use Christmas tree sales on Monroe Mountain.
- Personal use fuel-wood gathering on Monroe Mountain.
- Private land development including new homes on Monroe Mountain.
- Fuels reduction work on private lands
- Recreational use – primarily hiking, horseback riding, mountain biking, OHV use, cross-country skiing, hunting, fishing, and snowmobile use on Monroe Mountain.
- Swift Springs Water Development Project
- Monroe Mountain Livestock Management Improvement Project
- Livestock grazing.
- Livestock management adjustments under the purview of Forest Service administrative authorities found in 36 CFR 222.4.
- Ongoing maintenance of existing range infrastructure; fences, troughs, waterlines, etc.
- Ongoing maintenance of roads and trails.

Table 11: Past, Present and Reasonably Foreseeable Future Vegetation Related Actions on Monroe Mountain

Past, Present and Reasonably Foreseeable Future Actions on Monroe Mountain			
Name	**Type of Action**	**Year**	**Acres**
Blue Peak	Brushsaw	2003	766
Durkee Fuels	Brushsaw	2004	617
Thompson Basin	Brushsaw	2007	579
085 Road	Dixie Harrow	2000	22
Bagley North	Dixie Harrow	1997	47
Bell Rock	Dixie Harrow	1996	138
Big Flat	Dixie Harrow	2003	133
Blue Peak	Dixie Harrow	2003	766
Box Creek	Dixie Harrow	1995	29
Box Creek	Dixie Harrow	2003	104
Box Creek Retreat 1	Dixie Harrow	2008	156
Brindley Flat	Dixie Harrow	2006	40
Burnt Flat	Dixie Harrow	1995	96
Burnt Flat	Dixie Harrow	1998	316
Dry Creek	Dixie Harrow	2004	93
Durkee Springs	Dixie Harrow	2004	466
Forshea Mountain	Dixie Harrow	1999	65
Hells Hole	Dixie Harrow	2004	132
Indian Flat	Dixie Harrow	2003	14
Indian Flat	Dixie Harrow	2004	89
Indian Peak	Dixie Harrow	2006	95
Koosharem	Dixie Harrow	2003	76
Little Table	Dixie Harrow	1997	126
Rueben Burn	Dixie Harrow	2004	155
Six Patch	Dixie Harrow	1995	440
Six Patch	Dixie Harrow	2003	265
Six Patch/Rock Springs	Dixie Harrow	1995	109
Squaw Springs	Dixie Harrow	1995	440
Thurber Fork	Dixie Harrow	1998	570
Thurber Fork Retreat 1	Dixie Harrow	2009	461
Willis Spring	Dixie Harrow	2005	176
Twin Peaks	Dixie Harrow	2012	578
Big Flat Aspen 4,5 &6	Harvest	1983	4
Dry Creek –State	Harvest	1999	151

Annabella Aspen II	Harvest	2005	104
Doe Flat	Harvest	1992	28
Forshea	Harvest	1998	111
Indian Ranch	Harvest	1969	47
Langdon Mountain	Harvest	1969	17
Research Unit	Harvest	1998	12
South Monument Asp.	Harvest	1987	17
State Section 16	Harvest	1998	147
White Ledge	Harvest	1997	36
White Ledge B	Harvest	1998	71
Annabella	Harvest	2001	234
Annabella Aspen 3	Harvest	2005	22
Buck Hollow	Harvest	1994	24
Clover Flat	Harvest	1989	186
Cove Mtn. Salvage II	Harvest	1996	29
Cove Mtn. Salvage 1	Harvest	1993	9
Cove Mountain	Harvest	2014	1,774
Dry Lake	Harvest	1993	46
Langdon	Harvest	1991	151
Lone Pine	Harvest	1984	78
Lower Langdon	Harvest	1984	82
Mill #10	Harvest	2003	162
Mill #11	Harvest	2001	68
Mill #11a	Harvest	2003	68
Mill #8 Salvage	Harvest	1999	10
Mill #9 Salvage	Harvest	2000	52
Mill Creek	Harvest	2000	274
Monroe Peak	Harvest	1980	14
Monument Peak Salv.	Harvest	1998	60
Monument Peak Salv.II	Harvest	1999	131
North Clover	Harvest	2011	191
Pole Canyon	Harvest	1982	19
White Pine	Harvest	2000	49
White Pine 2	Harvest	2002	61
Wooten Spring	Harvest	1989	103
Mill 12	Harvest	2004	62
Box Creek Phase 1	Harvest	2012	386
Box Creek Phase 2	Harvest	2013	284

Monument Peak	Harvest	2014	400
Monument Peak	Prescribed Fire	2015	3,120
Box Creek	Prescribed Fire	2012	650
Box Creek	Prescribed Fire	2015	2,658
Twin Peaks	Prescribed Fire	2014	5,169
Kinney Spring	Prescribed Fire	1996	794
Greenwich Creek	Prescribed Fire	1996	83
Burnt Flat	Prescribed Fire	1983	359
Box Creek	Prescribed Fire	1997	509
Little Table	Prescribed Fire	1997	485
Bean Hill	Prescribed Fire	1986	123
Shaeffers	Prescribed Fire	1997	334
Jackie Canyon	Prescribed Fire	1997	267
Rubens	Prescribed Fire	2005	948
Deer Spring	Prescribed Fire	1989	41
Buck Hollow	Prescribed Fire	1989	18
Tuft Draw	Prescribed Fire	1989	622
Deer Spring	Prescribed Fire	1988	195
Pine Canyon	Prescribed Fire	1996	434
Tibadore Pond	Prescribed Fire	1988	669
Tibadore Pond	Prescribed Fire	1989	387
Kingston Trough	Prescribed Fire	1980	255
Forshea	Prescribed Fire	1993	1,313
Thompson Basin	Prescribed Fire	2009	180
Thompson Basin	Prescribed Fire	2008	163
Annabella	Wildfire	2006	573
Bald Knoll	Wildfire	2003	68
Flat	Wildfire	1997	5,505
Hell Hole	Wildfire	1975	896
Killian Spring	Wildfire	1990	407
Monroe Canyon	Wildfire	1996	196
Monroe Mtn.	Wildfire	1979	8
Monroe Mtn.	Wildfire	1979	67
Oldroyd	Wildfire	2000	1,329
Thompson Basin	Wildfire	1996	103
Marysvale Peak	Wildfire	2005	759
Blackbird Mine	Wildfire	2006	1,463
Box Creek	Wildfire	2012	1,520

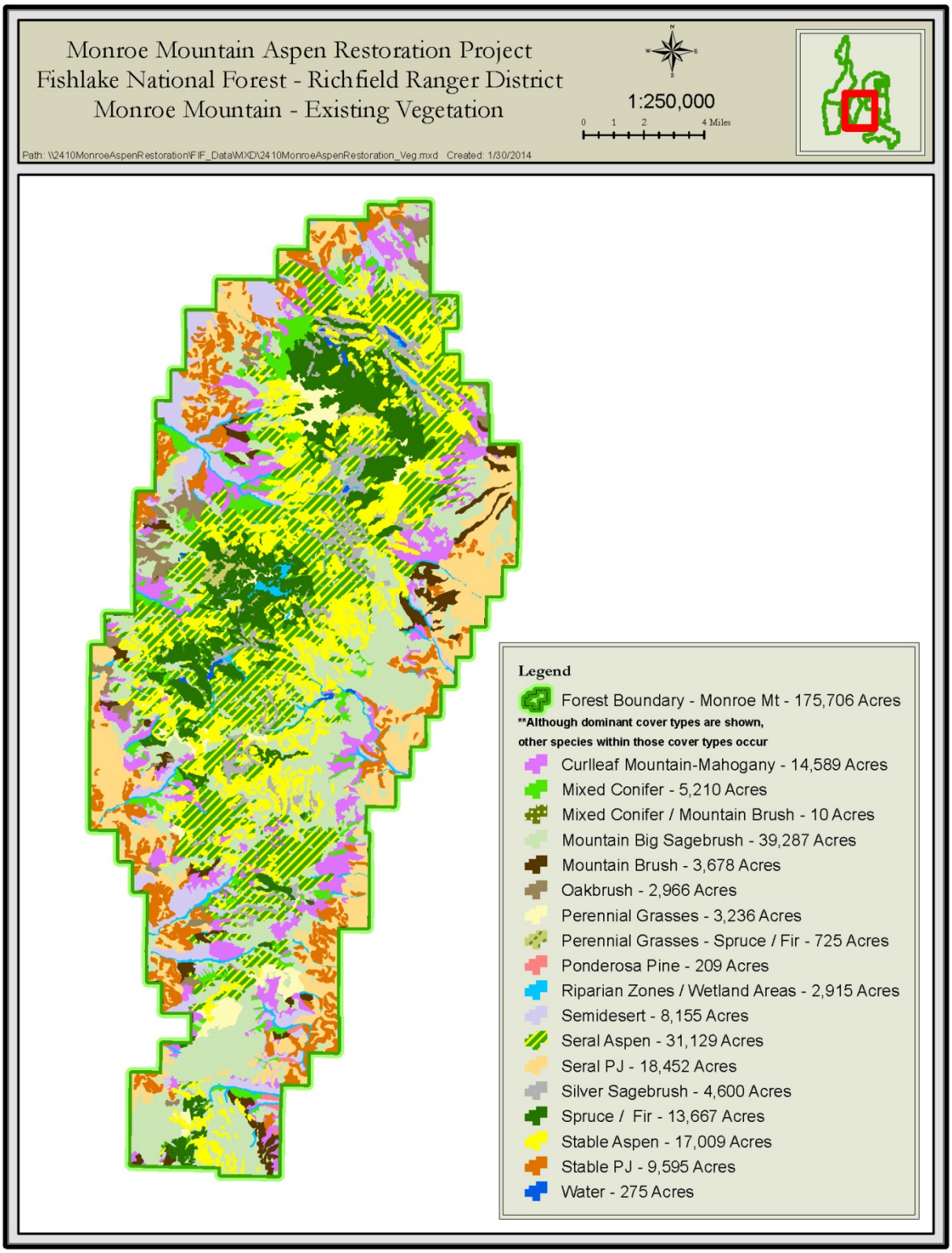

Figure 7: Cumulative Effects Area Map for the Monroe Mountain Aspen Ecosystems Restoration Project

Management Recommendations

- Permittees should follow allotment management plans to facilitate Forest Plan MIS population objectives.
- USFS should coordinate with UDWR to manage big game populations to ensure success of treatments. The "Thresholds Document" should be followed post treatment.
- Personnel responsible for implementation of prescribed burning or mechanical treatments should coordinate with the District Wildlife Biologist on timing, percentages for non-treatment within proposed areas, and avoidance areas, and areas of concern due to R4 Sensitive Species status (Goshawk territories, Flammulated owl habitat).

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9.0 Appendix

Appendix 1. Avian species observed on Fishlake National Forest from 1990 to present.

	COMMON NAME	SCIENTIFIC NAME
1	American Coot	Fuam
2	American Dipper	Cime
3	American Goldfinch	Catr
4	American Kestrel	Fasp
5	American Robin	Tumi
6	American Widgeon	Anam
7	Bald Eagle	Hale
8	Bank Swallow	Riri
9	Barn Swallow	Hiru
10	Belted Kingfisher	Ceal
11	Bewick's Wren	Thbe
12	Black billed Magpie	Pihu
13	Black capped Chickadee	Poat
14	Black chinned Hummingbird	Aral
15	Black crowned night Heron	Nyny
16	Black headed Grosbeak	Phme
17	Black throated gray Warbler	Deni
18	Black throated Sparrow	Ambi
19	Blue gray Gnatbird	Myci
20	Brewer's Blackbird	Eucy
21	Brewer's Sparrow	Spbr
22	Broad tailed Hummingbird	Sepl
23	Brown Creeper	Ceam
24	Brown headed Cowbird	Moat
25	Bullock's Oriole	Icbu
26	Bushtit	Psmi
27	California Quail	Caca
28	Canyon Wren	Came
29	Cassin's Finch	Caca
30	Cedar Waxwing	Boce
31	Chipping Sparrow	Sppa
32	Cinnamon Teal	Ancy
33	Clark's Nutcracker	Nuco
34	Cliff Swallow	Pepy
35	Common Nighthawk	Chmi
36	Common Raven	Coco
37	Common Snipe	Gaga
38	Cooper's Hawk	Acco
39	Cordilleran Flycatcher	Epoc
40	Dark eyed Junco	Juhy

41	Downy Woodpecker	Pipu
42	Dusky Flycatcher	Emob
43	Dusky Grouse	Deob
44	Eurasian Widgeon	Anpe
45	Europeon Starling	Stvu
46	Evening Grosbeak	Cove
47	Ferruginous Hawk	Bure
48	Flammulated Owl	Otfl
49	Fox Sparrow	Pail
50	Gadwall	Anst
51	Golden Eagle	Agch
52	Gray Catbird	Duca
53	Gray Flycatcher	Emwr
54	Gray Jay	Peca
55	Gray Vireo	Vivi
56	Great blue Heron	Arhe
57	Great horned Owl	Buvi
58	Green tailed Towhee	Pich
59	Green winged Teal	Ancr
60	Hairy Woodpecker	Pivi
61	Hermit Thrush	Cagu
62	House Finch	Came
63	House Wren	Trae
64	Juniper Titmouse	Bari
65	Killdeer	Chvo
66	Lark Sparrow	Chgr
67	Lazuli Bunting	Paam
68	Lesser Goldfinch	Caps
69	Lesser Scaup	Ayaf
70	Lincoln's Sparrow	Meli
71	Long eared Owl	Asot
72	Macgillivray's Warbler	Opto
73	Mallard	Anpl
74	Merlin	Faco
75	Mountain Bluebird	Sicu
76	Mountain Chickadee	Poga
77	Mourning Dove	Zema
78	Northern Flicker	Coau
79	Northern Goshawk	Acge
80	Northern Harrier	Cicy
81	Northern Mockingbird	Mipo
82	Northern pygmy Owl	Glgn
83	Northern roughed winged Swallow	Stse
84	Olive sided Flycatcher	Coco
85	Osprey	Paha

86	Pine Siskin	Capi
87	Pintail	Anac
88	Pinyon Jay	Gycy
89	Plumbeous Vireo	Vipl
90	Red Breasted Nuthatch	Sica
91	Red Crossbill	Locu
92	Red naped Sapsucker	Spnu
93	Red tailed Hawk	Buja
94	Red winged Blackbird	Agph
95	Ring necked Duck	Ayco
96	Rock Dove	Coli
97	Rock Wren	Saob
98	Ruby crowned Kinglet	Reca
99	Ruffed Grouse	Baum
100	Rufous Hummingbird	Seru
101	Sage Grouse	Ceur
102	Sage Thrasher	Ormo
103	Sharp shinned Hawk	Acst
104	Song Sparrow	Meme
105	Sora Rail	Poca
106	Spotted Sandpiper	Acma
107	Spotted Towhee	Pima
108	Steller's Jay	Cyst
109	Swainson's Hawk	Busw
110	Swainson's Thrush	Caus
111	Three toed Woodpecker	Pitr
112	Townsend's Solitaire	Myto
113	Tree Swallow	Tabi
114	Turkey Vulture	Caau
115	Vesper Sparrow	Pogr
116	Violet green Swallow	Tath
117	Virginia Rail	Rali
118	Virginia's Warbler	Vevi
119	Warbling Vireo	Vigi
120	Western Bluebird	Sime
121	Western Grebe	Aeoc
122	Western Kingbird	Tyve
123	Western Meadowlark	Stne
124	Western Scrub Jay	Apca
125	Western Tanager	Pilu
126	Western wood Pewee	Coso
127	White breasted Nuthatch	Sica
128	White crowned Sparrow	Zole
129	White throated Swift	Aesa
130	Wild Turkey	Mega

131	Williamson's Sapsucker	Spth
132	Willow Flycatcher	Emtr
133	Wilson's Warbler	Wipu
134	Yellow breasted Chat	Icui
135	Yellow rumped Warbler	Deco
136	Yellow Warbler	Depe

Appendix Q – Wildlife Biological Assessment and Evaluation

FISHLAKE NATIONAL FOREST

RICHFIELD RANGER DISTRICT

BIOLOGICAL ASSESSMENT

Monroe Mountain Aspen Ecosystems Restoration Project

USDA Forest Service
Richfield Ranger, Fishlake National Forest
Sevier & Piute Counties, Utah

Prepared and Approved By: _____ Date: 7-7-15
Kreig Rasmussen
District Wildlife Biologist

I. Introduction

This Biological Assessment (BA) has been prepared to document analysis of the potental direct, indirect, and cumulative effects on any Federally-listed threatened, endangered, proposed, and candidate species known or expected to occur within the project area. This BA addresses potential effects to Utah prairie dog, California condor, and Yellow-billed cuckoo.

This BA was prepared in accordance with Forest Service Manual (FSM) direction 2672.42 and meets legal requirments set forth under section 7 of the Endangered Species Act of 1973, as amended, and implementing regulations [19 U.S.C. 1536 (c, 50 CFR 402.12 (f) and 402.14 (c)].

II. Consultation

We are instructed by the U.S. Fish and Wildlife Service Field Office, Salt Lake City, Utah to query their current species list database by county. We are to use this information when preparing Biological Assessments to help determine which species are currently on their list and need to be considered when doing environmental analysis. This proposed project falls within the boundaries of Sevier and Piute counties. Section VIII list the July 1, 2015 threatened, endangered, proposed, and candidate wildlife species found on the USFWS Utah Field Office website for Sevier and Piute counties.

III. Background

The Monroe Mountain Aspen Ecosystems Restoration Project is a result of several years of planning and collaboration among interested parties, groups and organizations, and Federal, State and local government agencies. In January 2010, the Utah Forest Aspen Restoration Working Group (UFRWG) finalized the 2010 *Guidelines for Aspen Restoration on the National Forests in Utah*. As part of this effort, the UFRWG submitted a call for project proposals that could effectively test the newly created guidelines. The Fishlake National Forest submitted the Monroe Mountain Aspen Ecosystems Restoration Project to the UFRWG for their consideration. The proposal was accepted and in April 2011, the UFRWG created the Monroe Mountain Working Group (MMWG) to provide recommendations and feedback to the District as the project was being developed. Since its inception, the District has met with the MMWG almost monthly since May 2011. These meetings were open to the public to provide information, ask and answer questions, and discuss the proposed action and alternatives.

The MMWG consist of the following stakeholders: Utah Cattlemen's Association; Utah Woolgrowers Association; Utah State University Extension; Sportsmen for Fish and Wildlife; Rocky Mountain Elk Foundation; Trout Unlimited; Utah Division of Wildlife Resources (UDWR); Piute County Commission; Sevier County Commission; Utah Department of Agriculture and Food; Utah Farm Bureau; Rocky Mountain Research Station; Grand Canyon Trust; Western Aspen Alliance; and Utah Division of Forestry, Fire and State Lands.

IV. Purpose and Need

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions described in the FEIS. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire primarily due to an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain.

V. Project Description

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions outlined in the Fishlake National Forest's Land and Resource Management Plan. The area affected by the proposal includes Monroe Mountain, located in south-central Utah, south of Richfield, west of Koosharem, and east of Marysvale, encompasses approximately 175,706 acres of National Forest lands administered by the Fishlake National Forest, Richfield Ranger District, and approximately 11,805 acres of private inholdings (Map 1). To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire primarily due to an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. See the FEIS for additional information regarding background, existing conditions, desired conditions, and purpose & need.

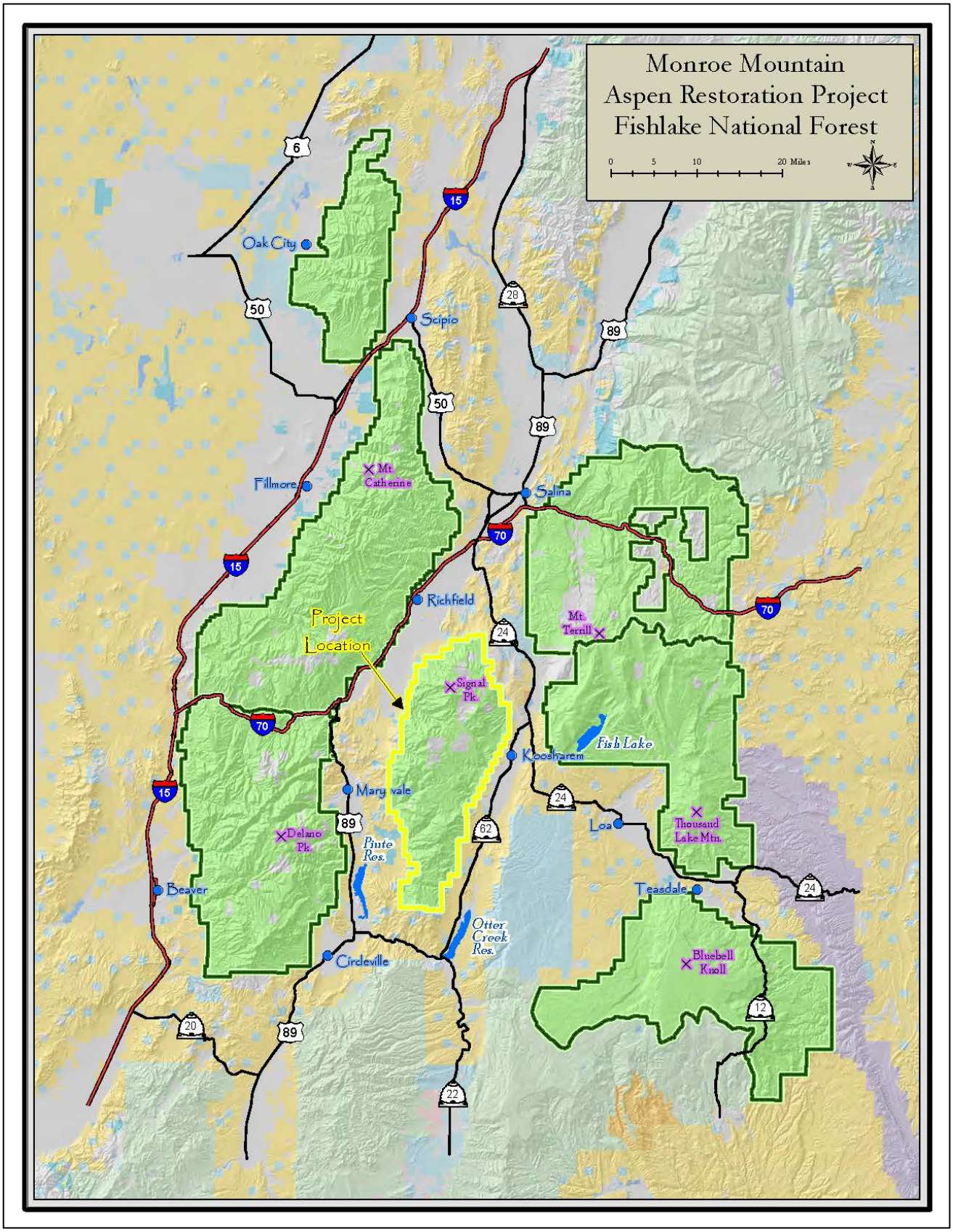
VI. Decision

As described in the Record of Decision (ROD) for the Monroe Mountain Ecosystems Restoration Project, the following is a summary of what will occur:

- Approximately 14,828 acres will be mechanically treated.
- Approximately 25,991 acres will be treated with prescribed fire.
- Approximately 12.1 miles of temporary roads will be built and re-habed after project completion.
- Approximatley 633 acres and 7.2 miles of temporary fence will be built around Manning Meadows Reservoir and Barney Lake to protect treatment areas.
- Aspen browse tresholds and response options will be implemented to ensure aspen regeneration successfully recruits.
- Several design features will be implemented to help minimize impacts to Northern goshawk, Flammulated owls, Bonneville cutthroat trout, migratory birds, boreal toads, etc.
- Implementation will occur over a period of approximatley 10 years.

The Wildlife Specialist Report completed for this project analyzes the effects from the no action alternative (alternative 1) and four action alternatives (alternatives 2-5). The total treatment acres described in the ROD are less than what was analyzed for with alternatives 2-5 in the Wildlife Specialist Report. Alternatives 2-5 all proposed more acres to be treated that what is described in the ROD.

For additional information see the Record of Decision and FEIS.



Map 1: Monroe Mountain Aspen Restoration Project

VII. Current Management Direction

Current management direction for threatened, endangered, proposed, and candidate species on the Fishlake National Forest can be found in the following documents, filed at the Richfield Ranger District:

-Forest Service Manual and Handbooks (FSM/H 2670)
-National Forest Management Act (NFMA)
-Endangered Species Act (ESA)
-National Environmental Policy Act (NEPA)
-Fishlake National Forest Land and Resource Management Plan (LRMP)
-Utah Prairie Dog Recovery Plan
-California Condor Recovery Plan

VIII. Species Evaluated for the Biological Assessment

The list below includes threatened, endangered, proposed, and candidate species that are known to occur in Sevier and Piute Counties, Utah and are considered in this document.

Table 1: List of Threatened (T), Endangered (E), Proposed (P), and Candidate (C) Species.

SPECIES Scientific Name	STATUS	SUITABLE HABITAT	HABITAT UNSUITABILITY BASED ON:	SPECIES TO BE ANALYZED FURTHER Y OR N
Utah Prairie Dog *Cynomys parvidens*	T	No	Short-grass prairie type preferred by prairie dogs does not occur in the project area. No prairie dog colonies.	No
California Condor (4) *Gymnogyps californianus*	E	No	Project area lacks the rock cliff habitat preferred by California condors. Trees are present for perching. Carrion may be present at times for foraging.	Yes
Yellow-billed Cuckoo *Coccyzus americanus*	T	No	Riparian habitat of cottonwood and willow below 6500 feet are not found within the project area.	No
Greater Sage Grouse *Centrocercus urophasianus*	C & Sensitive	Yes	Suitable Sage grouse habitat is found in the analysis area. Sagebrush is not a targeted vegetation species for treatment in this project (see Wildlife Specialist Report and Biological Evaluation).	Yes

Utah Prairie Dog (*Cynomys parvidens)*
As stated above (Table 1), the project area lacks the suitable habitat needed for this species.

California Condor *(Gymnogyps californianus)*
This project lies south of I-70 and is therefore within the 10j experimental non-essential area for the California condor. For more information on life histories and habitat accounts, refer to "Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Fishlake National Forest" (Rodriguez 2006). This document is hereby incorporated by reference.

Greater Sage Grouse (*Centrocercus urophasianus*)
The Greater sage grouse is a Candidate species known to occur in Sevier and Piute Counties, Utah. The Greater sage grouse is discussed and analyzed for affects in the Biological Evaluation because it is a current Forest Service Region 4 Sensitive Species. The Greater sage grouse analysis is also found in the

Wildlife Specialist Report and the final determination is listed in the Biological Evaluation for this project.

Yellow-billed cuckoo (*Coccyzus americanus)*
As stated above in Table 1, the project area is outside of the elevational range and habitat type for Yellow-billed Cuckoos.

IX. Analysis Process

As a part of this project, an assessment of possible impacts to the species mentioned above was conducted and is disclosed in the Wildlife Specialist Report. The project area was assessed for possible impacts to threatened, endangered, proposed, and candidate wildlife species known to occur in Sevier and Piute Counties, Utah. Table 1 lists the wildlife species in these two counties that are identified as threatened, endangered, proposed, or candidate. Table 1 shows the status of those wildlife species along with identification of habitat suitability within the project boundaries for the proposed action.

The techniques and methodologies used in this analysis are considered the best available science because the analysis includes a summary of the credible scientific evidence which is relevant to evaluating reasonably foreseeable adverse impacts.

The best available science is a composite of several key elements. The elements of science used are:

- On-site data and history. District records and the corporate GIS database were reviewed for sightings and potentially suitable habitat for each species.

- Scientific literature. Literature reviewed and cited is listed in the appendix and included within the Life History paper (Rodriguez 2006).

- Professional knowledge, judgment and experience. The primary specialist that conducted this analysis was Kreig Rasmussen, Richfield Ranger District Wildlife Biologist (23 years). Expert birder, Richard Wilkinson has worked summers for approximately 20 years to survey and record bird species around the Richfield Ranger District. Other wildlife technicians have worked several consecutive years on the RRD and helped enhance the collective database. The collective professional knowledge of the project area, judgment of how to integrate science with local conditions and the experience gained from implementation of other projects have been incorporated into the analysis.

- Project specific wildlife surveys were conducted during summer months of 2012-2014 with other surveys being conducted previous years. Monroe Mountain, including the project area, has been surveyed in select areas multiple times over the past 15-20 years to delvelop a baseline and trend data set. These surveys have also targeted the species listed above and their habitat.

X. Effects Analysis and Determinations (see Wildlife Specialist Report for detailed analysis)

Utah Prairie Dog (*Cynomys parvidens)*
There will be no direct, indirect, or cumulative effects to Utah prairie dogs or their habiat as a result of implementing the decision. The project area lacks the suitable habitat needed for this species. No prairie dog colonies occur at the present or historically in the project area.

Determination
As a result of this assessment it is my determination that the proposed action for the Monroe Mountain Aspen Ecosystems Restoration Project will have "No Effect" on the Utah prairie dog or their habitat. As stated above, the project area lacks the suitable habitat needed for this species.

California Condor *(Gymnogyps californianus)*
Direct and Indirect Effects: Implementation of the decision (mechanical and prescribed fire) would alter vegetation. These impacts would result in a decrease in some trees (live and dead) that condors could perch on; however, fire would also be creating more standing dead trees and open up some of the landscape for foraging. It is expected that opening parts of this landscape would increase the potential for condors to find and scavenge on carrion. The increased source of carrion would offset the reductions of potential perching habitat. In addition, the landscape provides abundant perching opportunities. These effects would displace condor use from one area to another within the same landscape as this landscape provides excellent perching habitat, and the decision will increase foraging potential. An indirect impact of the decision may result in more available food. With increased hunter success more potential for food could be available throughout the landscape.

This project lies south of I-70 and is therefore within the 10j experimental non-essential area for the California condor. The project area lacks the abundance of rock cliff habitat needed by this species; however, the area does contain large trees for perching. There have been no sightings at the present time or historical of this species on Monroe Mountain. Since this species does not utilize Monroe Mountain for any of it's life cyle (based on current knowledge) the writer of this document would determine the decision would have minimal to no affect on individuals or the viablitly of the species.

Because no California condor has been documented to occur on the Richfield Ranger District, impacts from the decision would be negligible and difficult to detect. Any effect discussed in this section may only occur if condor populations spread north and developed on the Forest.

The decision consists of a combination of mechanical forestry practices and prescribed fire. While implementation actions would not likely impact the California condor, the effects of the treatments could impact the bird (if they migrated to the Fishlake National Forest (FNF)) and its habitat. It is common for California condor to prey on the carcasses of un-recovered big game animals from hunting season or the parts of a harvested big game animal left from field dressing. Also included in this are fish that have either died or parts of fish that have been left behind after cleaning. They are also found utilizing the carcasses of dead livestock animals that have expired for unknown reasons on the summer range. As treatments are conducted and big game animals attracted to them, a higher number of hunters would hunt treated areas to take advantage of higher concentrations of big game species. As a result, the potential for habitat enhancement by increasing foraging habitat for some potential prey species is high with the decision. As a result, treatments to enhance the California condor occupancy are not crucial to manage for a sustainable population of condor on the Forest. Based on this analysis, implementation of this decision would impact perching and roosting habitat in varying degrees but would not impact the

species adversely by modifying any one of the primarily habitat components necessary for persistence of the species on the Fishlake National Forest. As more acres are treated more opportunities for carrion and prey would be made available to California condor.

Cumulative Effects:

Effects to the Condor over time and from the previous actions on Monroe Mountain will be minimal. Because there is little habitat features to support this species it is unlikely the mountain would support a viable population. Past, present and future habitat improvement projects would help provide opportunites in the form of prey. They depend on carrion (dead animal carcasses) for food. Prey would come in a slight increase of dead animals in the treatment areas. This increase could come from a higher number of wildlife and domestic animals being attracted to the site due to improved vegetative conditions. Animals may inadvertenly die there or be wounded from a hunter, not located and retrieved.

Section 5 in the Wildlife Specialist Report describes the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past,present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Determination
As a result of this assessment it is my determination that the decision for the Monroe Mountain Aspen Ecosystems Restoration Project will have minimal effect on their habitat, therefore I will make a non-jeopardy determination concerning this project as it lies south of I-70 and is therefore within the 10j experimental non-essential area for the California condor. As stated above, the project area lacks the rock cliff habitat needed by this species. I do have a "*may affect, but is not likely to adversely affect*" on the California condor as the project may benefit them in added foraging opportunities from gut piles as hunters harvest big game in newly treated areas.

Yellow-billed Cuckoo (*Coccyzus americanus*)
There will be no direct, indirect, or cumulative effects to Yellow-billed Cuckoo or their habiat as a result of implementing the decision. The project area lacks the suitable habitat needed for this species. Riparian habitat of cottonwood and willow below 6,500 feet are not found within the project area.

Determination
As a result of this assessment it is my determination that the decision for the Monroe Mountain Aspen Ecosystems Restoration Project will have "No Effect" on the Yellow-billed cuckoo or their habitat. As stated above, the project area lacks the suitable habitat needed for this species.

XI. LITERATURE CITED

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XII. CONTRIBUTORS

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- Kreig Rasmussen, District Wildlife Biologist, Richfield Ranger District
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FISHLAKE NATIONAL FOREST

RICHFIELD RANGER DISTRICT

BIOLOGICAL EVALAUATION

Monroe Mountain Aspen Ecosystems Restoration Project

USDA Forest Service
Richfield Ranger District, Fishlake National Forest
Sevier-Piute Counties, Utah

Prepared and Approved By: _____ Date: 7-8-15
Kreig Rasmussen
District Wildlife Biologist

I. Introduction

This Biological Evaluation (BE) has been prepared to analyze potential effects of the Monroe Mountain Aspen Ecosystems Restoration Project on wildlife species designated as Sensitive by the 1995 United States Forest Service Region 4 Sensitive Species List (updated in 1998 , 2003 and 2013). This BE addresses whether the decision will impact a species that may result in a loss of viability of the species, or cause sensitive species to trend toward federal listing.

II. Background

The Monroe Mountain Aspen Ecosystems Restoration Project is a result of several years of planning and collaboration among interested parties, groups and organizations, and Federal, State and local government agencies. In January 2010, the Utah Forest Aspen Restoration Working Group (UFRWG) finalized the 2010 *Guidelines for Aspen Restoration on the National Forests in Utah*. As part of this effort, the UFRWG submitted a call for project proposals that could effectively test the newly created guidelines. The Fishlake National Forest submitted the Monroe Mountain Aspen Ecosystems Restoration Project to the UFRWG for their consideration. The proposal was accepted and in April 2011, the UFRWG created the Monroe Mountain Working Group (MMWG) to provide recommendations and feedback to the District as the project was being developed. Since its inception, the District has met with the MMWG almost monthly since May 2011. These meetings were open to the public to provide information, ask and answer questions, and discuss the proposed action and alternatives.

The MMWG consist of the following stakeholders: Utah Cattlemen's Association; Utah Woolgrowers Association; Utah State University Extension; Sportsmen for Fish and Wildlife; Rocky Mountain Elk Foundation; Trout Unlimited; Utah Division of Wildlife Resources (UDWR); Piute County Commission; Sevier County Commission; Utah Department of Agriculture and Food; Utah Farm Bureau; Rocky Mountain Research Station; Grand Canyon Trust; Western Aspen Alliance; and Utah Division of Forestry, Fire and State Lands.

III. Purpose and Need

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions described in the Final Environmental Impact Statement (FEIS). To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire primarily due to an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain.

IV. Project Description

The purpose of this project is to restore aspen ecosystems on Monroe Mountain by achieving the desired conditions outlined in the Fishlake National Forest's Land and Resource Management

Plan. The area affected by the proposal includes Monroe Mountain, located in south-central Utah, south of Richfield, west of Koosharem, and east of Marysvale, encompasses approximately 175,706 acres of National Forest lands administered by the Fishlake National Forest, Richfield Ranger District, and approximately 11,805 acres of private inholdings (Map 1). To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire primarily due to an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. See the FEIS for additional information regarding background, existing conditions, desired conditions, and purpose & need.

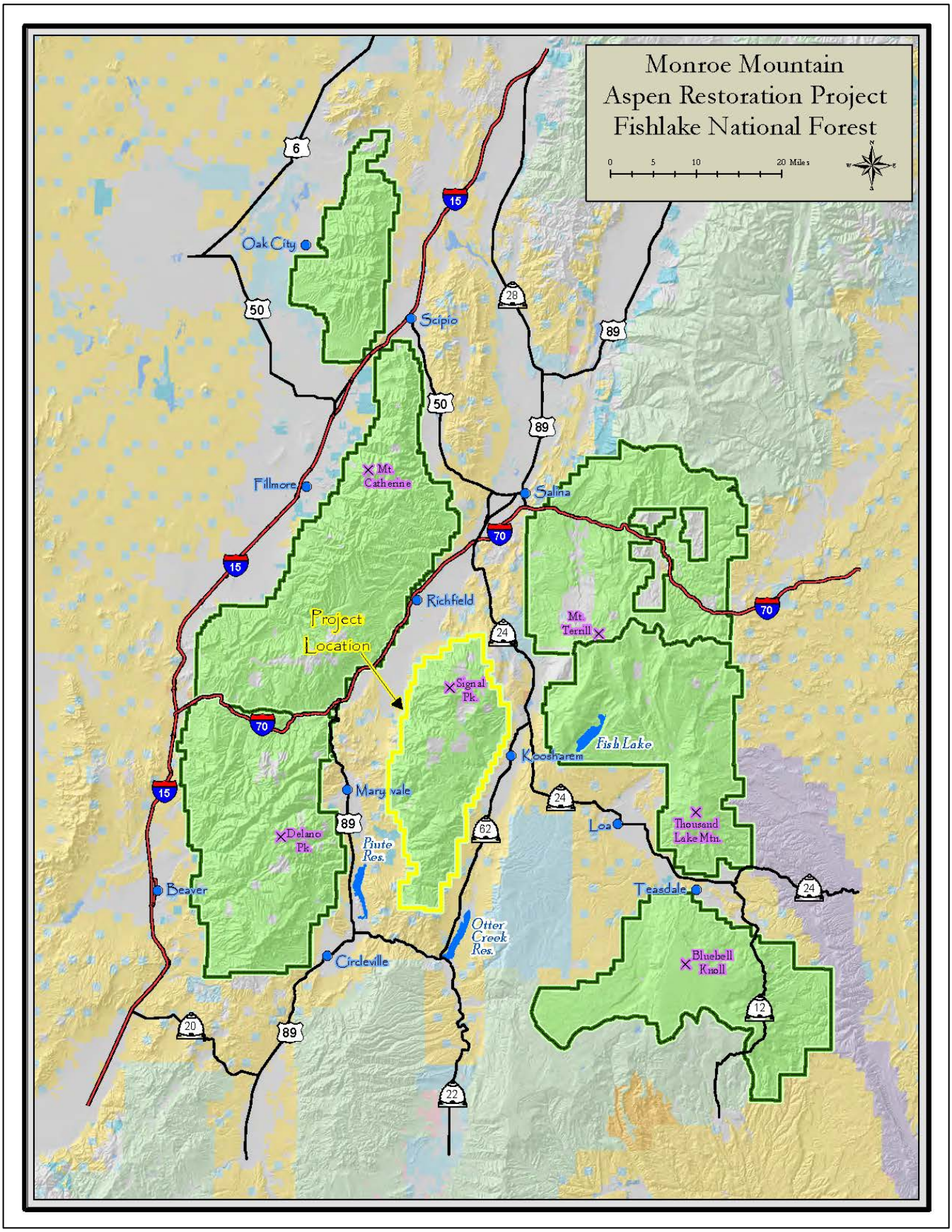
V. Decision

As described in the Record of Decision (ROD) for the Monroe Mountain Ecosystems Restoration Project, the decision is to implement alternative 5 with the following modifications: (1) no treatments will occur in Northern goshawk Post Fledgling Areas (PFAs) and Nest Areas (NAs), and (2) the 2.6 miles of temporary roads near Barney Lake will not be constructed. The following is a summary of what will occur:

- Approximately 14,828 acres will be mechanically treated.
- Approximately 25,991 acres will be treated with prescribed fire.
- Approximately 12.1 miles of temporary roads will be built and re-habed after project completion.
- Approximatley 633 acres and 7.2 miles of temporary fence will be built around Manning Meadows Reservoir and Barney Lake to protect treatment areas.
- Aspen browse tresholds and response options will be implemented to ensure aspen regeneration successfully recruits.
- Several design features will be implemented to help minimize impacts to Northern goshawk, Flammulated owls, Bonneville cutthroat trout, migratory birds, boreal toads, etc.
- Implementation will occur over a period of approximatley 10 years.

The Wildlife Specialist Report completed for this project analyzes the effects from the no action alternative (alternative 1) and four action alternatives (alternatives 2-5). The total treatment acres described in the ROD are less than what was analyzed for with alternatives 2-5 in the Wildlife Specialist Report. Alternatives 2-5 all proposed more acres to be treated that what is described in the ROD.

For additional information see the Record of Decision and FEIS.



Map 1: Monroe Mountain Aspen Restoration Project

VI. Current Management Direction

Current management direction on desired conditions for Sensitive species on the Fishlake National Forest can be found in the following documents, filed at the Richfield Ranger District:

-Forest Service Manual and Handbooks (FSM/H 2670)
-National Forest Management Act (NFMA)
-National Environmental Policy Act (NEPA)
-Fishlake National Forest Land and Resource Management Plan (LRMP)
-Intermountain Region (R4) Sensitive Species List
-Northern Goshawk Fishlake Forest Plan Amendment
-Utah Northern Goshawk Recovery Plan
-Bald Eagle Recovery Plan
-Greater Sage grouse

VII. Species Evaluated for the Biological Evaluation

The below list includes the United States Department of Agriculture Forest Service Regional Forester's (R4) wildlife sensitive species (November 1995 list, updated in 1999, 2003 and 2013) known to occur or potential habitat occurs on the Richfield Ranger District, Monroe Mountain.

WILDLIFE
Bighorn Sheep (Ovis Canadensis)
Bald Eagle (*Haliaeetus leucocephalus)*
Northern goshawk (*Accipiter gentilis*)
Pygmy Rabbit (*Brachylagus idahoensis*)
Greater Sage Grouse (*Centrocercus urophasianus)*
Townsend's big-eared bat (*Corynorhinus townsendii*)
Spotted bat (*Euderma maculatum*)
Peregrine Falcon (*Falco peregrinus anatum)*
Three-toed woodpecker (*Picoides tridactylus*)
Flammulated owl (*Otus flammeolus*)

VIII. Species Accounts

This section includes a summary review of the species that have suitable habitat or are known to occur within the project area. For more information on life histories and habitat accounts, refer to "Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Fishlake National Forest" (Rodriguez 2006). This document is incorporated here by reference.

Table 1. Status of wildlife Sensitive (S) species or their habitat known or suspected to occur on the Fishlake National Forest

SPECIES Scientific Name	STATUS	SUITABLE HABITAT	HABITAT UNSUITABILITY BASED ON:	SPECIES ANALYZED FURTHER Y OR N
Bighorn Sheep *Ovis Canadensis*	S	No	Contiguous acres of cliff face habitat lacking.	No
Bald Eagle *Haliaeetus leucocephalus*	S	Yes	Bald eagles migrate to the project area during the winter (Nov-Mar). Habitat used by eagles is found in the project area, but individuals are only present during the winter months.	Yes
Northern Goshawk *Accipiter gentilis*	Sensitive, MIS & Migratory Bird Species	Yes	Spruce, mixed conifer and aspen dominated stands containing variable sized mid-aged to mature trees that are near a permanent water source are found in the project area.	Yes
Pygmy Rabbit *Brachylagus idahoensis*	S	No	Tall, dense sagebrush habitat below 8,500 feet elevation is not present within the project area.	No
Greater Sage Grouse *Centrocercus urophasianus*	S	Yes	Suitable Sage grouse habitat is found in the analysis area. Sagebrush is not a targeted vegetation species for treatment in this project.	Yes
Townsend's Big-eared Bat *Corynorhinus townsendii*	S	Yes	Streams, springs, bogs, and lake foraging habitat is found in the project area.	Yes
Spotted Bat *Euderma maculatum*	S	Yes	Sagebrush, wetlands, and forested foraging habitat are found in the project area.	Yes

Peregrine Falcon *Falco peregrinus anatum*	Sensitive & Migratory Bird Species	No	The project area doesn't contain the steep cliffs and rocky ledges needed for nesting or the open country for foraging.	No
Three-toed woodpecker *Picoides tridactylus*	S	Yes	Forested areas used by Three-toed woodpecker are mainly mature spruce forested areas. Spruce forested areas occur in the project area.	Yes
Flammulated Owl *Otus flammeolus*	S	Yes	Forested acres used by Flammulated owls on Monroe Mt. are Douglas fir/spruce mix. The project area contains a scattered Douglas fir component.	Yes

As shown in Table 1 above, the following species are dismissed for further analyzed in this project for reasons pertaining to their known existence (present or historical) or lack of suitable habitat within the project area:

1. Bighorn Sheep (*Ovis Canadensis):* Contiguous acres of cliff face habitat lacking.
2. Pygmy Rabbit (*Brachylagus idahoensis)*: Tall, dense sagebrush habitat below 8,500 feet elevation is not present within the project area.
3. Peregrine Falcon (*Falco peregrinus anatum)*: The project area doesn't contain the steep cliffs and rocky ledges needed for nesting or the open country for foraging.

IX. Analysis Process

As a part of this analysis, an assessment of possible impacts to the species mentioned above in Table 1 was conducted. The project area was assessed for possible impacts to these species known to occur on the Fishlake National Forest. Table 1 lists the wildlife species known to occur on the Fishlake National Forest that are identified as R4 Sensitive species. Table 1 also identifies habitat suitability within the project boundaries for this project.

The techniques and methodologies used in this analysis are considered the best available science because the analysis includes a summary of the credible scientific evidence combined with local professional knowledge which is relevant to evaluating reasonably foreseeable adverse impacts.

The best available science is a composite of several key elements. The elements of science used are:

- On-site data and history. District records and the corporate GIS database were reviewed for sightings and potentially suitable habitat for each species. Information analyzed using GIS include:

  - Forest vegetation
  - Topography
  - Historical management activities, including treatments
  - Fences and other range improvements
  - Roads and trails
  - Streams and other water bodies

- Scientific literature. Literature reviewed and cited is listed in the appendix and included within the Life History paper (Rodriguez 2006). Relevant literature includes information reviewed for basic understanding and for current science literature.

  - Recovery and/or conservation plans
  - USFWS publications
  - UDWR studies, publications & range maps
  - Life history for sensitive species on the Richfield Ranger District (Rodriguez 2006)
  - Breeding Bird Surveys and FNF Breeding Bird Surveys 1995-2010
  - Internet Sources (Nature Serve)

- Goshawk— a variety of methods have been used to search for and locate Northern Goshawk territories on the Richfield Ranger District. Methods have included Region 4 protocol goshawk surveys for proposed projects, aerial helicopter surveys in suitable habitat (winter months), monitoring existing territories annually, and reporting of nests randomly located by public or survey contractors for other projects. Known nest and alternate nests have been GPS recorded and GIS mapped. Territorial boundaries were established by the District Wildlife Biologist working with the Geographic Information Systems (GIS) shop. Boundaries are drawn according to aerial photo maps using best judgment of forested areas around the nest areas that may be used by goshawk adults and their young. These boundaries are in no way absolute but are a good representation of suitable territorial habitat. As alternate nests and new territories are found the GIS data base and District wildlife data base records are updated at the end of each field season.

- Neo-tropical migratory birds—Data gathering for avian species were accomplished through walking and driving transect. Established routes have been surveyed on a regular basis since the Burnt Flat Analysis Project (BFAP) was proposed in 1993 (Monroe Mountain). Random point bird counts were established as well for the BFAP. Bird data are also collected along general wildlife survey routes as well as during protocol goshawk survey routes. Avian data were gathered by well experienced birders working for the Richfield Ranger District (RRD).

- Flammulated Owl—Data gathered for Flammulated owl was established throughout the project area on designated routes in suitable habitat. Night surveys during the early summer months using protocol calling methods helped establish a presence of owls and a preferred habitat type on Monroe Mountain. Data points of call responses were GPS recorded and entered into GIS for

future analysis. Areas of preferred habitat have been noted and a GIS data base is being established to reference preferred habitat by Flammulated owls.

- Three-toed Woodpecker-- Bird data were collected along general wildlife survey routes as well as during protocol goshawk routes in proposed treatment units. This species was identified and documented as well as its preferred habitat type (Hill 2002). Through years of survey work in the spruce zone on Monroe Mountain we have seen an increase of Three-toed woodpecker use during a spruce bark beetle outbreak. Three-toed woodpeckers continue to remain in the beetle ravaged areas.

- Bats—Bat data were collected with an electronic "Anabat" device. Data was recorded in the proposed project area. Data was retrieved and analyzed at the end of the 2014 field season.

- Scientific literature. Literature reviewed and cited is listed in the Literature Citations section and included within the Life History paper (Rodriguez 2008).

- Professional knowledge, judgment and experience. The primary specialist that conducted this analysis was Kreig Rasmussen, Richfield Ranger District Wildlife Biologist (23 years). Expert birder, Richard Wilkinson has worked summers for approximately 20 years to survey and record bird species around the Richfield Ranger District. Other wildlife technicians have worked several consecutive years on the Richfield Ranger District (RRD) and helped enhance the collective database. The collective professional knowledge of the project area, judgment of how to integrate science with local conditions and the experience gained from implementation of other projects have been incorporated into the analysis.

- Project specific wildlife surveys were conducted during summer 2012, 2013, and 2014 with other surveys being conducted within the project area in previous years. These surveys have also targeted some of the species listed above and their habitat. Monroe Mountain, including the project area, has been surveyed in select areas multiple times over the past 15-20 years to develop a baseline and trend data set. Specific surveys include:
    1. MIS Surveys
    2. Project level bird surveys

XI. Effects Analysis and Determinations (see Wildlife Specialist Report for detailed analysis)

1. Bald Eagle (*Haliaeetus leucocephalus)*

Direct and Indirect Effects: Bald eagles have been known to occur on the Fishlake National Forest during the late fall, early spring and winter months. During this time Bald eagles tend to concentrate wherever food is available, often around open water where fish and waterfowl can be caught. After the open water freezes, Bald eagles become more opportunistic and eat whatever is available. At this point Bald eagles generally move down to the foothills and valleys to feed on small mammals and carrion (Rodriguez 2008).

Utah hosts one of the largest state populations of wintering bald eagles. More than 1,200 bald eagles have been counted in Utah during recent years. About 3,000 to 4,000 of the 13,000 bald eagles that winter in the lower 48 states occur west of the Rocky Mountains. Twenty-five to thirty percent of these western eagles spend the winter in Utah, indicating the significance of Utah's winter habitat (UDWR 2009). In 2009 the USFWS published a Post De-listing monitoring plan in the lower contiguous 48 states (USFWS 2009). The main threat to Bald eagles is habitat loss and disturbance from development of shoreline areas, recreation, logging, road building, and mining (Spahr et al. 1991).

The proposed project would create some positive effects for this species and increase habitat effectiveness by creating more snags in the burned ares for perching, attracting more prey species to a newly treated area, and hunter opportunites would increase thus having the potential to have gut piles and unretrieved carcasses available for foraging.

The decision consist of a combination of mechanical forestry practices and prescribed fire. Since Bald eagles are seasonal visitors to Monroe Mountain it is expected that most mechanical and prescribed burn activities would be completed by early November when the first Bald eagle migrate to the mountain. While implementation actions would not likely impact the Bald eagle the effects of the treatments would impact the bird and its habitat. It is common for Bald eagles to prey on the carcasses of un-recovered big game animals from hunting season or the parts of a harvested big game animal left from field dressing. Also included in this are fish that have either died or parts of fish that have been left behind after cleaning. They are also found utilizing the carcasses of dead livestock animals that have expired for unknown reasons on the summer range. As treatments would be conducted and big game animals attracted to them, a higher number of hunters would hunt treated areas to take advantage of higher concentrations of big game species. As a result, the potential for habitat enhancement by increasing foraging habitat for some potential prey species is high. However, as stated previously, Bald eagles are only late fall, winter and perhaps early spring inhabitants and impacts to the bird and its habitat are expected to be minimal. As a result, treatments to enhance the Bald eagle occupancy are not crucial to manage for a sustainable population of eagles on the Forest. Based on this analysis, implementation of the decision would impact perching and roosting habitat in varying degrees but would not impacts the species adversely by modifying any one of the primarily habitat components necessary for persistence of the species on the Fishlake National Forest. As more acres are treated more opportunities for carrion and prey are made available to Bald eagles. See the Wildlife Specialist Report for additional information.

Cumulative Effects:

Effects to the Bald Eagle over time and from the previous actions on Monroe Mountain will be minimal. Bald eagles are known to use the mountain and the proposed project area seasonally. They arrive in early November and persist in the area until late March. They depend on carrion (dead animal carcasses) for food, but also kill their own prey. As winter snows increase in depth at the higher elevations eagles generally migrate to lower altitudes where carrion and prey are present. Past, present and future habitat improvement projects would help provide opportunites in the form of prey. Prey in the form of an increase of dead animals in the treatment areas. This increase would

come from a higher number of wildlife and domestic animals being attracted to the site due to improved vegetative conditions. Animals may inadvertenly die there or be wounded from a hunter, not located and retrieved.

In section 5 of the Wildlife Specialist Report is a description of the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past, present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

Determination
As a result of this assessment it is my determination that the decision for the Monroe Mountain Aspen Ecosystems Restoration Project "*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*".

2. Northern Goshawk (*Accipiter gentilis)*

Direct and Indirect Effects: Prescribed fire, wildfire, and mechanical thinning activities that occur within Northern goshawk territories may create habitat disturbances that would likely cause abandonment if not carefully mitigated by following the habitat recommendations identified in the Fishlake Forest Plan and other sources of best available science such as Graham et al. 1999. Implementation of these best science practices are part of the actions identified for this project. If activities occur within nest areas (NA) and post fledgling family areas (PFAs), territory abandonment would likely occur if Forest Plan requirements were not followed. The displacement of adult and juvenile birds, if present, would likely result in mortality and impact the viability of this species. The District developed alternatives and project design criteria that would minimize the chance of Northern goshawks being displaced because of project activities. Some project activities may remove or degrade potential foraging habitat in the short-term (5-15 years); however, the quality and quantity of potential foraging habitat would likely increase in select areas as aspen recovers following project implementation. To understand how the decision may impact the goshawk and its prey more or less it is important to discuss some of the key habitat requirements and guidelines that have been established by researchers.

Important to the architectural structure of a goshawk territory (including both the NA and PFA) is the combination of an older class of forest type vegetation (mixed conifer-aspen) including tall mature trees with interlocking crowns, large trees, large down woody debris, snags (mix of structural snags), water, understory vegetation, and openings. All these structural components are crucial to the existence and persistence of goshawk. Security habitat from predators (as the Great-horned owl known to prey on goshawk chicks and adults on the Fishlake N.F.) comes in the form of a balance of the above mentioned components maintained in an undisturbed fashion to protect goshawk young and adults. Nesting habitat structure with open conditions allows for the predation of goshawks, and especially their nestlings, by great horned owls (*Bubo virginianus*) (Boal and Mannan 1994; Moore and Henny 1983; Woodbridge and Detrich 1994). Nestling mortality may increase during periods of

low food availability (Moore and Henny 1983; Rohner and Doyle 1992; Woodbridge and Detrich 1994; Zachel 1985).

Another crucial aspect of managing for the goshawk is management of vegetation for the bird and its prey. Reynolds et al. 1992 and Graham et al. 1999 both discuss the importance of managing a balance of habitat for the goshawk and its prey. Goshawks prefer to forage in closed canopy forests with moderate tree densities as compared to young open forests (Squires and Reynolds 1997). Goshawks take prey from small openings, although they usually hunt these areas from perches near the edge (Younk and Bechard 1994b). Medium to large-sized birds (woodpeckers, robins, grouse, or jays) and mammals (ground and tree squirrels and hares) tend to dominate breeding season diets (Squires and Reynolds 1997).

In general, goshawks nest in mature to old forests with relatively large trees, high canopy closure (relative to surrounding areas), sparse ground cover and open understories. Nests are often located near the bottom of moderately steep slopes, close to water, and often adjacent to a canopy break (Squires and Reynolds 1997). Important internal components of forests in Utah include snags, multiple canopies, and down woody debris (Reynolds, et. al. 1994).

The underlying concern with a project of this scale is how treatments in goshawk territories would impact their continued use and return back to the territory post treatment. The Richfield Ranger District, and especially Monroe Mountain, has the largest concentration of goshawk territories known on the Fishlake National Forest. Of the goshawk territories currently known on the District, 22 are on Monroe Mountain, and 18 are within the direct/indirect effects area for this proposed project. As nests are monitored on the District some are documented to have blown out of the tree and a nest no longer exists. A search is done for a replacement alternative nest and if found it is documented.

In a previous action on the Richfield Ranger District, in the Oldroyd-Monroe Meadows area on Monroe Mountain, a treatment within the Post Fledgling Area (PFA) occurred. Implementation of the Forest Plan for Goshawk Management was implemented. These treatments were carefully evaluated prior to managing the area for hazardous fuels and it was determined that the risk of wildfire coming off the Fishlake National Forest to private lands was a substantial threat. Due to this threat an experimental treatment was developed to try and reduce fuels and manage for the bird. Treatments were implemented to reduce fuels near private land and a cabin. Although Forest Plan Guidelines were implemented, abandonment occurred and the pair has not been back to the area for the past two years. Being able to determine the exact cause and effect is difficult; however, it is the judgment of the Forest and district biologists that it was a direct result of the vegetation treatments and not applying our best knowledge to about the needs of the bird. Managing for bird persistence in the same area as summer cabins and private lands is difficult. As a result, thinning and burning treatments for this project in the Monroe area is a crucial component to the viability of the Northern goshawk population on the Fishlake National Forest. It is strongly recommended to not allow any treatments in NAs on Monroe Mountain.

A thinning in a PFA may be designed to help prevent the spread of wildfire to private property while maintaining the integrity of the territory (Forest Plan, Northern Goshawk Amendment, Guideline Z).

In Forest Plan direction for the Northern goshawk, forest vegetation structural stage classes are discussed and how they relate to preference by goshawk for nesting, post fledgling family areas, or rearing and teaching of young and foraging. Vegetation structural stage's (VSS) range from 1-6 (with 1 being smallest and 6 being largest). The VSS classes found on Monroe Mountain average in the "3" range with more in the 2, 3, and 4 range and with fewer 5s and 6s on the top end. We find that VSS 5 and VSS 6 trees found on Monroe Mountain are low in numbers. With this VSS class in limited supply so is nesting habitat for the goshawk. Therefore, care must be taken to retain the largest trees on the landscape.

The decision consist of a combination of mechanical forestry practices and prescribed fire. Mature goshawks are known to hunt an area approximately 5,000 acres per territory foraging in a wide variety of forested habitat. There are approximately 10,461 acres of Post Fledgling Area goshawk habitat within the proposed project area. There are approximately 2,817 acres of Nest Replacement Area acres in the proposed project area. Habitat for goshawks would be affected by the decision due to the combined size of the foraging areas (5,000 acres for each territory).

Goshawks are known to use a variety of habitats throughout their lifecycle. Removal of vegetation from a prescribed burn or mechanical thinning could have an indirect effect of decreasing foraging areas for an undetermined time period until it regrows back into suitable foraging habitat to support prey species. This could take 5-15 years or it could be greater than 100 years depending upon the location of the treatment and the species that inhabit the area. Goshawks are known to prey on a variety of mammals and birds such as; rabbits, squirrels, chipmunks, flickers, grouse, and jays. Burning would decrease habitat and populations of some prey species (especially small mammals) as woody debris is burned and increase populations of others (such as jays or woodpeckers) as snags are created. The larger mammals are more advantageous for them to forage upon as they provide more energy for the effort. As stated above, it is difficult to determine how long suitable vegetation will take to regrow and provide habitat for prey. This can further be complicated as the area is managed for other resources such as domestic and wild ungulates. Ungulates can slow or suppress suitable habitat for prey species, as well as weather events and storm patterns.

Goshawks can breed successfully in forests where timber harvesting has occurred (Reynolds and others 1994; Woodbridge and Detrich 1994) but they appear to prefer stands of mature and over-mature trees for nesting and foraging (Bright-Smith and Mannan 1994). Also, occupancy of the nest stand has been positively associated with patch size (Woodbridge and Detrich 1994). However, the effects of reducing the number and size of mature trees on existing goshawk densities or productivity are unknown. Population models for species in fragmented forest landscapes suggest that sharp declines in viability can occur if habitat decreases over the long-term (Franklin and Forman 1987; Lamberson and others 1992). The removal of suitable nesting habitat through timber harvesting or other management activities can be a threat to the goshawk (McCarthy 1989).

Past treatments within PFAs have not only caused abandonment on the Fishlake but also on the Dixie National Forest to the South (Rodriguez 2014, personal conversation). Based on Fishlake data and observations from other goshawks biologists, not treating in the NAs for this project is important to the viability of the goshawk on Monroe Mountain and on the Fishlake National Forest. Treating

within PFAs is generally not recommended in order to keep disturbance to a minimum.

Surveys conducted in 2014 revealed two new goshawk nests with associated NAs and PFAs; however, only one of the territories occurs within the boundaries of this project. This new territory will be referred to as the "Indian Ranch Territory". Approximately 310 acres of this territory occurs within the boundaries of this project. The nest was active in 2014 and successful in producing two fledglings. These 310 acres make up less than 1% of the project area. The majority of the 310 acres occur in stable aspen. To maintain habitat requirements and population viability, I recommended that no treatments occur in these 310 acres. These 310 acres could become part of the 40% non-treatment mosaic pattern that is required to remain to meet goshawk foraging guidelines.

In summary, consistent with Alternative 2, the decision is no treatments will occur in NAs and PFAs. The decision allows for treatments within the foraging area that will open small areas up to enhance habitat for prey and opens areas up for foraging by the goshawk. The decision also allows for management of down woody debris, and snag retention, which is crucial to the goshawk and prey management. No impacts to viability as a result of the decision are expected.

The following measures will be implemented on the Monroe Mountain project to ensure proper management is occurring and viability considered and met;

- "Monitoring requirements" (appendix CC) found within the goshawk amendment for the six forests in Utah discuss the following process:
- ID m-1--Question: Are known goshawk territories on national forests remaining occupies?
- Item to Measure: Goshawk territory occupancy at the forest level.
- Acceptable Range: Less than 20% decline in territory occupancy over a 3 year period.
- Measurement Frequency: Annually (report every 3 years)
- ID m-2—Question: Are mitigation measures (standards and guidelines) employed during vegetative management project implementation sufficient to prevent territory abandonment?
- Item to Measure: Goshawk territory occupancy following vegetative management treatments.
- Acceptable Range: No territory abandonment on projects where mitigation measures are used.
- Measurement Frequency: The first full breeding period following activity in all projects where pre-project surveys determined territory occupancy. (report annually)
- ID m-3—Question: Is habitat connectivity as represented by structural and species diversity and dispersion thereof, within and among 5th and 6th order watersheds (or equivalent ecological scale) being maintained?
- Item to Measure: Spatial dispersion patch size of mature and old forest groups within a 5th to 6th order watershed. Tree species composition mix within mature and old groups within a landscape.

- Acceptable Range: Approximately 40% of the coniferous and 30% of the aspen forested acres within a landscape are in VSS 5 and 6 classes. Seral species characteristic of the cover type are well represented VSS 5 and 6 classes.

- Measurement Frequency: Completion of each landscape assessment. (report every 5 years)

- Other sections of the monitoring matrix speak of monitoring long-term for down woody material and snags.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to goshawk in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. All these types of disturbances can affect goshawk occupancy within their territory to some degree. As we move into the future for goshawk habitat management it is important to keep in mind Monroe Mountain currently provides prime habitat to foster the life cycle components needed to sustain a healthy population. The mountain has more goshawk territories per square mile than any other district on the Fishlake National Forest. A delicate balance is needed to provide current territorial features while planning for key habitat components in the future.

In section 5 of the Wildlife Specialist Report is a description of the cumulative effects area, it's size, relationship with the actual analysis area and the rational behind the selection of the boundaries. The section also decscribes past, present, reasonably foreseeable projects and vegetative projects or fires that have occurred on Monroe Mountain. Also explained are "other" activities that have been known to or do occur on the mountain. All these activities may or may not have an effect on wildlife species that use the mountain at some part of their life cycle.

<u>Northern Goshawk Analysis Conclusion</u>

Maintaining adequate structural components within the NAs and PFAs of goshawk territories to ensure habitat effectiveness which encompasses the entire portion of their life cycle when they are on the forest is crucial to maintain viability. It is also important to follow recommendations in foraging habitat to manage for prey species habitat. These structural components referred to in the goshawk amendment will help maintain a prey base for the adults to utilize during mating and rearing season as well as for the fledglings when they are old enough to hunt for themselves within the territory. The decision allows enough habitat requirements to be maintained as no treatments will occur in PFAs and NAs. The decision does allow for treatments to occur in Northern goshawk foraging areas. To maintain goshawk habitat requirements in the foraging areas, the following will be implemented:

- Clumps of trees with interlocking crowns will be maintained across 40 to 70 percent of the foraging areas. Groups are made up of multiple clumps of trees. Clumps of trees will have two to nine trees with interlocking crowns.

- Within the aspen areas, a minimum of 200 snags per 100 acres: 8 inch DBH – 15 feet tall will be retained. Within the mixed conifer and spruce/fir areas, a minimum of 300 snags per 100 acres: 18 inch DBH – 30 feet tall will be retained.
- Within the aspen areas, a minimum of 50 down logs per 10 acres, 6-inch diameter at 8 feet long, and 30 tons per 10 acres will be retained. Within the mixed conifer and spruce/fir areas, a minimum of 50 down logs per 10 acres, 12-inch diameter at 8 feet long, and 100 tons per 10 acres will be retained.
- No temporary roads will be constructed in Northern goshawks PFAs or NRAs.
- All temporary roads will be reclaimed upon completion of the mechanical treatments.
- No clear-cuts will be implemented.
- Treated areas will be rested from livestock grazing for a least two growing seasons post implementation, and possibly three to reduce livestock browse pressure on new aspen sprouts. This will help vegetation grow and improve following implementation.
- Where mechanical treatments are to occur, no mechanical treatments using feller bunchers or skid-steers will occur in the stable aspen stands (approximately 5,338 acres) that have little to no conifer presence (less than 40 conifer stems per acre) in the aspen understory. These areas will still be mechanically treated, but with hand crews equipped with chainsaws, bow saws, or loppers.
- No direct fire ignitions will occur in the stable aspen stands (approximately 6,431 acres) that have little to no conifer presence (less than 40 conifer stems per acre) in the aspen understory.
- In the seral aspen, mixed conifer, and spruce/fir areas where direct fire ignitions are to occur, prescribed fire will be implemented with mosaic burn patterns and mixed burn severities as an objective. Prescribed fire will occur when no more than 60% of the area will be expected to burn.
- Within the spruce/fir and mixed conifer dominated stands that have little to no aspen presence (less than 15 aspen recruits per acre), prescribed burning will occur when low to moderate fire severities will be expected.
- In the seral aspen where mechanical thinning treatments are to occur, conifers will be removed while retaining as much of the aspen as possible. In the mixed conifer and spruce/fir areas where mechanical thinning treatments are to occur, live trees will be thinned using uneven aged management to a basal area of 90 with single and group tree selection. Dead and/or dying trees will be removed while ensuring consistency with the LRMP for snags and down woody debris. In spruce/fir and mixed conifer areas where LRMP stock levels are below plan guidance, replanting of spruce and/or mixed conifer will occur.
- Aspen browse thresholds and response options are included to ensure new aspen regeneration successfully recruits and aspen ecosystems move towards desired conditions.

- Several other design features listed in the Record of Decision (ROD) (i.e. design features related to riparian areas, HUCs, three-toed woodpeckers, Flammulated owls, etc.) will also indirectly help minimize impacts to Northern goshawks.

By not allowing treatments to occur in the NAs, PFAs, and by maintaining habitat in the foraging areas, impacts to goshawks will be minimized thus maintaining a viable population of goshawks across the Forest.

Determination
As a result of this assessment it is my determination that the decision for the Monroe Mountain Aspen Ecosystems Restoration Project "*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*".

3. **Greater Sage Grouse (*Centrocercus urophasianus*)**

Direct and Indirect Effects: The Greater sage grouse is a sagebrush obligate species because sagebrush is essential to their survival and is used for food and cover throughout their entire life cycle. The proposed project analysis area does contain acres of sagebrush but they are not targeted for treatment. The proposed project is a "forest type" treatment. Traffic used in project implementation will transect through areas of suitable sagebrush habitat. A direct effect could occur if a grouse were hit by a vehicle in suitable habitat area as traffic traveled to and from the project areas during implementation. A remote population of sage-grouse does occur on the very south end of Monroe Mountain (approximately 5 miles south from where active treatments will occur). No active treatments are proposed on the south end of Monroe Mountain. Also, there are several known leks and populations that occur in areas adjacent to Monroe Mountain on BLM and private land.

According to trend data, sage grouse numbers on Parker Mountain have been increasing since 1999 although numbers are fluctuating. In 2008, sage grouse numbers slightly dipped on leks for the Parker Mountain population; 930 males were observed on annually counted leks, which is slightly down from 936 in 2007 (UDWR, 2008). The UDWR expects sage grouse population numbers to increase because during the last 2 years they have discovered 9 new lek sites. Any lek sites that have birds on them for three consecutive years gets included in the trend data.

Also in a study conducted on the Parker Mountain, BYU research students combined with the Parker Mountain Adaptive Resource Management (PARM) Local Working Group to compare treatment types in sage grouse habitat. There treatments consisted of a control plot, Lawson Aerator, Dixie Harrow and Spike chemical treatment. They concluded that sage grouse preferred treated to non-treated sites (Dahlgren 2006). A FS-UDWR cooperative study was also conducted on the Hell's Hole sage grouse population at the south end of Monroe Mountain. Similar results to the Parker Mountain Study were documented (Kreitzer 2006).

Sage grouse surveys of the project area were conducted in birding routes in 2012, 2013 and 2014. No sage grouse were found as a result of these recent surveys. A single sage grouse was documented by a District Wildlife Technician in the late 90s within an area on the eastern bench in the central part of the mountain; however, no further individuals or groups have been documented to

date. Approximately 44,187 (39,287 of Mountain Big Sage and 4,900 Silver Sage) acres of sage are found within the Cumulative Effects Area for the project (Forest Boundary). Not all of these 44,187 acres of sagebrush are considered suitable habitat for Greater sage grouse. Not all sagebrush is considered suitable because various sage types occur, densities vary, aspect varies, patch size varies, sagebrush understories vary, and geography varies. Since this project is designed to treat forest types (aspen, mixed conifer, spruce/fir) and no intentional treatment efforts are designed in sagebrush, no habitat or suitable habitat would be altered. As vehicles traveled through suitable sagebrush habitat and if sage grouse populations expanded to the project area, an individual grouse may get struck by a vehicle. This would be a direct effect. We are not aware of any grouse being hit by vehicles on the south end of the mountain where we have sage grouse. Indirect effects may occur if sagebrush habitat adjacent to the proposed forest treatment areas improved in habitat effectiveness. This may be due to some ungulate grazing pressure being re-distributed to the newly treated areas allowing sagebrush areas improve.

The decision consists of a combination of mechanical forestry practices and prescribed fire in the forested cover types. As noted in the discussion above this proposed treatment is designed for direct treatments in forested ecosystems, it is unlikely that many acres of sagebrush that contain sage-nester habitat would be affected. Some direct minor impacts may occur to sagebrush as equipment is used to go along the edge of sagebrush meadows to transport equipment or personnel for treatment implementation. Indirectly, vehicles traveling through sage habitat to and from project areas may cause dust and an occasional direct impact with a vehicle. None of these impacts pose a threat to the integrity of the habitat or viability of the Greater sage grouse.

Cumulative Effects:

Past, present and future activities on Monroe Mountain in suitable sagebrush habitat for sage grouse are important to the Richfield Ranger District. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing, habitat treatments and private land development on Monroe Mountain.

Through the years acres of sagebrush have been mechanically treated, prescribed burned or burned from natural ignited wildfires. Past mechanical treatments in sagebrush have been carefully designed in a mosaic pattern and treated with tools that would thin sagebrush to meet wildlife habitat objectives. Large scale forestry projects may not produce any cumulative effect on sage grouse.

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Determination
As a result of this assessment it is my determination that the decision for the Monroe Mountain Aspen Ecosystems Restoration Project "*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*".

4. Townsend's Big-eared Bat (*Corynorhinus townsendii)* and Spotted Bat *(Euderma maculatum)*

Direct and Indirect Effects: Population densities are poorly understood because these species are difficult to monitor (Rodriguez 2008). They are still only suspected to occur on the Richfield Ranger District at the present time. Surveys were conducted across the District at select locations in 1993 (Toone 1993). Surveys with an electronic bat detector were conducted in the project area during the 2014 field season. The electronic detector was deployed at two riparian areas within the project area. Final data collected was sent to Titley Scientific for species verification. A final report was created by Titley Scientific (Corben 2015) and submitted to the Richfield Ranger District. Seven species were confidently identified in the dataset. They are: Big Freetailed Bat (NYMA), Mexican Freetailed Bat (TABR), Hoary Bat (LACI), Big Brown Bat (EPFU), Silver-haired Bat (LANO), Long-eared Myotis (MYEV), Little Brown Bat (MYLU). There were five files from Site 2 which may have been from two further species. One of these might have been Pallid Bat (ANPA) and the other might have been Fringed Myotis (MYTH). At this point Townsend's Big-eared bat and Spotted bats have not been documented in or around the project area according to surveys. Understanding literature about these bats gives us the opportunity to take a hard look at the life cycle and distribution of these species. The main threat to these bat species is human disturbance at roost or hibernacula sites, because they will abandon these sites if disturbed (Spahr et al. 1991). Direct effects would come in the form of a decrease of prey in the removal or burning of trees. Moths are in important part of their diet and forested areas provide foraging opportunities. Riparian areas inter-connected within the treatment areas would realize improvement and prey would increase for bats. Indirectly as the forest succession advanced over time insect prey for bats would improve.

The decision consists of a combination of mechanical forestry practices and prescribed fire. To date, studies assessing the impact of fire regimes on Spotted bats are not available. As Spotted bats tend to forage over open meadows and woodlands, some combination of silvicultural practices with prescribed fire to create open areas and maintain herbaceous plant diversity (and, presumably therefore, promote insect prey base diversity) may benefit this species (Schmidt 2003). Insect occurrence and density depend on adequate quantity, quality, proportions, configurations, and distribution of wet meadows and insect-supporting terrestrial vegetation,such as grasses and sedges in meadows and forest openings (Luce 2007).

No treatments will be conducted within open meadows of grasses or sagebrush. Minimal treatments will occur in riparian areas while no treatments would be conducted in bogs, or seeps where prey for bats may be disrupted.

The decision could have an effect on the habitat effectiveness of bats. Bats find moths and other important insect prey species in conifer forests. As treatments are implemented bats would have to move to other non-treated areas. This would compress the use with bats already existing in the non-treated areas. Therefore, there could be a direct and indirect impact on this species in the short-term. This could cause bats to move in location but is not likely to impact viability of the species. However, a long-term benefit would be realized after the forest successional stages became more advanced.

Cumulative Effects:

Past, present and future activities on Monroe Mountain that would affect bat habitat are minimal. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing, habitat treatments and private land development on Monroe Mountain. Maintaining a balance of forested ecosystems, sage-grass and riparian habitat have helped provide good bat habitat on Monroe Mountain. There are ample small cliffs and outcrops for hibernating. A large scale forestry project will reduce the amount of insect prey available in the short term. Long-term positive effects will be added as riparian systems improve. Healthy young forests will provide a variety and abundance of insects.

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Determination
As a result of this assessment it is my determination that the decision for the Monroe Mountain Aspen Ecosystems Restoration Project "*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*".

5. Three-toed Woodpecker (***Picoides tridactylus)***

Direct and Indirect Effects: Three-toed woodpeckers are found on Monroe Mountain within the Engelmann spruce forest types. These are mainly found on the central and northern part of the mountain. We have noticed they follow the spruce bark beetle outbreaks on the mountain. Past mechanical forestry projects on Monroe Mountain in Engelmann spruce have implemented forest plan guidance by managing for snags in groups and clumps of snags for cavity dependent species including the Three-toed woodpecker. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirect effects would occur in the form of habitat being removed through thinning or burning. Trees removed or burned may contain nest cavities, prey, and cover for the woodpecker.

The decision consists of a combination of mechanical forestry practices and prescribed fire. Implementation of the decision will temporarily reduce Three-toed woodpecker habitat in the

landscape. Because the landscape is not lacking snags, suitable habitat (snag habitat) will be present across the landscape over time. As with all landscapes dominated by dead trees, as these areas decay and turn into down woody debris, insect populations will be reduced and woodpecker populations will move and may decrease on the landscape. Implementation of the decision may slow down the rapid progression of tree decay and allow woodpecker populations to be managed over a larger period of time. To minimize impacts from prescribed fire, as described in the ROD, no direct fire ignitions would occur during the nesting season (usually between May 15th and August 1st) in areas where cavity nesting birds such as Three-toed woodpeckers are found. Delaying any ignition until the late summer will allow cavity nesting birds to have completed their nesting, incubation, fledgling and dispersal portion of their life cycle for the season. The adults and young would be able to flee from dangerous conditions that fire may impose on them. To minimize impacts from mechanical treatments on cavity nesting birds found in a spruce-fir dominated forest type, thinning activities would usually commence after July 15. This timing would allow time for cavity nesting birds to complete their nesting and rearing season. Mechanical treatments provide the opportunity to selectively leave snags in groups or clumps throughout the site to provide a continuance of habitat features that are useable during and after the treatment. These design features provide protection (delayed timing of treatments in the season) of the nesting-rearing season while providing habitat features (leaving snags and clumps of trees and 40% non-treated forested throughout the project) needed for future viable populations on Monroe Mountain.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to Three-toed woodpecker in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Past spruce beetle outbreaks have provided a flush in prey for all woodpecker species on the mountain, but especially the Three-toed. Populations of Three-toed woodpeckers thrive in beetle infested areas. As these areas are harvested or natural beetle life cycles complete populations of woodpeckers may vary over time. Future fire treatments will attract woodpeckers for a few years as they scavenge for bugs under the bark of burned trees. Populations on Monroe Mountain are expected to persist, be viable, and fluctuate with natural insect cycles and habitat treatment.

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Determination
As a result of this assessment it is my determination the decision for the Monroe Mountain Aspen Ecosystems Restoration Project "*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*".

6. Flammulated Owl (*Otus flammeolus*)

Direct and Indirect Effects: On the Richfield Ranger District Flammulated owls have been detected in Douglas fir stands that contain some mature spruce and a light mix of aspen. The proposed project area contains acres of spruce, sub-alpine fir, aspen and Douglas fir. Flammulated owl surveys to regional protocol were conducted in the project area in 2007, 2008, 2009, 2011 and 2014. Surveys for the 2014 field season were verified, analyzed and documented in the District database record and in GIS database at the end of the field season. At this time mapping occurred to delineate (with our best judgment and ground knowledge) Douglas fir habitat that may be suitable for Flammulated owls. Based on these surveys, we have determined there are approximately 1,550 acres of Douglas fir dominated forest type on Monroe Mountain. Not all of these acres are found within areas proposed for treatments. To help minimize impacts to Flammulated owls, as described in the ROD, no fire ignitions that would likely result in moderate to high fire severities in Douglas fir dominated areas would occur. Low severity fire in the Douglas fir dominated stands during the non-nesting season (usually before May 15 and after August 1) would be allowed. Very light "low severity" treatments of prescribed burning are possible to accomplish an understory type treatment while leaving over-story components intact (understanding that fire can have unpredictable actions we will be cautious to burn under uncertain conditions). Flammulated owls were detected each of the five years and were specific to Douglas fir habitat. Douglas fir habitat occurs within the project area mainly on the rims, and sharp ridgelines. The Douglas fir component of the spruce-fir mapped acres does not consist of a large quantity. It occurs in smaller acres and is patchy across the landscape. Moths and small mammals are the primary prey for owls. Moths are directly associated with trees. Owl surveys were conducted along major roads and trails as well as on foot through suitable habitat. Direct effects would occur as some birds may be struck by a falling tree during implementation or some may be burned during fire implementation. Indirect effects would occur in the form of habitat being removed through thinning or burning. Trees removed or burned may contain cover for the Flammulated owl.

The decision consists of a combination of mechanical forestry practices and prescribed fire. We estimate approximately 1,550 acres of Douglas fir are represented in the spruce-fir mix. Douglas fir habitat occurs within the project area mainly on the rims, and sharp ridgelines. The Douglas fir component of the spruce-fir mapped acres does not consist of a large quantity. It occurs in smaller acres and is patchy across the landscape. With the thinning treatments, the retention of large snags would occur where they are lacking in order to meet Forest Plan guidelines. Where available, stands would continue to maintain the number of snags required by the Forest Plan to support Flammulated owl nesting.

As conifer treatments occur around Douglas fir habitat, Flammulated owls would persist in the area and benefit from the insects associated with post-fire treatments. Treatment areas are designed to

leave nesting habitat with an associated foraging area. No fire ignitions, that would likely result in moderate to high fire severities in the Douglas fir dominated areas, would occur as to preserve Flammulated owl habitat and populations on the mountain. Low severity fire in the Douglas fir dominated stands during the non-nesting season (usually before May 15th and after August 1st) would be allowed (refer to "low", "medium" and "high" fire severity definitions in the FEIS). By avoiding the Doug fir dominated stands with moderate and high fire severities, habitat effectiveness will be maintained and viable populations of owls will be retained on Monroe Mountain. From past fire experiences on Monroe Mountain it has been evident that it is hard to withhold fire from spreading into Doug fir stands. This is mainly due to Doug fir stands being surrounded by and inter-mingled with sub-alpine fir. This condition has caused fire in the past to transfer into Doug fir stands and affect owl habitat in some cases. The use of mechanical thinning treatments and/or control lines, as described in the ROD, and the use of low severity fire would help minimize impacts from prescribed fire. The use of mechanical thinning treatments and/or control lines and low severity fire would help maintain the existing Douglas fir stands and components needed for Flammulated owls to persist on the mountain.

Cumulative Effects:

Past, present and future activities in forested areas on Monroe Mountain may cause disturbance to Flammulated owls in different ways. We have seen an increase of A.T.V. traffic, camping, hunting, sight-seeing and private land development, on Monroe Mountain. We have seen an increase in mechanical treatments, natural and prescribed fire that have changed the density and patch size of older age aspen-mixed conifer on the mountain. Past timber projects have only affected small patches of Douglas fir habitat. Areas within the Dairies that were burned during the Box Creek Fire and areas burned during the Twin Peaks prescribed fire also only affected small patches of Douglas fir habitat. Habitat effectiveness for Douglas fir stands can be lost if subjected to high severity fire. Past and present conditions have left habitat effectiveness for owls in good condition. Future activities could play a role in how much habitat is disturbed or removed in the Douglas fir type. This would have an effect on the amount and quality of habitat that would remain for Flammulated owl.

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Determination

As a result of this assessment it is my determination the decision for the Monroe Mountain Aspen Ecosystems Restoration Project "*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*".

IX. Summary of Determinations

As a result of this evaluation, it is my professional determination that implementation of the decision for the Monroe Mountain Aspen Ecosystems Restoration Project will have "*No Impact*" to the Bighorn sheep, Pygmy rabbit, and Peregrine falcon.

As a result of this evaluation, it is my professional determination that implementation of the decision for the Monroe Mountain Aspen Ecosystems Restoration Project will have a "*May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing Or Cause A Loss of Viability To The Population Or Species*" for the Bald eagle, Northern goshawk, Greater Sage grouse, Spotted bat, Townsend's Big-eared bat, Three-toed woodpecker, and Flammulated owl.

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XI. CONTRIBUTORS

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Appendix R – Aquatics Biological Assessment and Evaluation

BIOLOGICAL ASSESSMENT
AND
BIOLOGICAL EVALUATION
FOR
AQUATIC SPECIES

MONROE MOUNTAIN ASPEN ECOSYSTEMS RESTORATION PROJECT

RICHFIELD RANGER DISTRICT
FISHLAKE NATIONAL FOREST

Monroe Mountain boreal toad 2003.

Prepared by: James E. Whelan **Date:** 7/23/15
Forest Fisheries Biologist

I. INTRODUCTION

This Biological Assessment and Biological Evaluation (BABE) analyzes the potential impacts of the Monroe Mountain Aspen Ecosystems Restoration Project on the threatened, endangered, proposed, candidate or R-4 Forest Service sensitive [1995 USFS Region 4 Sensitive Species List updated in 1998, 2003 and 2013] (TES) aquatic species which occur or have habitat within the project area. The purpose of this report is to make a determination regarding the effects of the Selected Action on these TES aquatic species. This BABE addresses whether the decision will impact a species that may result in a loss of viability of the species, or cause a sensitive species to trend toward federal listing.

The purpose of this project is to restore aspen ecosystems on Monroe Mountain. The project lies on the Richfield Ranger District of the Fishlake National Forest, in Sevier and Piute Counties, Utah. Monroe Mountain is located approximately 6 to 40 miles south southeast of Richfield running in a north-south direction.

The project area contains a variety of habitat types and encompasses elevations between about 5,600 feet at the lower elevation foothill slope breaks along the Forest boundary to over 11,200 feet on some of the peaks. The majority of the project is sited on the relatively gentle slopes of the plateau top of Monroe Mountain, but some components are on steeper slopes of all aspects, especially on some of the west facing drainages in Monroe Creek south to Dry Creek. The project area encompasses a variety of habitat types including aspen, mixed conifer with remnant aspen, high elevation conifer stands, mountain sagebrush, mountain brush, pinyon-juniper, herbaceous forbs and grasses, and streams and lakes with associated riparian habitats. Riparian areas contain conifers, aspen, cottonwoods, willows, and birch along with a variety of lower shrubs, grasses, sedges, rushes, and forbs.

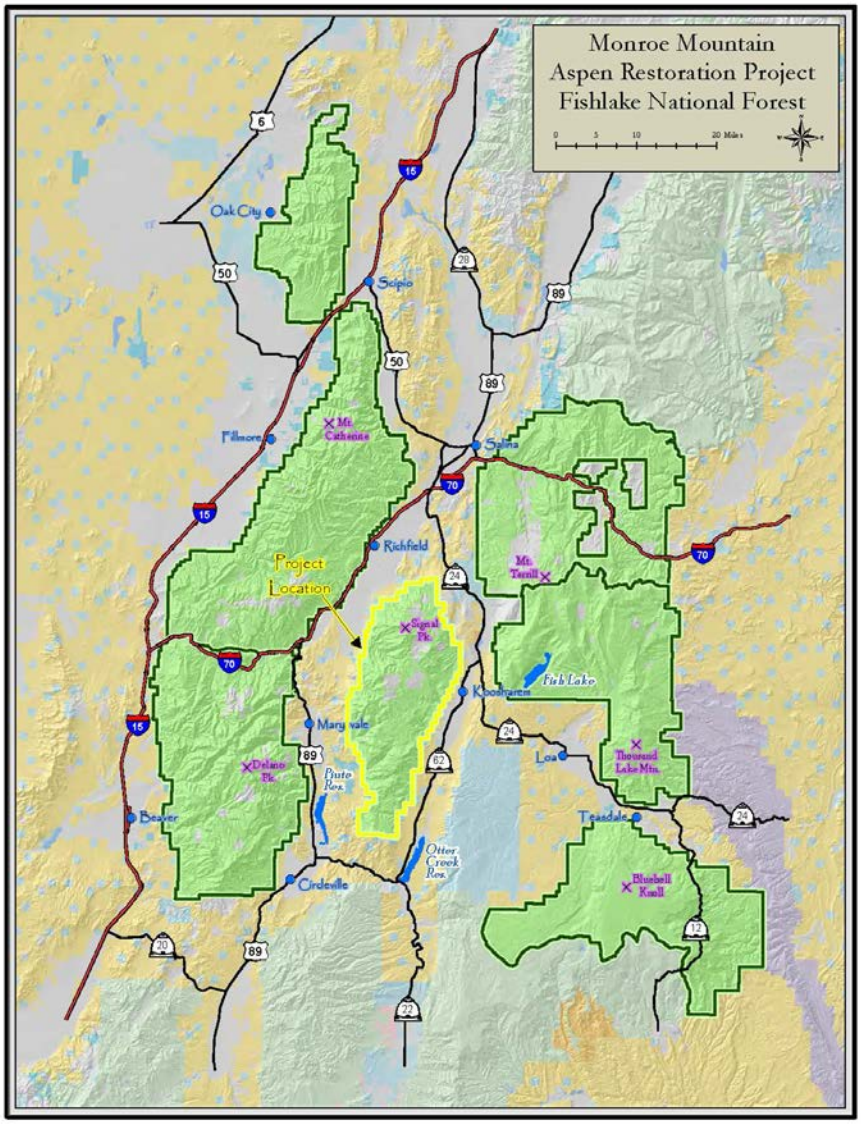
This report tiers heavily to the Monroe Mountain Aspen Ecosystems Restoration Project FEIS (hereafter called FEIS) for its background information and descriptions of existing conditions, desired conditions, purpose & need, and lists of design features.

This report also tiers heavily to the Aquatic Specialist Report for Sensitive and MIS Aquatic Species for the Monroe Mountain Aspen Ecosystems Restoration Project (Whelan 2015a; hereafter called Aquatic Specialist Report) and hereby incorporated by reference, for its descriptions of design features applicable to all action alternatives, monitoring requirements, aquatic field conditions, alternative analysis and synthesis, and determinations for the action alternatives. This report will focus on effects specific to the actual Record of Decision (ROD) for the Monroe Mountain Aspen Ecosystems Restoration Project to threatened, endangered, proposed, candidate or R-4 Forest Service sensitive aquatic species, with consideration of any differences from alternatives as described in the FEIS.

II. PURPOSE AND NEED

The purpose of this project is to restore aspen ecosystems on Monroe Mountain. To help accomplish this purpose, the District has identified a need to (1) address the conifer encroachment that occurs due to the reduced occurrence of wildland fire because of an increase in wildland fire suppression, and (2) address aspen overbrowsing by domestic and wild ungulates. These are two of the primary underlying causes for aspen decline on Monroe Mountain. Restoring aspen communities on Monroe Mountain will result in multiple benefits, which include but are not limited to restoring aspen to levels more representative of its long-term level across the landscape, increasing native species biodiversity – both flora and its associated fauna, decreasing fire risk both at the watershed level and reducing the risk of large multi-watershed catastrophic fire, and increased grazing forage.

Figure 1: Monroe Mountain Aspen Restoration Project General Location



III. PROJECT DESCRIPTION

Alternatives are created to respond to issues associated with the initially proposed action. The Monroe Mountain Aspen Ecosystems Restoration Project Final Environmental Impact Statement (FEIS) considers and describes five alternatives in detail. The alternatives are:

- No Action (current management) – Alternative 1
- Action Alternatives – Alternatives 2-5

See the FEIS for additional information regarding Alternatives 2-5. See the Aquatic Specialist Report for additional description and broad analysis of the effects of these alternatives to aquatic species

IV. DECISION

As described in the Record of Decision (ROD) for the Monroe Mountain Ecosystems Restoration Project, the decision is to implement Alternative 5 with the following modifications: (1) no treatments will occur in Northern goshawk Post Fledgling Areas (PFAs) and Nest Areas (NAs), and (2) the 2.6 miles of temporary roads near Barney Lake will not be constructed. The following is a summary of what will occur:

- Approximately 14,828 acres will be mechanically treated.
- Approximately 25,991 acres will be treated with prescribed fire.
- Approximately 12.1 miles of temporary roads will be built and rehabbed after project completion.
- Approximately 7.2 miles of temporary fence enclosing 633 acres will be built around Manning Meadows Reservoir and Barney Lake to protect treatment areas.
- Aspen browse thresholds and response options will be implemented to ensure aspen regeneration successfully recruits.
- Several design features will be implemented to help minimize impacts to Northern goshawk, Flammulated owls, Bonneville cutthroat trout, migratory birds, boreal toads, etc.
- Implementation will occur over a period of approximately 10 years.

Due to the removal of goshawk PFAs and NAs from the treatment area, the total treatment acres described in the ROD are less than what was analyzed in the Aquatics Specialist Report for alternatives 2-5.

V. CUMULATIVE EFFECTS AREA

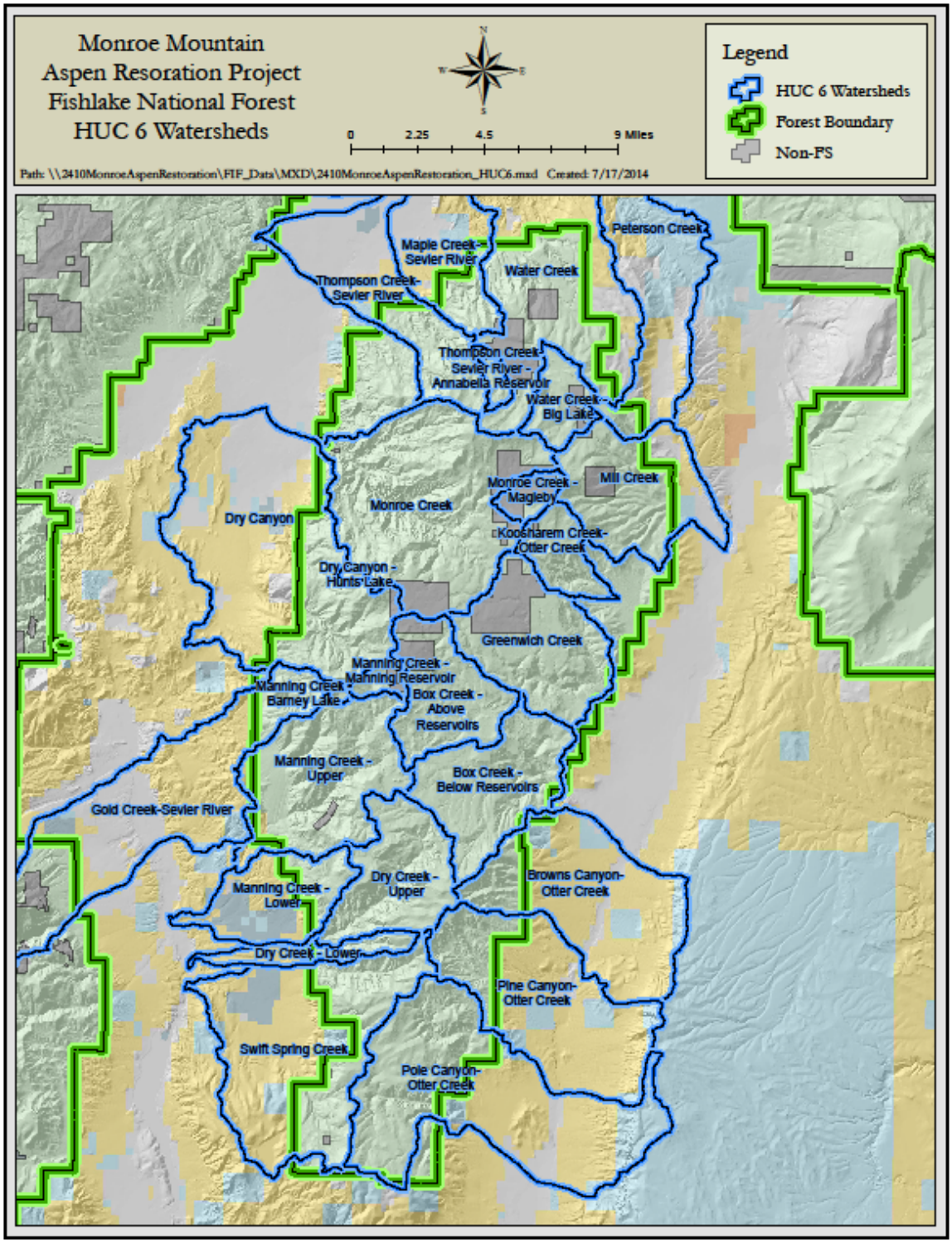
The cumulative effects area (CEA) for the aquatic species that will be analyzed in this document includes the aquatic habitat contained in the sub-watersheds within the Monroe Mountain unit Forest Boundary that contains the project area. See Figure 2 for a map of the modified Hydrological Unit Code (HUC) 6th field watersheds [afterwards called HUC6] and smaller inclusive subwatersheds that are within this CEA.

Many of the HUC6s as nationally defined include large areas of face drainages (i.e. short slopes on the sides of mountains that don't interact with the main tributary stream on the Forest but instead include a segment of the larger valley bottom stream channel and even areas across these major streams such as Otter Creek and the Sevier River; for example see the Thompson Creek – Sevier River HUC in Figure 2). In most cases streams become disconnected near the Forest boundary by irrigation diversions. These were often placed near the head of alluvial fans and losing reaches. Due to this disconnect, analysis of the complete HUC below the diversion is unwarranted. It also artificially diminishes the calculated effects from projects on the Forest. Using a pour point at the diversion ensures that the area that supports the aquatic populations and the areas of maximum effects are included in analysis, while extraneous areas that would artificially dilute effects are not.

Therefore, many of the HUC6 subwatersheds were modified to a pour point at the diversion structure, losing reach, or Forest boundary. The redefined HUC6s that support important aquatic resources – major lakes and streams with fish populations and/or boreal toads have been analyzed in more detail using GIS tools for the analysis section of the document. In addition, smaller HUC7 and HUC8 subwatersheds within these HUC6s were broken out where they contained important lakes that are high value for fisheries and boreal toads. To simplify GIS analysis, the GIS runs were done one time for all the polygon pieces. I.e. in upper Manning Creek the analysis included one polygon for most of the subwatershed, and two smaller ones that were split out with lakes. For an overview of the whole modified HUC6, the three polygons were combined into tables arithmetically.

Starting in the SW corner of the Monroe Mountain CEA and working clockwise, which is the order they are discussed in the Aquatic Specialist Report, the subwatersheds analyzed in detail are: Upper Dry Creek, Upper Manning Creek (with subwatersheds Barney Lake and Manning Reservoir), the subwatershed Hunts Lake in Dry Canyon (the main Dry Canyon does not support aquatic resources with the exception of some potential and relatively minor boreal toad use areas in the headwaters), Monroe Creek (with subwatershed Magleby Lake), Thompson Creek - only some GIS criteria were developed due to the HUC configuration (including subwatershed Annabella Reservoir), Water Creek - only some GIS criteria were developed due to the HUC configuration (including subwatershed Big Lake), Koosharem Creek, Greenwich Creek, and Box Creek (split into upper and lower subwatersheds).

Figure 2: Project Area HUC6 and HUC7 Map and Cumulative Effects Area (see text for additional description).



VI. THREATENED, ENDANGERED, AND CANDIDATE SPECIES

Current policy for Threatened and Endangered species as stated in the Forest Service Manual 2670.3 (WO Ammendment 2600-95-7; USDA Forest Service 1995) includes the following direction:

1. Place top priority on conservation and recovery of endangered, threatened, and proposed species and their habitats through relevant National Forest System, State and Private Forestry, and Research activities and programs.
2. Establish through the Forest planning process objectives for habitat management and/or recovery of populations, in cooperation with States, the Fish and Wildlife Service (FWS) (or National Marine Fisheries Service (NMFS)), and other Federal agencies.
3. Through the biological assessment process, review actions and programs authorized, funded, or carried out by the Forest Service to determine their potential for effect on threatened and endangered species and species proposed for listing.
4. Avoid all adverse impacts on threatened and endangered species and their habitats except when it is possible to compensate adverse effects totally through alternatives identified in a biological opinion rendered by the FWS; when an exemption has been granted under the act, or when the FWS biological opinion recognizes an incidental taking. Avoid adverse impacts on species proposed for listing during the conference period and while their Federal status is being determined.
5. Initiate consultation or conference with the FWS or NMFS, when the Forest Service determines that the proposed activities may have an adverse effect on threatened, endangered species; is likely to jeopardize the continued existence of a proposed species; or result in the destruction or adverse modification of critical or proposed critical habitat.
6. Identify and prescribe measures to prevent adverse modification or destruction of critical habitat or other habitats essential for the conservation of endangered, threatened, and proposed species. Protect individual organisms or populations from harm or harassment as appropriate.

Field surveys were completed within the project area to analyze habitat for aquatic species and their populations numerous times between 1999 and 2014. As a result of these visits and through consultation with state and federal agencies, it is known that there are currently no threatened, endangered, proposed or candidate aquatic species on the Fishlake National Forest. Since no threatened, endangered, proposed or candidate aquatic species are present on the Forest, and therefore none within the aquatic biota CEA described above***, there will be no effect to any threatened, endangered, proposed or candidate aquatic species from this project***. Therefore, there will be no further discussion for aquatic species in these categories.

VII. SENSITIVE SPECIES

Forest Service Manual (FSM) 2670 provides management direction for Threatened, Endangered, and Sensitive Plants and Animals (FSM 2670). Forest Service policies for designated sensitive species (FSM 2670.32) states:

> 1. Assist States in achieving their goals for conservation of endemic species.
> 2. As part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.
> 3. Avoid or minimize impacts to species whose viability has been identified as a concern.
> 4. If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. (The line officer, with project approval authority, makes the decision to allow or disallow impacts, but the decision must not result in loss of species viability or create significant trends toward Federal listing.)
> 5. Establish management objectives in cooperation with the States when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for Federal candidate species, in cooperation with the FWS or NMFS and the States.

The Forest Service follows a two-tier planning process. The first tier is the Fishlake Land and Resource Management Plan (Forest Plan); the second is the site-specific project planning level which is represented by the NEPA analysis. The Forest Plan was prepared in accordance with the National Forest Management Act (NFMA) of 1976, the regulations in 36 CFR 219, and the National Environmental Policy Act (NEPA) of 1979. The Fishlake Forst Plan was approved in June 1986.

> A goal documented in the Fishlake National Forest Land and Resource Management Plan (USDA Forest Service 1986) is to “identify and improve habitat for sensitive, threatened, and endangered species including participation in recovery efforts for both plants and animals”. In addition the Plan states, “Current habitat of threatened and endangered species will be maintained. No adverse effects from management activities will be allowed”. General Direction in this Plan states, “Maintain habitat for viable populations of existing vertebrate species… …Do not allow activities that would negatively impact endangered, threatened, or sensitive plant or animal species. Follow direction in recovery plans.”

The Aquatic Specialist Report has additional information regarding the management zones encompassed within the project area and Forest Plan Goals, Direction, and Standards and Guidelines that apply Forest-wide and within specific management zones (Whelan 2015a; p27-29).

Suitable habitat is present in the project area for Bonneville cutthroat trout and boreal toads. A summary of Forest aquatic sensitive species is included in Table 1, below.

Table 1: Suitability of Habitat for Intermountain Region Sensitive Aquatic Species found in the Monroe Mountain Project Area on the Fishlake National forest.

Species	Suitability of Habitat for Sensitive Aquatic Species		
	Status	Suitable Habitat in Project Area	Rationale/Comments
Colorado River Cutthroat Trout *Oncorhynchus clarki pleuriticus*	S/MIS	N	Outside of native range. No Colorado River cutthroat trout exist in project area waters, and there is no plan to reintroduce this species. Waters outside of native range are not normally considered for recovery purposes.
Bonneville Cutthroat Trout *Oncorhynchus clarki utah*	S/MIS	Y	Within historic native range. A Bonneville cutthroat trout (BCT) core conservation population exists in project area waters in Manning Creek and its tributaries. Manning Meadow Reservoir is a critical southern region UDWR BCT broodstock. The Manning Creek drainage has the only BCT conservation lake habitat on the Forest. BCT are managed under a Conservation Agreement that the Forest Service R-4 is a member signatory of (Lentsch 2000 [rangewide] and BVCT State of Utah Conservation Team 2008 [for Utah]). Rodriguez (2006) has life history information and overall Forest trend information on Bonneville cutthroat trout.
Southern Leatherside* *Lepidomeda aliciae*	S	N	Not known from Monroe Mountain. Historically occurred in the Sevier River drainage. Some use ***may*** have historically occurred in the lower most stream reaches on Monroe Mountain below the project treatment areas but within the project CEA. There is no evidence that southern leathersides currently occur in any of these waters (Utah Div. Wild. Res. 2009). Since Forest streams are generally disconnected from downstream waters by diversions and dry sections there will be no effects that could carry to currently occupied habitat.

Boreal toad *Anaxyrus boreas boreas*	S	Y	Boreal toads are widespread across Monroe Mountain at elevations above 8,000 feet. Monroe Mountain was considered a Utah stronghold, with relatively stable numbers but monitoring methods have not been rigorous enough to quantitatively determine trend. Chytrid fungus, which is associated with population declines in other portions of their range, has recently been detected in all areas of Monroe Mountain. Declines may now be starting to be evident in some areas of Monroe Mountain. Besides their Forest Service sensitive species status they are considered a state sensitive species in Utah and managed under a UDWR Conservation Plan that other agencies are not signatories to (Hogrefe et al. 2005).

Life history information regarding Bonneville cutthroat trout can be found in Life History and Analysis of Endangered Threatened, Candidate, Sensitive, and Management Indicator Species of the Fishlake National Forest (Rodriguez, 2006, hereby incorporated by reference). This document contains summarized population trend and monitoring information, which can also be found in Hadley et al. (2011a) and Hepworth et al. (2003). For general life history information on boreal toads this report tiers to Rodriguez (2012) and Hogrefe et al. (2005). The U-W-C Habitat recommendations also include some general toad information, although more geared towards northern Utah (Appendix E). Finally, Goates et al. (2007) and Goates (2006) provides life history information gleaned from the 2003-2004 radio tracking project established to validate design features developed for an earlier Monroe Mountain planning project. The Aquatic Specialist Report contains a general synopsis of boreal toad life history and habitat use on Monroe Mountain, along with specific information on habitat use, movements, and response to treatments in the analysis section.

Due to population declines throughout their range, boreal toads were petitioned for listing as a threatened species. The U.S. Fish and Wildlife Service determined that the Southern Rocky Mountain population did not warrant listing, but that the Eastern Clade (which occurs in Utah) did warrant a full status review. Higher priority species are currently ahead of boreal toads in the process, but the full status review must be completed by FWS by September 2017. It is important that boreal toad habitat and population levels in the project area not be adversely affected by project activities, as it could add pressure towards a listing decision.

VIII. AQUATIC FIELD REVIEW

As described in the Aquatic Specialist Report, based on office file review, field review, and discussion with hydrologists and Division of Wildlife Resources biologists, the sensitive aquatic resources and habitat areas of concern are the Bonneville cutthroat trout broodstock in Manning Meadow Reservoir, boreal toads and their habitat across the mountain, the Bonneville cutthroat trout population in Manning Creek and its tributaries, and the Bonneville cutthroat trout lake habitat and trophy/high quality fisheries in Barney Lake and Manning Meadow Reservoir.

Figure 3 shows the project area stream fisheries habitat including Bonneville cutthroat trout streams, and Figure 4 shows project area boreal toad key habitat.

Figure 3. Stream Fisheries Resources of Monroe Mountain.

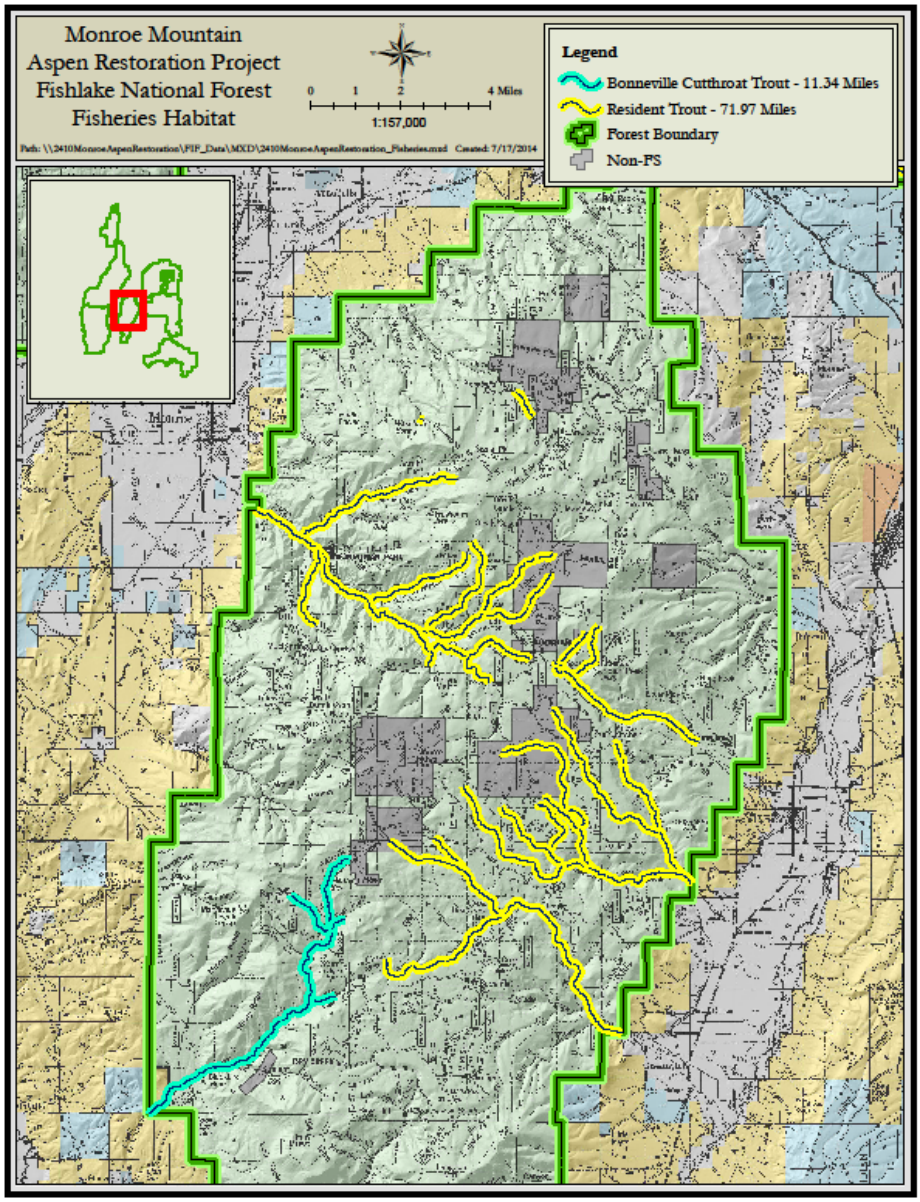
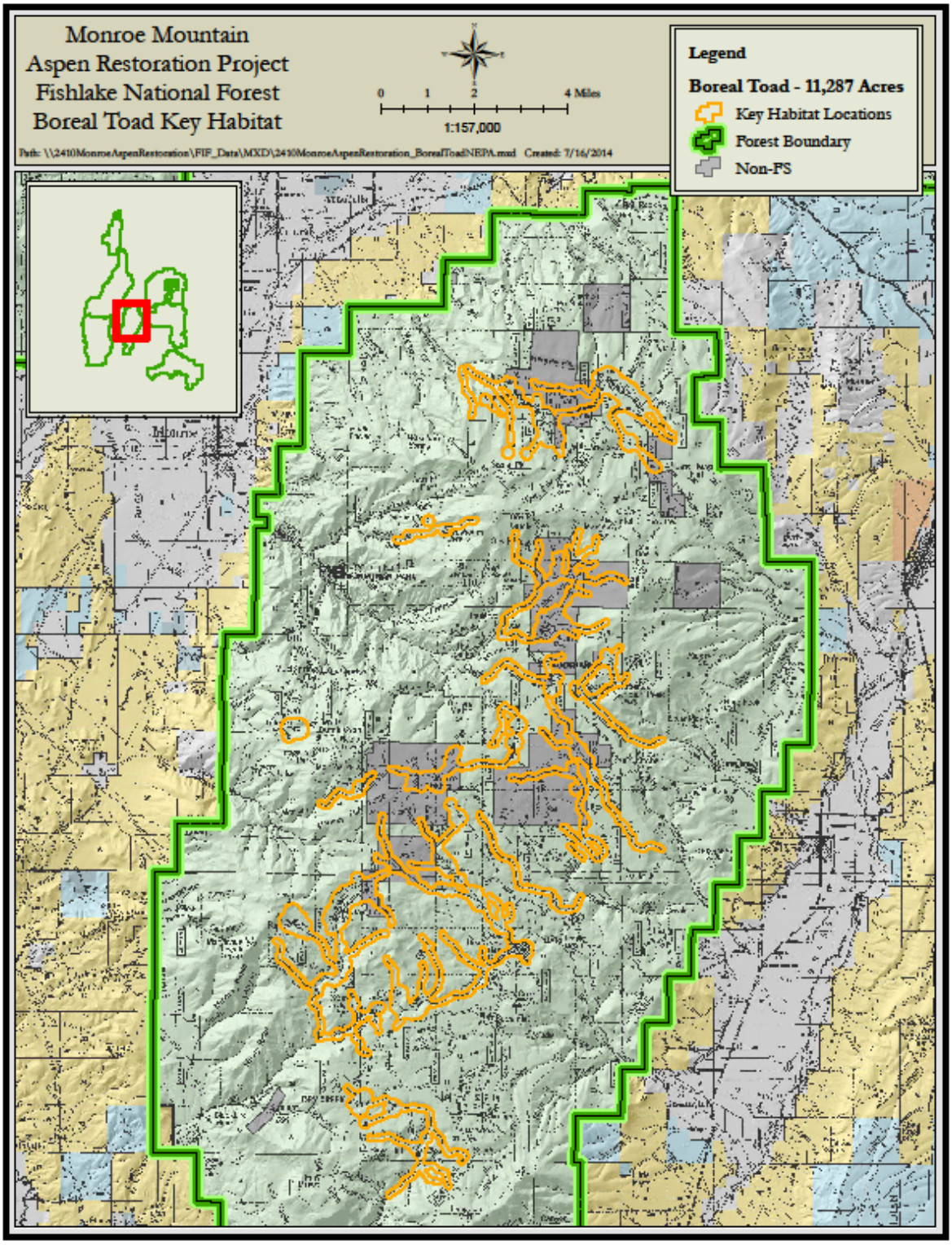


Figure 4: Mapped key boreal toad habitat.



The Aquatic Specialist Report has an extensive description of field review sampling and survey results for the project area (Whelan 2015a; p42-62). This document tiers to that section.

IX. EFFECTS ANALYSIS

This BABE tiers heavily to the Aquatic Specialist Report, which had an introductory write-up on general effects of fire and vegetation management projects to aquatic resources, then considered 9 specific measures or areas of effects to aquatic resources (Whelan 2015a; p63-119). That report then quantified and ranked 7 of the 9 measures. The ranking was done overall for the entire project area and by subwatersheds within the aquatic CEA (see Appendix K-1). This report will focus on a few general effects comments with regard to sensitive aquatic species and effects specific to the selected action described in the ROD.

Direct and Indirect Effects

A. Direct Effects

Direct effects are impacts that directly result in the death or injury to a fish or toad. One example would be a water quality impact such as a major chemical spill. Another example would be heavy equipment directly adjacent to a creek that crushes and kills a toad. As described in Whelan (2015a), direct effects to BCT and boreal toads are considered generally unlikely to occur, with the exception of a low but real risk to boreal toads from vehicles or equipment. The required design features applicable to all action alternatives in the FEIS and listed in the ROD for the Selected Action of the Monroe Mountain Aspen Ecosystems Restoration Project reduce these risks to very low levels.

B. Indirect Effects

Indirect effects are impacts that are not directly connected in space and time. One example would be the spread of an aquatic invasive species that changes the ecology of an aquatic habitat, indirectly reducing the habitat quality for a native species. The activities associated with this project are relatively low risk for aquatic invasive species (AIS) transfer provided the required design features are followed (see USFS 2014a and 2014b).

There are several potential effects to aquatic habitats and associated species that can result from prescribed fire and vegetation manipulation projects. These include increased solar radiation and water temperature, decreased supply of large woody debris, erosion of streambanks, altered streamflow patterns, accelerated erosion, and increased sediment input to aquatic habitats. These are covered in detail in Whelan (2015a). The design features for this project, along with best management practices (BMP) guidelines, Forest Service manual and handbook direction, and Forest Plan standards and guidelines, help minimize these indirect effects to aquatic habitats.

Appendix C provides maps that show overlap of the proposed treatments with aquatic species habitat including mapped boreal toad habitat. Keep in mind that only the maps for Alternative 5 would be applicable to the decision made in the ROD, with the major change that the temporary road shown on the map near Barney Lake in the Manning Creek watershed would not be built.

There would also be minor changes in reductions of treatment areas around three of the goshawk territories, which would reduce the level of impacts from those already considered and disclosed.

Effects of the No Action Alternative

Under the No Action Alternative there would be no vegetative treatments and no direct adverse effects would be expected to Bonneville cutthroat trout and boreal toads and their habitat.

Potential indirect effects would come from natural succession as the areas move from early/mid seral species to late seral communities. This change in vegetation communities could potentially affect fire risk, fire behavior, fire severity and recovery times, and watershed function.

A wildfire may have a negative effect on stream or lake water quality (depending when and where it burned), as it would likely occur in the summer months when control efforts are more difficult and the acreage burned may be greater than the area proposed for treatment under one of the action alternatives. This would result in potentially more sediment moving into the streams and/or lakes following a post-fire precipitation event than from a planned prescribed burn. These high rates of sediment could cover gravels and spawning habitat and may adversely affect localized populations resulting in long-term negative effects to aquatic species.

Indirect Effects of the Selected Action (Alternative 5 with Modifications)

General discussion – The Aquatic Specialist Report analyzed the impacts of all action alternatives, Alternatives 2-5, on aquatic species including Bonneville cutthroat trout and boreal toads. A summary ranking based on 7 criteria found Alternative 2 to have the least impacts to aquatic species and their habitat overall, with Alternative 5 as having the second least level of impacts of the action alternatives. Alternative 3 had somewhat more impacts than Alternative 5, with Alternative 4 having the most impacts to aquatic biota (see Whelan 2015a; p107-108).

Since treated area was fairly consistent between action alternatives, mostly varying the type of treatments between them, the benefits of the action alternatives to reduce fire risk to aquatic species and their habitat was considered constant between the alternatives. Thus the analysis focused on the impacts or “costs” associated with obtaining these benefits for aspen, aquatics, and other resources.

The Aquatic Specialist Report made determinations for Bonneville cutthroat trout and boreal toads for the base action alternatives, Alternatives 2-5. The determination was “MIIH” for all action alternatives for both species (Whelan 2015a; p125). This is not to say there would be no impacts; the ranking of alternatives in the paragraph above could be considered a relative ranking of the short to moderate-term impacts to these species. If the design features are implemented correctly and the required monitoring built into the project is carried out, these impacts will not impact long-term viability.

The Selected Action (Alternative 5 with modifications) removes some of the proposed acres that were in three goshawk territories from treatment, which drops the overall treatment area. It also removes a temporary road that had potentially high levels of impacts to both Bonneville cutthroat trout and boreal toads (Whelan 2015a; Table 12 p94, Table G-3 p106). Thus the Selected Action will have fewer impacts than those already determined to have a “MIIH” determination. This

supports a "MIIH" determination for the Selected Action, provided the project is properly administered and implemented.

Additional specific information for Bonneville cutthroat trout and boreal toads is listed below. This information is also found in the Aquatic Specialist Report but for all action alternatives.

Bonneville cutthroat trout – The Selected Action (Alternative 5 with modifications) may impact individual Bonneville cutthroat trout due to indirect effects. Part of the project planning area is important habitat for Bonneville cutthroat trout (BCT):

- Manning Meadow Reservoir has been managed as a southern Utah Division of Wildlife (UDWR) BCT broodstock since 1992. This source of pure BCT has been instrumental in preventing BCT listing to date, has helped refound several new conservation populations on the Forest, is important for native cutthroat sport-fishing stocking (to eliminate the need to stock non-native cutthroat trout), and currently provides over 500,000 eggs annually to meet UDWR needs.
- Manning Creek has been managed as a UDWR core conservation population since 1996. For many years it was one of the larger populations on the Forest, functions as a partial metapopulation, and provides high quality habitat for BCT.
- The Manning Creek watershed contains the only BCT core conservation population lake habitat on the Forest. Manning Meadow Reservoir provides a high quality sport fishery after the lake is opened for fishing following broodstock operations. Barney Lake, where BCT co-occur with sterile hybrid tiger trout, also provides a high quality fishery.

The following factors make short to moderate term impacts to BCT highly likely to occur from the selected alternative with modifications.

- A considerable portion of the Manning Creek drainage is planned for treatment under the modified Alternative 5.
    1) Treatment is planned for 20% of the land area in the upper Manning Creek subwatershed excluding the upper reservoirs. Above Manning Meadow Reservoir 33% of the area is planned for treatment. Above Barney Lake 62% of the area is planned for treatment. When all areas are considered together, 21% of the land area in the Manning Creek combined HUC6 (see Figure 2) is planned for treatment [note: some of these treatment levels will be reduced slightly by the modification of removing goshawk territories from treatment] .
        i. These treatments at the 6th field HUC are at levels where population scale effects have been experienced by other fish populations based on effects of past fires in the UDWR Southern Region.
        ii. The Forest does not have experience at modeling at the 7th field HUC level, but communication with professional hydrologists indicate reasons for concern at high treatment percentages at the 7th field level.
    2) Equivalent Roaded Area (ERA) modeling found ERAs for the action alternatives to be near, at, or above the suggested Threshold of Concern (10). Under Alternative 5 the ERA value was 10.5 in the upper Manning Creek subwatershed excluding the upper reservoirs. Above Manning Meadow Reservoir the ERA was 14.9. Above Barney Lake the calculated ERA was 22.3, but this included the

road. When all upper Manning areas are considered together, the ERA was 10.9 [note: some of these ERA levels will be reduced slightly by the modification of removing goshawk territories from treatment, and removal of the road drops the Barney Lake ERA to 21.1].

i. These treatments at the 6th field HUC are at ERA levels where population scale effects have been experienced by other fish populations on the Forest based on observed fisheries effects and calculated ERA values by Haraden (2013) on the Twitchell Canyon fire.
    1. Calculated ERAs for North Fork of North Creek and Indian Creek were 9 and 10.3 (Haraden 2013). These fish populations suffered population scale declines.
    2. Calculated ERAs for Fish Creek and Shingle Creek were 14.4 and 15.5 (Haraden 2013). These fish populations were effectively lost.

ii. The Forest does not have experience at predicting effects at the 7th field HUC level based on ERA calculations and monitoring for results, but the high levels calculated for Manning Meadow Reservoir and Barney Lake would seem to indicate need for *extreme caution and multiple entries*. Note, however, that these ERA levels are calculated assuming full implementation in one year which is unrealistic for these drainages as design features and fencing have been incorporated to ensure multiple entries over time in the Barney Lake and Manning Meadow Reservoir subwatersheds.

Boreal Toad – The situation for the boreal toad is similar to the one above for Bonneville cutthroat trout (since they both occur in the Manning Creek drainage) with the following additional considerations project area wide:

- The entire upper elevation zone of Monroe Mountain can be considered crucial habitat for boreal toads. This mountain acts as a large conservation metapopulation for boreal toads. While monitoring to date has limited power to determine trends (K.Wheeler, UDWR native aquatics biologist, personal communication), professional opinion is that populations have been stable, at least until around 2012. Mountain-wide, over 11,000 acres has been mapped as important boreal toad habitat

The following factors make impacts to boreal toad highly likely to occur from the selected alternative with modifications.

- Under Alternative 5 a considerable portion of the watersheds containing boreal toad habitat on Monroe Mountain are planned for treatment.
    1) Treatment is planned for 21% of the land area in the upper Manning Creek combined modified HUC6 subwatershed. Above Manning Meadow Reservoir 33% of the area is planned for treatment. Above Barney Lake 62% of the area is planned for treatment. Above Hunts Lake 29% of the area is planned for treatment. Treatment is planned for 31% of the Monroe Creek subwatershed. Above Magleby Reservoir 26% of the area is planned for treatment. Above Annabella Reservoir 52% of the area is planned for treatment. Above Big Lake 36% of the area is planned for treatment and this does not include some approved but not yet implemented or completed treatments. Treatment is planned for 10%

of the Koosharem Creek subwatershed and this does not include some approved but not yet implemented or completed treatments. Treatment is planned for 15% of the Greenwich Creek subwatershed. Treatment is planned for 14% of the Box Creek above reservoirs subwatershed and this does not include some approved but not yet implemented or completed treatments [note: some of these treatment levels will be reduced slightly by the modification of removing goshawk territories from treatment].

i. The Forest does not have experience at modeling boreal toad effects at the 6th field HUC but professional opinion would indicate reasons for concern at levels over 15% due to potential watershed effects to breeding sites and riparian use areas (i.e. flooding may cause sediment deposition on breeding sites and downcutting that dewaters riparian areas and makes them unsuitable for future toad use).

ii. The Forest does not have experience at modeling boreal toad impacts vs. watershed area treated at the 7th field HUC level, but professional opinion would indicate reasons for concern at the high treatment percentages at the 7th field level in some boreal toad use HUCS.

2) Under Alternative 5 Equivalent Roaded Area (ERA) modeling found ERAs for many subwatersheds to be near, at, or above the suggested Threshold of Concern. In Dry Creek the calculated ERA was 11.6 (just below TOC 12). The ERA value was 10.5 in the upper Manning Creek subwatershed (TOC 10). Above Manning Meadow Reservoir the ERA was 14.9 (TOC 10). Above Barney Lake the ERA was 22.3 (TOC 10). Above Hunts Lake the ERA was 12.5 (just over the TOC of 12). The ERA value was 10.6 in the Monroe Creek subwatershed (TOC 11). Above Magleby Lake ERA was 8.8 (TOC 10). Above Annabella Reservoir the ERA was 12.9 (TOC 10). Above Big Lake the ERA was 15.5 (TOC 10) and this does not include some approved but not yet implemented or completed treatments. The ERA value was 7.3 in the Koosharem Creek subwatershed (TOC 10) and this does not include some approved but not yet implemented or completed treatments. The ERA value was 11.2 in the Greenwich Creek subwatershed (TOC 10). The ERA value was 14.1 in the Box Creek above reservoirs subwatershed (TOC 10) and this does not include some approved but not yet implemented or completed treatments.

i. The Forest does not have experience at modeling boreal toad effects at the 6th field HUC at various ERA levels but professional opinion would indicate reasons for concern at levels over suggested TOCs.

ii. The Forest does not have experience at predicting boreal toad effects at the 7th field HUC level based on ERA calculations and monitoring results, but professional opinion would indicate reasons for concern at high treatment percentages at the 7th field level. Note, however, that these ERA levels are calculated assuming full implementation in one year which is unrealistic for these drainages as design features have been incorporated to limit treatment to 20% of a subwatershed at one time with multiple entries in the Barney Lake, Manning Meadow Reservoir, Annabella Reservoir and Big Lake subwatersheds.

- A considerable portion of the boreal toad mapped habitat (RHCAs) is planned for treatment.
- In several subwatersheds, a considerable portion of mapped boreal toad habitat (RHCAs) already contains high existing road densities, and planned temporary roads will increase this density further. Note, however, that the one subwatershed where new roads had the greatest impact to boreal toad habitat, Barney Lake, has had the temporary road removed from the Selected Action.

C. Cumulative Effects

Bonneville Cutthroat Trout

The introduction of non-native fish, stocking of hatchery fish, grazing, fires, fire management activities, timber/thinning operations, irrigation diversion, and water manipulation has altered riparian and upland vegetation composition and densities and riparian environments, which has reduced habitat for Bonneville cutthroat trout (BCT) in some cases and created habitat in others. In general, stream habitats have generally been reduced in quantity and quality, while large (vs. small beaver pond) lake quantity has increased. Also, across their historic range, BCT have generally been displaced by non-native trout species. BCT only occur on Monroe Mountain where they have been reintroduced into the Manning Creek drainage. Despite these cumulative effects and concerns, Manning Creek remains an important fisheries resource and BCT stream in the state of Utah, and is generally considered to be in good condition.

As described above, the direct and indirect effects from the Selected Action to Bonneville cutthroat trout are expected to be of a short to mid-term duration provided that the required design features are properly implemented and the project properly administered. Thus the effects of the activities listed above in the cumulative effects section, in combination with the Selected Action is not expected to cause *long-term* measurable adverse changes to Bonneville cutthroat trout. Any adverse effects to Bonneville cutthroat trout or their habitat from future projects can be avoided or minimized on the National Forest through the use of project design features. The activities and effects listed above in the cumulative effects section are not expected to increase as a result of the selected action.

Boreal Toad

The introduction of non-native fish, stocking of hatchery fish, grazing, fires, fire management activities, vegetation management, irrigation diversion, and water manipulation has altered riparian and upland vegetation composition and densities and riparian environments, which has reduced habitat quality for boreal toads in some cases and created habitat or improved habitat quality in other cases. In general, stream habitats have generally been reduced in quantity and quality, and beaver density reduced from pre-European settlement conditions. Despite these cumulative effects and concerns, Monroe Mountain remains a very important area for boreal toad conservation in the state of Utah, although the true historic population size and distribution of boreal toads on Monroe Mountain is not known.

As described above, the direct and indirect effects from the Selected Action to boreal toads are expected to be of a short to mid-term duration provided that the required design features are

properly implemented and the project properly administered. Thus the effects of the activities listed above in the cumulative effects section, in combination with the Selected Action, is not expected to cause *long-term* measurable changes to boreal toads. Any adverse effects to aquatic species or aquatic habitat for future projects can be avoided or minimized on the National Forest through the use of project design features. The activities and effects listed above in the cumulative effects section are not expected to increase as a result of the selected action.

X. DETERMINATION AND RATIONALE

As a result of this evaluation it is my determination that implementation of the decision as described in the ROD for the Monroe Mountain Aspen Ecosystems Restoration Project (Alternative 5 without the temporary road in the Barney Lake subwatershed and with no treatments in goshawk PFAs and NAs) may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species for Bonneville cutthroat trout and boreal toads.

Table 16. Determination for the Record of Decision (ROD) regarding impact to the affected sensitive species.

SPECIES	DETERMINATION
Bonneville cutthroat trout	MIIH
Boreal toad	MIIH

NI = No Impact
MIIH = May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing Or Cause A Loss Of Viability To The Population Or Species.
WIFV = Will Impact Individuals Or Habitat With A Consequence That The Act ion Will Contribute To A Trend Towards Federal Listing Or Cause A Loss Of Viability To The Population Or Species.
BI = Beneficial Impact

Bonneville cutthroat trout *(Oncorhynchus clarki utah)*- A determination of **May Impact Individuals or Habitat** is made for Bonneville cutthroat trout. See rationale below for documentation of factors considered when making this determination.

Boreat toad *(Anaxyrus boreas boreas)* - A determination of **May Impact Individuals or Habitat** is made for boreal toad. See rationale below for documentation of factors considered when making this determination.

Rationale:

Bonneville cutthroat trout - The following project design features reduce the effects expected from the above modeling and make it likely that while short to moderate term effects could occur, they would not likely be at a scale of a trend towards federal listing.

- Since BCT in Manning Creek overlap boreal toad habitat above 8,000 feet, they receive additional protection in this zone as there is a 100 foot stream buffer and 328 foot breeding site buffer with no harvest. There is also a zone from 100 feet to 328 foot from

streams and 328 feet to 984 feet from breeding sites where no mechanized equipment can be used for harvest.

1) This buffer distance will filter out the vast majority of overland sediment flow [not channelized] before it can reach the creeks or lakes. This design feature is consistent with guidance found in the Fishlake Forest Plan (FP IV-33) that states: "Special protection and management will be given to floodplains, wetlands, and all land and vegetation for a minimum of 100 feet from the edges of all perennial streams, lakes, and other bodies of water or to the outer margin of the riparian ecosystem if wider than 100 feet".

- Treated areas would be rested from livestock grazing for 2 growing seasons (i.e. usually grazed late the 2nd year) and possibly 3 if needed. This reduces cumulative effects from livestock grazing.
- AIS control measures are included as a design feature, which should effectively eliminate the risk of bringing in new AIS or spreading AIS currently on the mountain (see USDA Forest Service 2014a and 2014b). Drafting will include screens to prevent intake of fish or amphibians.
- Standard measures are included for fueling and storing of fuel away from riparian areas, spill containment plans to prevent effects from spills, etc.
- Upland areas would be treated first and separately from riparian areas.
- No more than 15% of the upland area at the modified HUC6 area would be treated at one time. The area would then be allowed to recover [comparable to pre-treatment] watershed function, after which an additional 15% could be treated, or the remaining area if less than 15%.
    1) Empirical data from past fires in southern Utah show that trout populations are likely to survive at this level with habitat suffering only minor short-term negative impacts.
- No more than 5 to 10% of the riparian area within a modified HUC6 subwatershed would be treated at one time. The area would then be allowed to recover [comparable to pre-treatment] riparian function, after which an additional 5-10% could be treated.
- Post-treatment visual monitoring would be conducted to determine potential for increased sediment into streams. Localized treatments of straw mulch, wood chips, slash placement, seeding, and silt fencing could be installed as needed to control, prevent, or minimize effects from soil erosion.
- Snags (200-300/100 acres) and downed logs (50/10 acres) would be left which will help provide large wood for habitat formation/diversity.
- Ground based treatments would occur only on slopes less than 40%.
- Equipment use within riparian areas would occur only when soils were dry, frozen, or covered with snow to prevent wheel or track damage. Low ground pressure equipment would be used when possible.
- Temporary roads would be reclaimed upon completion of the mechanical treatments.
- No skid trails or landings would be constructed in riparian areas.
- No direct ignitions would occur in riparian areas on slopes greater than 40%. Prescribed burning would be ignited when low to moderate fire severities would be expected in riparian areas and spruce/fir or conifer stands with very low aspen component (<15 recruits/acre). Since BCT in Manning Creek overlap boreal toad habitat above 8,000 feet, in this zone above 8,000 feet there is a 100 foot no direct ignition zone along streams (fire could back in).

1) The 100 foot no ignition zone along streams will trap the majority of overland sediment [not channelized] flow from shallower slopes along treated/burned areas and capture a portion of the sediment from steeper slopes. This will reduce sediment delivery to the streams. The 100-foot no ignition zone will likely maintain stream shading and stream temperature at levels nearly the same as for the no action alternative. A 100-foot no ignition zone will also likely maintain large woody debris levels very close to the no action alternative. This design feature is consistent with guidance found in the Fishlake Forest Plan for vegetation treated by burning (FP IV-49) that apply to wildlife, which states: "Limit use of prescribed fires on areas adjacent to riparian areas to protect riparian and aquatic values".
2) Nutrient loading effects from the burning will be reduced by passage of overland water flow and sediment through the riparian buffer (Belt et al. 1992 4:3).

- For the seventh field HUCS (as delineated for the aquatics CEA): Manning Cr. – Manning Res., Manning Cr. – Barney Lake, Thompson Cr. - Anabella Res, and Water Cr. - Big Lake – vegetation treatments will be limited to 20 percent of the HUC area until watershed function is recovered [comparable] or will be limited to treatments that keep a current Equivalent Roaded Area (ERA) modeling of the HUC at or under the Threshold of Concern (TOC) of 10.
- Prior to beginning implementation within a HUC6 watershed, the ERA modeling will be repeated for that HUC to incorporate the recovery period (i.e., years from the analysis done for this project to the implementation start date) for past projects, allow inclusion of new projects that were previously authorized but not yet carried out or completed during this planning process, and the proposed work. This will help incorporate effects from the currently authorized but not yet implemented or completed work in the Box Creek, Monument Peak, and Cove Mountain/North Clover projects. If the new ERA modeling shows the planned work will push the HUC over the TOC, multiple entries will occur to reduce cumulative effects to the subwatershed.
- The District will coordinate project treatments in watersheds containing Bonneville cutthroat trout or boreal toads with the UDWR southern region fisheries/toad personnel.

Additional factors and considerations include:

- The Selected Action (Alternative 5 with modifications) does not include building the temporary road near Barney Lake that was predicted to have considerable impacts to Bonneville cutthroat trout habitat.
- Fencing of Manning Meadow Reservoir and Barney Reservoir treatment areas will ensure good protection of aspen sprouts and likely increase the amount and rate of aspen recovery within the treated area, reducing sedimentation to the reservoirs. It also would allow for multiple entries which will spread the treatment effects over time.
- Other boreal toad design features will provide additional protection of Bonneville cutthroat trout habitat.
- The soils and hydrology report (Solt 2015) suggests very little additional risk of sediment delivery from areas burned at low intensity/severity.
- The prescribed burning (with a mix of fire severities planned to primarily have low to moderate severities) would likely have less negative effects then a wildfire.
- The treatments would reduce the risk of a large high severity wildfire in the drainages treated.

- The fish populations at the stations within the project area sampled appeared relatively robust. The majority of Manning Creek and its tributaries had good streambank stability as determined by Pfankuch adjusted for stream channel type (Petty 2004, Appendix I).
- Robust monitoring is built into the selected action, including stream fish populations, streamflow, water turbidity, basic water chemistry, and aquatic macroinvertebrates. Monitoring would also include lake water quality and hydrological channel characteristics at established stations.
- There are no long-term adverse cumulative effects of this project on Bonneville cutthroat trout (see cumulative effects section).

The conclusion of all of the above factors in combination is that while there will be impacts to Bonneville cutthroat trout, their population will be maintained in the aquatic CEA in the long-term.

Boreal toad – The following project design features reduce the effects expected from the above modeling/considerations and make it likely that while short to moderate term effects could occur to boreal toads, they would not likely be at a scale of a trend towards federal listing. For boreal toads, this includes all of the factors listed under Bonneville cutthroat trout along with the following additional factors:

- Project implementation would utilize boreal toad Riparian Habitat Conservation Areas (RHCAs) of 328 feet from each side of streams or the high water line of ponds, lakes, and wetlands as buffers for vegetation treatments. Utilize RHCAs of 984 feet from known boreal toad breeding ponds (see Figure 4 for mapped RHCAs).
- In order to protect Boreal toads and hibernacula[1] from being crushed, no ground-based mechanized harvesting equipment would be permitted within the RHCAs.
- Within the RHCAs, vegetation treatments would be limited to hand-thinning, horse, or helicopter thinning up to 100 feet from the stream or up to 328 feet from the known boreal toad breading ponds.
- No vegetation treatments (hand treatment, horse, or helicopter thinning) would be allowed within 100 feet of perennial streams or within 328 feet of breeding ponds unless such treatments are coordinated with and approved by the Forest's fisheries biologist* (*for the purpose of improving boreal toad habitat or reducing fire risk to boreal toad habitat – See Whelan 2015a; p20 and Appendix M).
    1) This will filter out the majority of overland sediment flow [not channelized] before they reach the creeks. This design feature is consistent with guidance found in the Fishlake Forest Plan (FP IV-33) that states: "Special protection and management will be given to floodplains, wetlands, and all land and vegetation for a minimum of 100 feet from the edges of all perennial streams, lakes, and other bodies of water or to the outer margin of the riparian ecosystem if wider than 100 feet".
- Within the RHCAs, no pile/slash burning would occur within 100 feet from the stream or breeding sites edge. Within the remainder of the RHCAs, pile or slash burning would occur during the Boreal toad dormant season (October 1 thru April 15) unless coordinated with and approved by the Forest's fisheries biologist*.
- Within the RHCAs, snags (200 per 100 acres in aspen, 300 per 100 acres in mixed conifer spruce/fir, and large downed logs (50 per 10 acres; a minimum of 15 tons per

[1] An opening where Boreal toads can go underground.

acre) would be retained as cover for toads. This is the same criteria as general project criteria for snags and downed logs.

- Within the RHCAs, thinning treatments (hand treatment, horse, or helicopter thinning) would target less than or equal to 60 percent of the stands.
- If any unmapped perennial streams or water sources in Boreal toad supporting habitat were encountered during project implementation, these areas would be protected by a 100-foot buffer. No treatments (hand treatment, horse, or helicopter thinning) would be allowed within this buffer unless treatments are coordinated with and approved by the Forest's fisheries biologist*.
- If any boreal toad hibernacula were encountered during project implementation, these areas would be protected by a 328-foot buffer. No treatments (hand treatment, horse, or helicopter thinning) would be allowed within this buffer unless treatments are coordinated with and approved by the Forest's fisheries biologist*.
- Temporary roads within the RHCAs would have toad passage friendly culverts installed where culverts are needed (buried culverts or bottomless arched structures) for the duration of the project.
- Dipping or drafting water for fire activities from smaller boreal toad breeding sites that may show a change in water levels from the use would be avoided, except for emergencies.
- Within the RHCAs, prescribed burning would occur when generally low to moderate fire intensity and severities would be expected. Prescribed fire personnel would attempt to implement prescribed burning during the Boreal toad dormant season (1 October thru April 15).
- No direct fire ignitions would occur within 100 feet from the streams and 328 feet from Boreal toad breeding ponds unless coordinated with and approved by the Forest's fisheries biologist*. Fire ignitions could occur outside these buffers and allowed to back into these areas.
    1) The 100 foot no ignition zone along streams will trap the majority of overland sediment [not channelized] flow from shallower slopes along treated/burned areas and capture a portion of the sediment from steeper slopes. This will reduce sediment delivery to the streams. The 100-foot no ignition zone will likely maintain stream shading and stream temperature at levels nearly the same as for the no action alternative. A 100-foot no ignition zone will also likely maintain large woody debris levels very close to the no action alternative. This design feature is consistent with guidance found in the Fishlake Forest Plan for vegetation treated by burning (FP IV-49) that apply to wildlife, which states: "Limit use of prescribed fires on areas adjacent to riparian areas to protect riparian and aquatic values".
- Temporary roads within RHCAs will not be constructed or used for hauling logs between April 15 and October 1 of the calendar year, unless surveys and field inspections determine that toads are not likely to be impacted.

Additional factors and considerations include:

- Robust monitoring is built into the selected action before, during, and after project implementation. Monitoring will be done to ensure project design features are implemented as designed, work as intended and are effective, and that site-specific findings of toad use areas, timing, etc. are incorporated into implementation actions. This

monitoring will help ensure that boreal toad impacts are minimized. Monitoring will also include breeding site monitoring to document use and relative densities of populations (see Appendix J in Whelan (2015a) - which is Appendix F in the FEIS - for a draft monitoring plan). The monitoring plan includes project objectives of determining changes in toad use areas, chytrid fungus infection rates/changes, finding key concentration areas such as breeding sites and hibernacula that will be buffered/protected, determining boreal toad use of areas planned for treatment, comparing toad use of treated versus untreated habitat, and (to the extent possible) determining population size and survival data. Aquatic Invasive Species (AIS) control measures and annual reporting requirements are also included as part of the monitoring plan.

- There are no long-term adverse cumulative effects of this project on boreal toads (see cumulative effects section).

The conclusion of all of the above factors in combination is that while there will be impacts to boreal toads, their populations will be maintained in the aquatic CEA in the long-term.

XI. COMPLIANCE WITH MANAGEMENT DIRECTION

There will be no irreversible or irretrievable commitment of habitat associated with selection and implementation of the Selected Action (Alternative 5 without the temporary road in the Barney Lake subwatershed and no treatments in goshawk PFAs and NAs) that affects threatened, endangered, proposed or candidate aquatic species.

This process has served to review the effects of implementing the Monroe Mountain Aspen Ecosystems Restoration Project on aquatic sensitive species of the Fishlake National Forest. Adverse impacts that could affect the long-term viability of these aquatic sensitive species should be avoided provided the required design features listed in the ROD, FEIS, and Aquatic Specialist Report are implemented; thus the Selected Action (Alternative 5 with modifications) would meet Forest Plan Standards and Guidelines. See Appendix A for more information. Appendix A was based on Alternatives 2-5, but also applies to the Selected Action, since it has less impacts than Alternative 5. This is due to the reduced treatment area and the removal of the temporary road in the Barney Lake subwatershed, which was one of the major concerns for Bonneville cutthroat trout and boreal toads under Alternative 5.

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Note on methods used and author experience:

The techniques and methodologies used in this analysis are considered best available science due to the comprehensive analysis and review that included field experience, monitoring records, professional opinion of agency biologists, scientific literature, and other materials which were relevant to evaluating the potential impacts of this project and reasonably foreseeable actions. Specifically the elements used were: Personal experience developed though on-site field visits and survey or monitoring work for data collection from 1999-2015; interaction with UDWR and FWS biologists as part of work programs, field projects, and annual conservation team meetings; Forest records, file data, and the GIS corporate database; responses by UDWR, FWS, and other agencies and NGOs to project scoping and draft document review periods; UDWR conservation monitoring reports for BCT and boreal toads; Life History documents for the Fishlake N.F. (Rodriguez 2006) and Dixie N.F. (Rodriguez 2012); and scientific literature (see references cited in the Aquatic Specialist Report).

This author first worked on projects to restore degraded stream systems in 1985, first worked with native cutthroat trout (threatened Lahontan cutthroat trout) on an interagency survey crew in 1989, was Ely Ranger District Wildlife Biologist for 8 years - including cooperative work to restore native cutthroat trout in Nevada with the Nevada Division of Wildlife, and has been a cooperative interagency Forest Fisheries Biologist on the Fishlake N.F. for the last 16 years - including work to restore native cutthroat trout and work with boreal toads. He concieved and supervised the field study later used by M. Goates to develop his thesis (Goates 2006) and a later publication (Goates et al. 2007). He has co-authored with UDWR many of the monitoring trend reports for BCT on the Fishlake N.F. (see references cited in the Aquatic Specialist Report) and wrote a UDWR publication documenting effects to aquatic macroinvertebrates from restoring Bonneville cutthroat trout to Manning Creek (Whelan 2002).