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DRAFT Environmental Impact Statement

Becker Integrated Resource Project

Chapters 1 through 4

Boise National Forest
Idaho City Ranger Districts
Boise County, Idaho

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Appendix J—Maps

List of Acronyms

AOP	Aquatic Organism Passage
ASQ	Allowable Sale Quantity
BA	Biological Assessment
BA	Basal Area
BE	Biological Evaluation
BMP	Best Management Practices
CAA	Clean Air Act
CSE	Common Stand Examination
CWA	Clean Water Act
CWD	Coarse Woody Debris
dbh	Diameter at Breast Height
DC	Desired Condition
DD	Detrimental disturbance
DEM	Digital Elevation Model
DPS	Distinct Population Segment
EA	Environmental Assessment
EC	Existing Condition
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FFE	Fire and Fuels Extension
FVS-FFE	Forest Vegetation Simulator to the Fire and Fuels Extension
Forest Plan	Boise National Forest Land and Resource Management Plan
Forest	Boise National Forest
FR	Functioning At Risk
FSH	Forest Service Handbook
FSM	Forest Service Manual
FSV	Forest Service Vegetation Simulator
ft^2	Square feet
FUR	Functioning At Unacceptable Risk
GIS	Geographic information system
GRAIP	Geomorphic Road Analysis and Inventory Package
HRV	Historic Range of Variability
HU	Hydrologic Unit
HUC	Hydrologic Unit Code
Idaho CWCS	Idaho Comprehensive Wildlife Conservation Strategy
IDEQ	Idaho Department of Environmental Quality
IDT	Interdisciplinary Team
IRA	Inventoried Roadless Area
LWD	Large Woody Debris
MA	Management Areas

MBTA	Migratory Bird Treaty Act
mi/mi^2	Miles per square mile
MIS	Management Indicator Species
ML	Maintenance Level
MM	Maximum Modification
MMBF	Million Board Feet
MPC	Management Prescription Category
MT/ID	Montana/Idaho
MVUM	Motor Vehicle Use Map
NAAQS	National Ambient Air Quality Standards
NCT	Noncommercial Thinning
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
OHV	Off-Highway Vehicle
OSHA	Occupational Safety & Health Administration
OSV	Oversnow Vehicle
PM	Particulate Matter
PR	Partial Retention
PVG	Potential Vegetation Group
RAWS	Remote Automated Weather Station
RCA	Riparian Conservation Areas
RD	Ranger District
RM	Roaded Modified
RNA	Research Natural Areas
ROD	Record of Decision
SHA	Soil Health Assessment
SHPO	State Historic Preservation Office
SINMAP	Stability Index Mapping
SIS	Smoke Impact Spreadsheet
SOPA	Schedule of proposed actions
SWRA	Soil, Water, Riparian, And Aquatic Resources
TAP	Transportation Analysis Process
TEA	Transaction Evidence Appraisal
TEPC	Threatened, Endangered, Proposed, and Candidate Species
TES	Threatened, Endangered, Sensitive
TSRC	Total Soil Resource Commitment
USFWS	U.S. Fish and Wildlife Service
VQO	Visual Quality Objective
WCI	Watershed Condition Indicator
WCS	Wildlife Conservation Strategy
WTY	Whole Tree Yarding
WUI	Wildland-Urban Interface

CHAPTER 1 PURPOSE AND NEED

1.1 INTRODUCTION

This environmental impact statement (EIS) discloses the environmental impacts of the No Action Alternative (Alternative A), the Proposed Action (Alternative B), and four additional action alternatives (Alternatives C, D, E, and F) for the Becker Integrated Resource Project (project) on the Idaho City Ranger District of the Boise National Forest (Forest) in Boise County, Idaho. This document has been prepared under the National Environmental Policy Act (NEPA), (42 U.S.C 4321 et seq., 40 CFR 1500-1508), the U.S. Department of Agriculture (USDA) Forest Service National Environmental Policy Act Procedures (36 CFR 220) and the *Boise National Forest Land and Resource Management Plan* (Forest Plan) as amended in 2010 (USDA Forest Service 2003a, 2010a).

1.2 PROJECT AREA DESCRIPTION

The 19,327-acre Becker project area falls within the Middle Crooked River subwatershed (HUC 17050110503), formerly named the Beaver-Edna watershed, and Pikes Fork (HUC 17050110502) subwatersheds; both subwatersheds are part of the larger Crooked River watershed. The area is located approximately 18 miles northeast of Idaho City, Idaho, and about 48 miles northeast of Boise, Idaho, in Boise County (Figure 1-1). The following primary drainages and streams are located in the project area: Crooked River, Whoop-Um-Up Creek, Beaver Creek, Pikes Fork Creek, Banner Creek, Little Beaver Creek, China Fork Creek, Gold Fork Creek, Sawmill Creek, and Edna Creek. The Pilot Peak mountain landform lies in the southwest corner of the project area, State Highway 21 bisects the area, Banner Ridge lies along the north end, and Crooked River and Whoop-Um-Up Creek roughly form the southern boundary of the project area.

1.2.1 Land Management History of the Project Area

The Becker project area has a long and diverse history of land management activities, including vegetation management, wildfire and fire suppression, mining, livestock grazing, recreation, and transportation management. Wildfire and fire suppression, vegetation management, historic mining, and transportation management have influenced forest vegetation, wildlife habitat, and aquatic resources. Recreation use in the area has increased over time because the area is easily accessed by Treasure Valley residents.

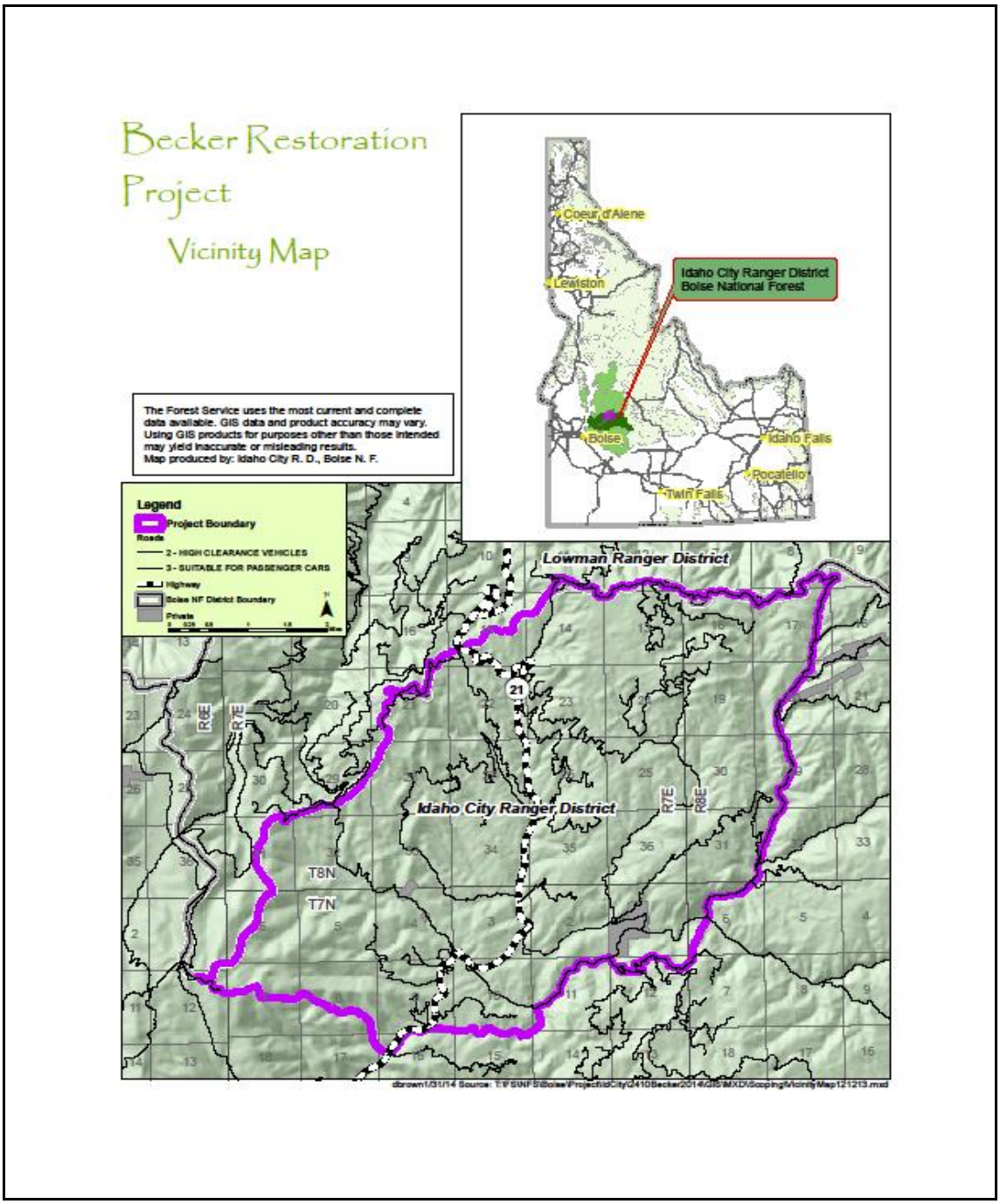

Figure 1-1. Becker Integrated Resource Project vicinity map

1.2.1.1 Wildfire and Fire Suppression

Fire has dramatically affected the Crooked River watershed in recent years—in 1994, the 149,958-acre Rabbit Creek Fire burned large portions of the Crooked River and North Fork Boise River watersheds, and in 2007, the Trapper Flat Fire burned 18,341 acres in the Crooked River and Ten Mile Creek watersheds. These fires burned at extreme intensity, resulting in uncharacteristic levels of overstory tree mortality. In addition to recent large fires within the Crooked River watershed, the 1989 Lowman Complex Fire burned 44,150 acres in the South Fork Payette watershed, immediately north of the project area. While the Lowman Complex Fire was not centered in the Crooked River watershed, two of the wildfires did extend into the Becker project area boundary—the Sawmill (1,240 acres in the project area) and Gold Fork (809 acres in the project area) fires. These fires were started by lightning strikes and burned at high intensity with extreme mortality to the overstory tree cover provided by ponderosa pine and Douglas-fir.

The Becker project area is the remaining large forested patch with generally intact forests within a landscape of early successional forest that resulted from historic wildfire activity. The Becker project area has averaged one fire start per year from lightning or human activity over the last 30 years. With the exception of the Sawmill and Gold Fork fires, these wildfires have stayed small (less than 10 acres) and have been quickly suppressed by initial attack fire suppression resources.

1.2.1.2 Vegetation Management

Timber harvest records indicate that approximately 13,000 acres (67%) of the 19,327 acres within the project area were harvested between 1964 and 1995. These acres were harvested by 17 different timber sales during this 30-year period, with some of the sales overlapping previous areas. These sales removed a variety of tree sizes and utilized various silvicultural prescriptions, including thinning, salvage, and regeneration cutting that involved some clear-cuts. Based on an estimate of the stand acres that were reforested by planting or natural regeneration and old timber sale maps, approximately 6,000 acres are estimated to have been harvested with a regeneration cutting method in which most of the large size class trees would have been removed.

1.2.1.3 Historic Mining

Mining (placer, hydraulic, and dredging) occurred in the Becker project area in the late 1800s and early 1900s. Larger trees were removed from approximately 5%–10% of the project area in support of mining operations. Most tree removal occurred along the major tributaries, including Whoop-Um-Up Creek, Edna Creek, China Fork Creek, Gold Fork Creek, Beaver Creek, Sawmill Creek, Banner Creek, and Crooked River.

1.2.1.4 Transportation Management

An extensive road system was constructed in this area. Road management activities have affected the Middle Crooked River and Pikes Fork subwatersheds. As the subwatersheds were roaded, the stream channel network was extended, which increased the interception of subsurface flows and overland runoff. Increased overland runoff caused water to enter the stream channels more rapidly than would have occurred naturally. Although the total volume of water moved over time has not been substantial, the timing and duration of these flows and sediment delivery rates to these streams, have likely been altered.

Numerous aquatic organism passage (AOP) barriers (Figure 1-2) caused by the transportation system exist throughout the Becker project area. Of the 31 known barriers within the project area, 9 occur on Highway 21 outside of National Forest System (NFS) road management jurisdiction. AOP barriers within the project area primarily affect Beaver, Edna, Sawmill, and Banner creeks. These affected creeks include habitat patches important to Endangered Species Act (ESA) listed bull trout.

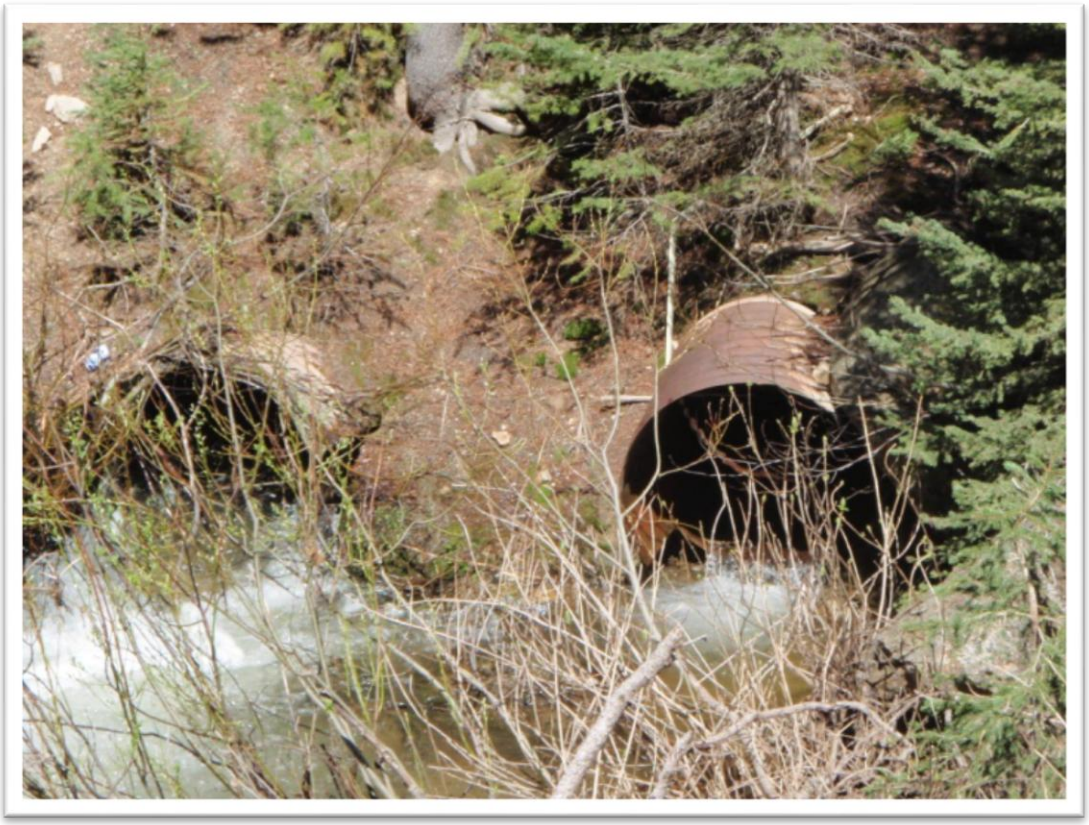

Figure 1-2. Culverts can be barriers to aquatic organism passage

1.2.1.5 Livestock Grazing

Sheep grazing in and around the Becker project area began in the late 1800s/early 1900s. Two allotments encompass the Becker project area: Boise Basin Sheep and Goat (S&G) Allotment and North Fork S&G Allotment. The Boise Basin S&G Allotment is approximately 299,131 acres and the North S&G allotment is about 416,065 acres.

Currently, one permittee grazes sheep on these two allotments and approximately 19,327 acres of these allotments occur in the Becker project area.

1.2.1.6 Recreation

The following developed and dispersed use recreational facilities and activities occur within the Becker project area: the Whoop-Um-Up and Edna Creek campgrounds; the Beaver Creek rental cabin; six rental yurts; park and ski parking lots / trailheads; groomed snowmobile trails; summer and winter nonmotorized trails; and a small amount of dispersed camping that mainly occurs during the big game hunting season and is concentrated along the roadways within the project area. The summer and winter nonmotorized trails allow for Nordic skiing, snowshoeing, mountain biking, hunting, and horseback riding. The Nordic ski trail system include four parking areas / trailheads—Whoop-Um-Up, Gold Fork, Beaver Creek Summit, and Banner—that are operated under the Idaho Department of Parks and Recreation Park N' Ski permit system. Six rental yurts are located within the project area: Whispering Pine, Stargaze, Skyline (Figure 1-3), Rocky Ridge, Elkhorn, and Banner Ridge. The Idaho Department of Parks and Recreation operates these yurts in partnership with the Forest.

Figure 1-3. Sykline yurt (Photo courtesy of Idaho Parks and Recreation)

1.3 RELATIONSHIP OF THIS PROJECT TO THE 2010 FOREST PLAN

Recognizing the temporal and spatial nature of landscape patterns and the agents responsible for their creation (e.g., biotic processes, disturbance regimes, and environmental constraints) is crucial to resource planning. It has been suggested that if existing landscape patterns and disturbance regimes emulate historic conditions, then biodiversity, long-term site productivity, and habitat for wildlife species would be conserved. Landscape patches and patterns, as discussed in Chapter 3 of this EIS, reflect the pattern of tree size class, stand canopy cover, tree species composition, and snags and coarse wood debris (CWD) within a given fire regime. Landscape patch and pattern is important, in part because of the relationship of these patches to habitat for terrestrial wildlife species and the ability of ecological disturbance processes to operate similarly to historical conditions. The underlying philosophy of the *Vegetation and Wildlife Habitat Restoration Strategy* associated with the 2010 Forest Plan is that restoration of historic vegetative conditions that would allow natural disturbance processes to operate characteristically would contribute to wildlife species conservation (Noss 1987, Hunter et al. 1988, Haufler et al. 1996, Raphael et al. 2000, Wisdom et al. 2000, McComb and Duncan 2007). As discussed in section 3.2.3.3, an understanding of landscape patches and patterns is key to implementing the conservation principles presented in Appendix E of the 2010 Forest Plan (USDA Forest Service 2010a, Appendix E, p. E-7 through E-13) and were developed under the following assumptions:

- Contiguous patches of habitat are better than fragmented habitat.
- Large patches of habitat are better than small patches.
- Patches of habitat close together are better than patches far apart.
- Interconnected patches are better than isolated patches.

While emphasis is placed on restoring landscape patch and patterns needed to improve forest resiliency, the Forest Plan also emphasizes the need to integrate related multiple-use objectives (e.g., aquatic resource restoration, recreational opportunities enhancement) with vegetative restoration projects where practical and efficient to do so. Thus, to contribute to the accomplishment of the Forest Plan goals and objectives for Management Prescription Category (MPC) 5.1 (Restoration and Maintenance Emphasis within Forested Landscapes), activities within the project area should emphasize the restoration or maintenance of vegetative landscape patch and patterns within priority watersheds to provide a diversity of habitats and reduced risk from disturbance events and sustainable resources for human uses (USDA Forest Service 2010a). The Proposed Action for this project addresses the following goals, objectives, and priorities in the Forest Plan (USDA Forest Service 2010a):

- *Restoration and maintenance of priority forested wildlife habitat acres*—The 2010 Forest Plan focuses forest restoration and maintenance in low- to mid-elevation forests dominated by ponderosa pine in the nonlethal and mixed1 fire regimes. The project area is in the Crooked River watershed, which is identified as "Active, Moderate Priority" for restoration under the *Vegetation and Wildlife Habitat Restoration Strategy* (USDA Forest Service 2010a). This watershed is adjacent to two short-term wildlife priority watersheds, one to the north (Lowman) and one to the southwest (Upper Mores). Both watersheds are short-term priorities due to their current and potential ability to provide source habitat for white-headed woodpecker, a species of conservation concern that is associated with low- to mid-elevation forests (USDA Forest Service 2010a). The proposed action would maintain and restore low to mid-elevation forested stands in the non-lethal and mixed1 fire regimes within the project area.
- *Restoration of a Watershed and Aquatic Restoration Strategy (WARS) moderate priority subwatershed*—The project area fall within two subwatersheds: (1) the Pikes Fork Subwatershed, which is identified in the 2010 Forest Plan as an Aquatic Conservation Strategy (ACS) priority watershed with a moderate priority for active restoration and (2) the Middle Crooked River subwatershed, which is a moderate priority under the WARS Forest Plan management strategy for active restoration to improve watershed and aquatic conditions. The Proposed Action addresses Forest Plan objectives that identify work that should be completed during the planning period in both of these subwatersheds.
- *Enhancement of recreational opportunities*—While motorized recreation is allowed within the project area along the current transportation system, no NFS motorized trails are specifically designated to offer opportunities for off-highway vehicle (OHV) recreation. In addition, while the Forest has an ongoing partnership with Idaho Parks and Recreation to provide for nonmotorized recreational uses, existing routes utilized are not specifically authorized for this use. The Proposed Action would designate a motorized trail for OHVs 50 inches wide or less and authorize several miles of nonmotorized trails, contributing toward accomplishing objectives in the Forest Plan that identify enhancing recreational opportunities (Forest Plan 2010a).
- *Removal of wood products as an outcome of forest maintenance and restoration treatments on acres in the suited timber base*—All acres within the project area are allocated to MPC 5.1 (Restoration and Maintenance Emphasis within Forested Landscapes). The Proposed Action includes removing wood products as a byproduct of forest restoration and maintenance treatment on acres in the suited timber base.

1.4 PURPOSE AND NEED

1.4.1 Purpose 1

Contribute to the restoration of low- to mid-elevation forests in the project area; forests that fall within the non-lethal and mixed1 fire regime. Modifying forest densities, tree size classes, and species composition and breaking-up the horizontal and vertical wildland fuel continuity will reduce the risk of uncharacteristic stand-replacement wildfire and improve forest resiliency. Moving conditions toward those that are more

representative of the desired condition for the fire regimes in the project area will benefit wildlife habitat restoration, as well as provide greater assurance that forested overstory cover in this landscape, which attracts recreational users to the area, is sustained over time.

Three primary fire regimes within the Becker project area comprise the landscape patch and pattern: nonlethal, mixed1, and mixed2 (USDA Forest Service 2010a, Glossary). The nonlethal and mixed1 fire regime patches occupy 93% of the project area. Forest vegetation and wildlife habitat conditions are most departed from desired conditions in these patches. These are also the fire regimes at greatest risk to uncharacteristic wildfire impacts that would further depart them from the desired conditions that are important to meeting Conservation Principles (USDA Forest Service 2010a, Appendix E).

The sites classified as mixed2 fire regime are generally small inclusions within the more extensive nonlethal and mixed1 fire regimes. As a result of the intermix within these other fire regimes, the mixed2 sites contain early seral conifer species (e.g., ponderosa pine) and exhibit structural conditions more similar to the mixed1 fire regime than a typical mixed2 regime. Small inclusions, representing less than 100 acres within the project area, are classified as the lethal fire regime. Because management in these mixed2 and lethal fire regime areas would be similar to management in adjacent areas, acres classified as mixed2 and lethal have been combined with the mixed1 fire regime for purposes of this project.

Because of the landforms in the area, vegetative conditions associated with the different fire regimes are similar throughout the landscape, including areas that fall into the 2010 Forest Plan definition of Riparian Conservation Areas (RCAs). Within the project area, most vegetation, including vegetation within the RCAs, is upland vegetation with only narrow communities of riparian (moisture-influenced) vegetation adjacent to stream channels. Desired vegetative conditions for the upland communities captured by RCAs are similar to the desired conditions outside of the RCAs. However, within RCAs, how the vegetative components function to provide aquatic habitat features (e.g., stream shade and large coarse woody debris) is a major consideration while how vegetation functions to provide terrestrial habitat features is a major consideration upslope and outside of the RCAs.

1.4.1.1 Need for Action to Address Purpose 1

In the context of Forest Plan desired conditions (USDA Forest Service 2010a, Appendices A and E), the cumulative effects of past and present disturbances, fire suppression, and management actions have resulted in departed forested stand and landscape patch conditions. These departed conditions have increased the risk of uncharacteristic forest stand-replacing wildfires; reduced quantity and quality of habitat for wildlife species of conservation concern associated with nonlethal fire regimes (e.g., white-headed woodpecker [Figure 1-4]); and redistributed habitat for wildlife species whose source habitat is associated more with mixed1 fire regimes (e.g., flammulated owl) in areas where it historically would not have occurred. Habitat has generally increased in the mixed1 fire regime patches and decreased in the nonlethal patches.

Figure 1-4. White-headed woodpecker

The following restoration needs were identified and are categorized below by the respective fire regime.

Nonlethal Fire Regime (Figure 1-5)

1. In areas outside of plantations, a need exists to promote medium-to-large ponderosa pine or Douglas-fir trees while reducing subalpine fir, lodgepole pine, smaller Douglas-fir, and ponderosa pine trees. This change in species composition would improve the health and vigor of the residual forest and reduce ladder fuels in order to reduce the risk of undesirable outcomes from natural disturbance. This change would also promote large tree development and begin to move the stand composition and structure toward the desired condition (USDA Forest Service 2010a, Appendices A and E).
2. Within plantations, a need exists to reduce overall stocking levels, remove undesirable species (favor ponderosa pine and Douglas-fir while reducing lodgepole pine and subalpine fir), reduce dwarf mistletoe infections, and establish non-uniform tree spacing for future large tree clump development.
3. Throughout the project area, a need exists to reduce surface fuel loading and continuity, increase canopy base height, and decrease ladder fuel densities to increase stand resiliency and reduce the risk of undesirable overstory mortality.

4. While addressing needs 1 through 3, a need exists to maintain old forest[1] and wildlife source habitat components characteristic of the fire regime where they are present; where not present, a need exists to promote restoration.
5. In light of the importance of forested overstory cover to the recreational experience in this area, a need exists to promote vegetative conditions in and around higher use areas (e.g., yurts, trails, campgrounds) that is important to providing a quality recreational experience for users that frequent the project area, including assigning visual quality objectives (VQOs) to these areas (refer to proposed Forest Plan amendments below).
6. Restoration objectives to achieve functioning vegetation and terrestrial habitat conditions associated with departed forest stand and landscape patch condition necessitates the need to consider the disturbance regimes and patch dynamics of upland vegetation communities that fall within the RCAs. These upland RCAs are transition zones that influence the functions and ecological processes of both the upland terrestrial and true riparian/aquatic settings. Restoration actions within RCAs are needed to develop structure and function that facilitate terrestrial and riparian/aquatic processes and to establish conditions that have a gradual, diverse transition zone with greater integrity and resiliency when subjected to physical events and natural disturbance processes.

[1] Old forest components are described in Appendix E of the Forest Plan (USDA Forest Service 2010a, p. E-25) and include tree size class, canopy cover, species composition, snags, and coarse woody debris desired conditions by Potential Vegetation Group (PVG). Other stand structural components are also important (USDA Forest Service 2010a, pp. E-24 through E-28) but are not easily derived from data, including within-stand patchiness, canopy gaps, and decadence.

Figure 1-5. Example of Potential Vegetation Group (PVG) 2 (nonlethal fire regime) stand in the Becker project area

Mixed1 Fire Regime Patches (Figure 1-6)

7. In areas outside of plantations, a need exists to reduce stand densities and restore structure and species composition to desired conditions. Specifically, the relative abundance of lodgepole pine and subalpine fire needs to be reduced while healthy, larger ponderosa pine, Douglas-fir, and Engelmann spruce need to be retained. Promoting this species composition would increase forest resilience, reduce the risk of undesirable outcomes from natural disturbance, promote large tree development, and begin to move the stand composition and structure toward the desired condition (USDA Forest Service 2010a, Appendices A and E).
8. Within plantations, a need exists to reduce stand densities to improve tree vigor and growth and reduce the relative abundance of lodgepole pine and subalpine fir while retaining healthy and larger ponderosa pine or Douglas-fir. A need exists to reduce dwarf mistletoe-infected trees where they would impact achieving restoration objectives.
9. Throughout the project area, a need exists to reduce surface fuel loading and continuity, increase canopy base height, and decrease ladder fuel densities to increase stand resiliency and reduce the risk of undesirable overstory mortality. While similar to the nonlethal fire regime, the mixed1 fire regime will generally have more pockets of slightly higher fuel loading and ladder fuels than the nonlethal fire regime.

10. While addressing needs 7 through 9, a need exists to maintain old forest and wildlife source habitat components characteristic of the fire regime where they are present; where not present, a need exists to promote their restoration.
11. In light of the importance of forested overstory cover to the recreational experience in this area, a need exists to promote vegetative conditions in and around higher use areas (e.g., yurts, trails, campgrounds) that is important to providing a quality recreational experience for users that frequent the project area, including assigning VQOs to these areas (refer to proposed Forest Plan amendments below).

Figure 1-6. Example of mixed1 fire regime stand in the Becker project area

12. Restoration objectives to achieve functioning vegetation and terrestrial habitat conditions associated with departed forest stand and landscape patch condition necessitates the need to consider the disturbance regimes and patch dynamics of upland vegetation communities that fall within the RCAs. These upland RCAs are transition zones that influence the functions and ecological processes of both the upland terrestrial and true riparian/aquatic settings. Restoration actions within RCAs are needed to develop structure and function that facilitate terrestrial and riparian/aquatic processes and to establish conditions that have a gradual, diverse transition zone with greater integrity and resiliency when subjected to physical events and natural disturbance processes.

1.4.2 Purpose 2

Improve watershed conditions by reducing motorized route-related impacts to water resources and fish, soil, and wildlife and associated habitats while providing for a safe and efficient transportation system necessary to meet long-term management needs.

The project area requires a safe, sustainable transportation system that provides for existing and future access for fire protection, forest resource management, and a variety of recreational opportunities while protecting aquatic resources and terrestrial wildlife habitats and populations. A Travel Analysis Report (TAR) was prepared to document the Travel Analysis Process (TAP) (USDA Forest Service 2014b) for the Becker project area. The purpose of the TAP is to identify opportunities to change the transportation system to meet current or future management objectives and provide information that allows integrating ecological, social, and economic needs into future decisions. The 2010 Forest Plan states that the Forest should identify roads that are not needed for land and resource management and evaluate for disposal or decommissioning (FROB06; USDA Forest Service 2010a, p. III-61).

The Forest Plan includes an Aquatic Conservation Strategy (ACS) for the Forest. Identified ACS priority subwatersheds were prioritized for watershed restoration activities based on several factors, including population or habitat strongholds for chinook salmon, sockeye salmon, steelhead trout, bull trout, or native cutthroat trout; anadromous fish spawning or rearing habitat; highly isolated local population of bull trout or native cutthroat trout; the presence of a Total Maximum Daily Load (TMDL) Watershed Restoration Plan; or the presence of a municipal watershed (USDA Forest Service 2010a, Appendix B). The Becker project area includes portions of two subwatersheds: Middle Crooked River subwatershed and Pikes Fork subwatershed. The Middle Crooked River subwatershed is identified a moderate priority under the WARS Forest Plan management strategy for active restoration to improve watershed and aquatic conditions; the Pikes Fork subwatershed is identified in the Forest Plan as an ACS priority watershed with moderate priority for active restoration (USDA Forest Service 2010a).

More recently, the Forest Service completed a national assessment of the current condition and prioritization of subwatersheds within NFS lands called the Watershed Condition Framework (WCF) (USDA Forest Service 2011). The Pikes Fork subwatershed was identified as “Functioning at Risk” by the WCF based on high road density within riparian areas, aquatic habitat conditions, and vegetation conditions being outside the historical range of variability (HRV). The Middle Crooked River subwatershed received a functionality rating of “Impaired Function” because of water quality concerns, high road density within riparian areas, numerous fish passage barriers, and vegetation conditions being outside the HRV.

Watershed resources and fish habitat conditions within the project area have been identified as being negatively impacted by the existing NFS transportation system and the known unauthorized routes (Figure 1-7). Some roads within the project area are poorly located and deteriorating. The TAP (USDA Forest Service 2014b) determined that many roads in the project area are a source of management-induced sediment that is reaching project area streams; this sediment is impacting water quality and aquatic resource

conditions. The existing NFS transportation system and known unauthorized routes also impact existing soil resource conditions, such as total soil resource commitment (TSRC) and landslide prone areas, in the project area.

Figure 1-7. Roads within the project area are contributing to resource impacts

Numerous physical barriers to aquatic species migration are present in the project area. These barriers limit or prevent access to fish habitat within and adjacent to the project area. Access to potential spawning and rearing habitat for Threatened bull trout is limited by these barriers. Effectiveness of occupied and designated Critical Habitat for bull trout is also adversely affected by these barriers. Culvert structures associated with the project area's transportation system comprise these AOP barriers.

Likewise, the TAP indicates that the current transportation system impacts the quality and effectiveness of terrestrial wildlife habitats through disturbance, access to source habitat, vulnerability to hunting-related mortality, and modification of habitats adjacent to the transportation system. Modifications to habitat include removing snag and down log habitats associated with the personal use firewood program and establishing and spreading noxious weeds, both of which affect habitat quality and effectiveness for a variety of wildlife species in the project area.

1.4.2.1 Need for Action to Address Purpose 2

1. A need exists to decommission authorized roads and unauthorized routes within the project area to reduce sediment to streams, improve wildlife habitat, and decrease noxious weed spread, thereby improving watershed, aquatic, and

terrestrial resource conditions. The 2010 Forest Plan states that the transportation system should be managed to reduce degrading effects to resources and help achieve other resource objectives (FROB04; USDA Forest Service 2010a, p. III-60).

2. A need exists to decommission authorized roads and unauthorized routes within the project area to reduce effects on soil productivity. Roads are considered TSRC as defined by converting a productive site to an essentially nonproductive site for more than 50 years (USDA Forest Service 2010a, p. GL-50). Reducing road/route effects on soil productivity is identified in the Forest Plan as a Forest-wide objective SWOB18 (USDA Forest Service 2010a, p. III-21).
3. A need exists to reduce road/route density and RCA road/route density within the project area to reduce road/route-related effects on water quality and aquatic, riparian, and terrestrial species and their habitats. This need is identified in the Forest Plan as Forest-wide objectives SWOB18 and WIOB16 (USDA Forest Service 2010a, p. III-21 and III-26). Direction specific to Management Area (MA) 7 (North Fork Boise River) indicates that watershed restoration should be initiated in the Pikes Fork subwatershed to improve watershed conditions and fish habitat related to roads (MA 7 Objectives 0726, 0727, and 0728; USDA Forest Service 2010a, p. III-189).
4. A need exists to reduce undesirable impacts to stream systems, aquatic habitat, and wildlife habitat through road reconstruction and relocation to more suitable locations to reduce effects while providing access to meet long-term management objectives. Forest-wide objective FROB04 states that the transportation system should be managed to reduce degradation of resources (FROB04; USDA Forest Service 2010a, p. III-60).
5. A need exists to replace or modify existing culvert structures that do not provide AOP with structures that do provide AOP or, alternatively, a need exists to modify habitat below these culverts to provide AOP. Forest-wide objective FROB12 states that roads and facilities identified as a potential concern or problem that is contributing to degradation of water quality or aquatic, wildlife, or plant habitats should be evaluated for opportunities to mitigate effects (USDA Forest Service 2010a, p. III-61). Restoring migration connectivity for bull trout throughout MA 7 (North Fork Boise River) by removing migration barriers caused by existing road design is identified in MA 7 objective 0725 (USDA Forest Service 2010a, p. III-189).
6. A need exists to close project area roads to public motorized access that have been identified as needed to only support restoration activities to reduce impacts such as sediment delivery to streams, removal of snags and down logs important to wildlife, and noxious weed spread and introduction. Forest-wide objective FROB04 states that the transportation system should be managed to reduce degradation of resources (FROB04; USDA Forest Service 2010a, p. III-60).

1.4.3 Purpose 3

Improve and enhance the quality and diversity of recreational opportunities in the Middle Crooked River and Pikes Fork subwatersheds by reducing risk of loss of forested overstory cover, providing for a variety of recreation experiences, and reducing the potential for conflicts between motorized and nonmotorized recreational users.

The Becker project area is one of the more popular recreational areas on the Idaho City Ranger District based on its proximity to Boise and easy access from Highway 21. Visitors to the area find opportunities for a wide variety of developed and dispersed recreational activities (Figure 1-8). Although the area is popular with recreationists, an opportunity exists to improve the variety of year-round recreational experiences, reduce conflicts between motorized and nonmotorized users, and reduce the risk of undesirable impacts from uncharacteristic disturbance events to the quality of recreational experiences in the area.

Figure 1-8. Recreational opportunities with the Becker Integrated Resource Project area

1.4.3.1 Need for Action to Address Purpose 3

1. A need exists to reduce risks of uncharacteristic or undesirable disturbance events that would reduce forested overstory cover important to the quality of the recreational experience in the project area. The project area is surrounded by historic wildfire areas where forested overstory cover has been substantially reduced or eliminated. Retaining forested overstory cover not only contributes to the quality of the recreational experience but is important for retaining snow cover, particularly on nonmotorized winter cross country ski trails managed in partnership with Idaho Parks and Recreation and local user groups. Purpose 1 describes the vegetation restoration needs that would result in reducing the risk of an undesirable disturbance event in the project area.
2. A need exists to modify the transportation system to improve the quality and diversity of the recreational experience in the project area. Roads the TAP determined to be unnecessary for long-term management were considered for conversion to trails. An opportunity exists to convert roads to trails in the project area to support a variety of recreational experiences and reduce the potential for conflict between full-sized vehicles and recreationists. Additionally, a need exists to designate unauthorized roads as Maintenance Level (ML) 2 (Administrative Use Only) roads to provide access to the yurts, managed in partnership with Idaho

Parks and Recreation, for maintenance purposes. Forest-wide objective FRGU09 states travel management should be used, as needed, to provide for the safety and welfare of the users; provide a diversity of recreational experiences and reduce user conflicts; and comply with Forest contracts or permits, cooperative agreements, road purchase agreements, easement deeds, or other formal documents of the Government requiring the road use be controlled (USDA Forest Service 2010a, p. III-62).

3. A need exists to authorize nonmotorized trails in the project area to improve opportunities such as hiking, mountain biking, and/or horseback riding during the snow-free or summer season. Authorization of a summer nonmotorized trail system would allow the Forest to expend trail maintenance dollars to maintain trails to standard, which is important for addressing user safety, and apply best management practices, which is important for minimizing effects to resources such as soil, water, vegetation, and wildlife. A summer trail system would provide a variety of nonmotorized recreational opportunities from the yurts located in the project area. All new trails would have VQOs established (see proposed Forest Plan amendments below). Providing an authorized nonmotorized trail system would move the area toward meeting the Forest Plan objective to identify, evaluate, and improve recreation opportunities and experiences along the Highway 21 corridor (USDA Forest Service 2010a, p. III-205). Finally, a need exists to authorize trailhead facilities at Beaver Creek Summit to support the nonmotorized trail system and provide a safe parking location off of Highway 21.

4. A need exists to authorize a system of over-snow or winter nonmotorized trails in the project area. Providing a good mix of groomed and ungroomed routes on nonmotorized trails would provide separation between motorized and nonmotorized winter uses and reduce the potential for conflict between motorized and nonmotorized recreationists. All new trails would have VQOs established (see proposed Forest Plan amendment below). A winter nonmotorized trail system would provide groomed and ungroomed over-snow opportunities from the yurts located in the project area. Authorizing winter nonmotorized trails in the project area would move the area toward meeting Forest Plan objectives to emphasize winter nonmotorized uses, minimize conflicts between backcountry skiers and snowmobilers, continue coordination with counties and other groups related to grooming trails, protect the groomed cross-country ski system from the Gold Fork Trailhead to Beaver Creek Summit from unauthorized damage by unauthorized snowmobile use, and continue coordination with Idaho Parks and Recreation on management of the park and ski areas to maintain winter recreational opportunities (USDA Forest Service 2010a, pp. III-190, III-205, and III-206). Forest-wide objective REOB23 directs the Forest to provide networks of marked and designated winter travel routes and trailhead facilities (USDA Forest Service 2010a, p. III-65).

5. A need exists to provide designated motorized recreational opportunities within the project area for vehicles 50 inches or less in width to reduce the potential for mixed use interactions and conflicts between different classes of motorized vehicles that can affect overall user safety. The project area neither manages for

nor offers opportunities for vehicles 50 inches or less in width off of the current NFS road system, which is open to all motor vehicles (i.e., mixed use). A mixed use transportation system increases the risk of accidents between full-sized vehicles and OHVs. Designating a motorized loop trail system would allow the Forest to expend motorized trail maintenance dollars to maintain trails to standard, which is important for addressing user safety, and apply best management practices, which are important to minimizing effects to resources such as soil, water, vegetation, and wildlife. All new trails would have VQOs established (see proposed Forest Plan amendment below). Finally, a need exists to authorize trailhead facilities to support the proposed motorized trail system. Forest-wide objective REOB05 states opportunities to develop motorized uses through trail conversions and development of new trails should be identified in appropriate locations (USDA Forest Service 2010a, p. III-64).

1.4.4 Purpose 4

Support the local and regional economies by providing enhanced recreational opportunities, by utilizing wood products from the suited timber base, and by implementing forest restoration activities.

Providing a sustainable and predictable supply of goods and services, such as recreational opportunities, forest restoration activities, and wood products from lands identified as suitable for timber management, is important to meeting social and economic management objectives identified in the Forest Plan (USDA Forest Service 2010a, p. III-79). Diverse recreational opportunities support local businesses and economies by attracting visitors to the local area. Providing wood products that contribute to sustaining a local/regional wood products processing industry is essential for continuing forestland restoration and maintenance services in southwestern Idaho as well as for supporting local and regional economic sustainability. Forest restoration activities, including forest thinning; road/trail construction, maintenance, and decommissioning; prescribed fire; and stream restoration, benefit local and regional economies through commercial utilization of wood products, related direct and indirect job creation, and demand for materials and supplies.

1.4.4.1 Need for Action to Address Purpose 4

1. A need exists to maintain and improve recreational opportunities in the project area to support the local economy. Purpose 3 identifies the recreational needs that would result in enhanced recreational opportunities in the project area (USDA Forest Service 2010a, pp. III-64 and III-79).
2. A need exists to provide wood products from vegetation restoration activities to local and regional economies (Figure 1-9). Forested lands within the project area are classified as MPC 5.1 (USDA Forest Service 2010a). Most forestlands in MPC 5.1 have been identified in the Forest Plan as suitable for timber management where wood products produced from treatments are an outcome of achieving restoration objectives. MPC 5.1 emphasizes restoring or maintaining vegetation within desired conditions to provide a diversity of wildlife habitats, reduce risk from undesirable disturbance events, and support sustainable human

uses of resources (USDA Forest Service 2010a, p. III-90). Purpose 1 identifies the vegetation restoration needs that would result in commercial wood products in the project area.

3. A need exists to support local and regional economies through forest restoration activities such as noncommercial thinning; prescribed fire; stream restoration; and road/trail construction, maintenance, and decommissioning. These activities benefit local and regional economies by creating demand for supplies, materials, and a labor force. Purposes 1, 2, and 3 identify the needs for non-commercial vegetation and transportation and aquatic resource restoration and management in the project area that may generate additional revenues in support of local and regional economies.

Figure 1-9. Providing wood products as an outcome of restoration treatments supports local and regional economies

1.5 PROPOSED ACTION

The Proposed Action would implement a variety of vegetation management, transportation management, and recreation management activities within the project area. Table 1-1 through Table 1-12 display the components of the Proposed Action that correspond with the identified treatment/action summaries below.

1.5.1 Purpose and Need 1—Vegetation/Fuels

Table 1-1 and Table 1-4 display the vegetation and fuel treatments proposed for the project area. Table 1-3 provides a summary of the temporary road construction and Table 1-4 summarizes the logging systems that would be needed to facilitate the vegetation management actions proposed.

Table 1-1. Summary of the vegetation Proposed Action, including acres treated within and outside of riparian conservation areas (RCAs)

Treatment Description	Total (acres)	Outside RCAs (acres)	Within RCAs (acres)
Thinning with no product removal	3,245	2,277	968
Thinning (optional mastication) with no product removal	683	544	139
Thinning with optional miscellaneous wood product removal	1,264	954	310
Thinning with product removal	2,231	1,611	620
Mixed treatment with product removal	930	640	290
Totals	8,353	6,026	2,327

Table 1-2. Summary of the fuels Proposed Action, including acres treated within and outside of the riparian conservation areas (RCAs)

Treatment Description	Total (acres)	Outside RCA (acres)	Within RCA (acres)
Natural Fuels Treatment Block			
Direct application of fire	501	375	126
Indirect application of fire	936	743	193
Totals	1,437	1118	319
Activity and Natural Fuels Treatment Block			
Chip; lop and scatter; handpile and burn; and/or burn concentrations	2,717	1,969	748
Whole-tree yard; lop and scatter; handpile and burn; and/or burn concentrations	3,065	2,176	889
Yard; lop and scatter; handpile and burn; and/or burn concentrations	1,174	872	302
Totals	6,956	5,018	1,938
Activity Fuels Only Treatment Block			
Chip; lop and scatter; and handpile and burn concentrations	1,230	331	352
Whole-tree yard and handpile and burn concentrations	128	97	31
Yard; handpile and burn concentrations, and lop and scatter	40	34	6
Totals	1,398	1009	389
Natural Fuels Restoration Fire Treatment Only			
Natural fuels treatment—3 to 5 years after activity fuels treatments	3,637	2,396	1,241
Totals	3,637	2,396	1,241

Table 1-3. Summary of temporary road construction to facilitate vegetation management actions under each alternative, outside of and within Riparian Conservation Areas (RCAs)

Treatment	Total (miles)	Outside RCAs (miles)	Within RCAs (miles)
Temporary road construction	5.8	5.2	0.6

Table 1-4. Summary of logging systems to facilitate vegetation management actions under each alternative, outside of and within Riparian Conservation Areas (RCAs) (includes miscellaneous forest products)

Treatment Description	Total (acres)	Outside RCA	Within RCA
Tractor/Jammer	3,736	2,709	1,027
Light Cable	612	446	166
Helicopter Logging			
With pre-bunching	0	0	0
No pre-bunching	0	0	0
TOTAL ACRES	4,348	3,155	1,193

1.5.2 Purpose and Need 2—Watershed Restoration

Table 1-5 summarizes the transportation changes proposed and Table 1-6 summarizes the AOP barrier treatments proposed.

Table 1-5. Summary of the transportation system for the Proposed Action, within and outside of the riparian conservation area (RCA)

Treatment Description	Total (miles)	Outside RCA (miles)	Within RCA (miles)
Travel Management Changes—Closures to Motorized Use			
National Forest System (NFS) roads changed from ML 2 (open to public motorized use) to ML 2 Administrative Use Only (closed to public motorized use)	19.8	11.9	7.9
NFS roads changed from ML 2 (open to public motorized use) to ML 1 (closed to all motorized use/state of storage)	8.3	7.2	1.1
Totals	28.1	19.1	9.0
Road Reconstruction			
NFS road reconstruction of ML 1(closed to all motorized use/state of storage) to ML 2 (open to public motorized use) as part of the realignment of NFS Road 393	1.8	1.2	0.6
NFS Road Reconstruction of ML 1(closed to all motorized use/state of storage) to ML 2 Administrative Use Only (closed to public motorized use)	3.0	2.7	0.3
Totals	4.8	3.9	0.9
New Road Construction			
Construct 2 road segments as part of the realignment of NFS Road 393 that will be ML 2 (open to public motorized use)	1.2	1.1	0.1
Construct 1 road segment as a realignment of NFS Roads 362D1 and 362D6 that will be ML 2 Admin Use Only (closed to public motorized use)	<0.1	<0.1	0.0
Totals	1.2	1.1	0.1
Addition of Unauthorized Routes to the Transportation System			
Add unauthorized routes to the transportation system as ML 1 roads(closed to all motorized use/state of storage)	2.4	2.1	0.3
Add unauthorized routes to the transportation system as ML2 roads(open to public motorized use) as part of the realignment of NFS Road 393	0.3	0.3	0
Add unauthorized routes to the transportation system as ML 2 Administrative Use Only (closed to public motorized use)	1.9	1.5	0.4
Totals	4.6	3.9	0.7
Road Decommissioning—NFS Roads and Unauthorized Routes			
Decommissioning of NFS roads	22.8	12.5	10.3
Decommissioning of 16 unauthorized routes	8.1	4.6	3.5
Totals	30.9	17.1	13.8
Conversion of NFS Roads to Trail			
Converting NFS roads to motorized trail designated for vehicles 50 inches wide or less	2.1	1.4	0.7
Converting NFS roads to motorized trail designated for vehicles 60 inches wide or less	0.0	0.0	0.0
Converting NFS roads to nonmotorized trail	5.1	1.7	3.4
Totals	7.2	3.1	4.1

Note: NFS = National Forest System and ML = Maintenance Level

Table 1-6. Summary of the Aquatic Organism Passage barrier treatments under the Proposed Action

Aquatic Organism Passage Proposed Activity	Total Culverts
Priority critical bull trout habitat culvert treatments[a]	7
Culvert treatments[a]	15
Culvert—outlet pool modification	1
Total	23

[a]Culvert treatments may include culvert replacements or removal

1.5.3 Purpose and Need 3—Recreation

Table 1-7 summarizes the miles of motorized trail designation, Table 1-8 summarizes the winter nonmotorized trail system, and Table 1-9 summarizes the summer nonmotorized trail system proposed. Table 1-10 provides the miles of shared use traffic where nonmotorized recreational and/or motorized recreational traffic share ML 2 roads or motor vehicle trails.

A comparison between the current condition for designated motorized trails and authorized nonmotorized trails is not displayed in the tables below because neither exists within the project area.

In addition to the information in Table 1-11, a trailhead would be designated at the Beaver Creek Summit, along Highway 21 in the north, northwest corner of the project area. No structures beyond information kiosks and signs would be constructed.

Table 1-7. Summary of motorized trail designation under the Proposed Action, including miles within and outside of riparian conservation areas (RCAs)

Trail Designation Proposed Activity	Total (miles)	Outside RCAs (miles)	Within RCAs (miles)
Trail construction—new construction (motor vehicles 50 inches or less in width)	1.5	1.1	0.4
Trail construction—new construction with visible prism (motor vehicles 50 inches or less in width)	0.6	0.3	0.3
Existing road (ML 2 Administrative Use Only) with mixed use as motorized trail (motor vehicles 50 inches in width)	6.3	4.1	2.2
Existing road (ML 1)—Designated as motorized trail (motor vehicles 50 inches or less in width)	12.8	9.8	3.0
Convert existing road (ML 1) to motorized trail (motor vehicles 50 inches or less in width)	2.1	1.4	0.7
Totals	23.3	16.7	6.6

Table 1-8. Summary of the winter nonmotorized trail system under the Proposed Action, including miles within and outside of riparian conservation areas (RCAs)

Trail Authorization Proposed Activity	Total (miles)	Outside RCAs (miles)	Within RCAs (miles)
Groomed route, nonmotorized trail	29.2	13.3	15.9
Ungroomed route, nonmotorized trail	31.0	21.4	9.6
Totals	60.2	34.7	25.5

Table 1-9. Summary of the summer nonmotorized trail system under the Proposed Action, including miles within and outside of riparian conservation areas (RCAs)

Trail Designation Proposed Activity	Total (miles)	Miles Outside RCA	Miles Within RCA
Existing NFS nonmotorized trail	2.9	1.2	1.7
Authorize nonmotorized trail on unauthorized routes	19.8	13.5	6.3
Authorize nonmotorized trail on existing road (ML 1 [closed to all motorized use])	8.7	6.5	2.2
Authorize nonmotorized trail on existing road (ML 2 Administrative Use Only [closed to public motorized use])	7.7	4.5	3.2
Convert existing road (ML 2 [open to all motorized use]) to authorized non-motorized trail	1.2	0.2	1.0
Convert existing road (ML 1 [closed to all motorized use]) to authorized non-motorized trail	3.9	1.5	2.4
Totals	44.2	27.5	16.8

Table 1-10. Summary of National Forest System road/trail system shared motorized and nonmotorized uses

Description of Shared Use	Miles
Miles of shared use traffic where nonmotorized recreational and/or motorized recreational (unlicensed motor vehicles) traffic share Management Level 2 roads open to all motor vehicles	43.8
Miles of shared use traffic where nonmotorized recreational and or motorized recreational (motor vehicles 50 inches or less in width) traffic share motor vehicle trails	1.9
Totals	45.7

Table 1-11. Summary of trailheads established to support trail opportunities

Trailheads	Number
Construct Motorized Trailheads	1
Authorize Non-motorized Trailhead at Beaver Creek Summit	1

1.5.4 Purpose and Need 4—Support to Local and Regional Economies

Recreational Opportunities: Refer to Purpose 1 (vegetation and fuels) and Purpose 3 (recreation). Providing these improvements to the recreational use and experience in the Becker project area would continue to provide recreational use support to the local area, including the direct and indirect benefits this use provides to the local and regional economies.

Commercial and Miscellaneous Wood Products Resulting from Restoration Activities: The volume listed in Table 1-12 is expected to be generated as an outcome of commercial and noncommercial vegetation management activities in the Becker project area.

Table 1-12. Summary of the commercial production under the Proposed Action

	Million Board Feet (MMBF)	Cords	Tons
Commercial Sawtimber			
Ponderosa pine/Douglas-fir/lodgepole pine/subalpine fir 3,000 thousand board feet per acre (mbf/acre	6–8	—	—
Commercial and Personal Use Miscellaneous Forest Products			
Fuelwood[a]	—	1,700±	—
Post and poles	0.250	—	—
Biomass[b]	—	—	42,000±

[a]Fuelwood includes yarding of noncommercial thinning material in commercial and mixed treatment units and noncommercial thinning units associated with SICI yarding. Fuelwood would be available in a mix of commercial firewood use, as well as personal use firewood collection.
[b]Biomass is associated with slash generated through commercial harvest activities.

Other Restoration Activities Anticipated to Generate Economic Outputs to Support Local and Regional Economies: The estimated job creation from the American Recovery and Reinvestment Act of 2009 (US President 2009) was that $92,000 of government spending created 1 job/year; 64% of jobs created were from direct or indirect employment. Several restoration activities are expected to generate additional direct and indirect support to local and regional economies:

- Road realignment, construction, reconstruction, and maintenance
- Motorized and nonmotorized recreation trail realignment, construction, reconstruction, and maintenance
- AOP culvert replacement or improvements
- Noncommercial thinning
- Installation of road closure devices (seasonal or long term)
- Activity fuel treatments, both mechanical and prescribed fire

1.6 DECISIONS TO BE MADE

After reviewing the completed analysis, the Boise Forest Supervisor will make one or more of the following decisions:

- Should vegetation maintenance and restoration treatments (mechanical and fire) in the project area be implemented, and if so, which forested stands should be treated, and what silvicultural prescriptions and methods should be applied?
- Should the transportation system be managed within the project area as recommended in the *Becker Travel Analysis Process Report* (USDA Forest Service 2012), and if so, which road management treatments should be implemented?
- Should recreation management activities in the project area be implemented, and if so, which motorized and/or nonmotorized proposed trails/trailhead improvements should be implemented?
    - Should the proposed motorized trail be designated as a motorized recreation trail per 36 CFR 212.51, subpart B, and if so, which portions and for what type of vehicle use?

  - Should the proposed nonmotorized trails be authorized, and if so, which portions and for what type of recreation user?
  - What actions should be taken to reduce conflicts between nonmotorized and motorized recreational users in the project area?
- Should culvert treatments be implemented to improve access to aquatic habitat in the project area, and if so, which culverts should be removed or replaced?
- What design features and/or mitigation measures should be applied to the project?

1.7 FOREST PLAN DIRECTION RELATIVE TO THE PROJECT AREA

This document is tiered to the *Boise National Forest Land and Resource Management Plan* (Forest Plan) (USDA Forest Service 2010a), the *Southwest Idaho Ecogroup Land and Resource Management Plans Final Environmental Impact Statement* (USDA Forest Service 2003b), and the *Final Environmental Impact Statement Supporting Forest Plan Amendments to Integrate the Boise National Forest WCS, Phase 1: Forested Biological Community* (USDA Forest Service 2010b). This document references and incorporates information from these documents and all associated appendices and supporting documentation.

The proposed vegetation management actions were designed to contribute to the accomplishment of all or portions of the following Forest-wide Forest Plan objectives:

- **Forest-wide FMOB08**—On a decadal basis, use prescribed fire to treat at least 100,000 acres. These treatments would contribute to accomplishment of VEOB08 and FMOB04.
  - The Proposed Action would implement prescribed fire maintenance burns on 12,000 acres within the low- to mid-elevation ponderosa pine forests.
- **Forest-wide VEOB08**—On a decadal basis, schedule and complete at least 215,000 acres of treatments designed to maintain or restore desired vegetative and associated wildlife source habitat conditions. Focus treatments in vegetative and wildlife habitat priority watersheds displayed on the combined *Vegetative and Wildlife Habitat Restoration Strategy Map*. Within these watersheds, emphasize treatments in forest stands in the nonlethal and mixed1 fire regime able to attain the range of desired conditions for the large tree size class or old forest habitat within the short-term [sic].
  - The Proposed Action would implement a combination of mechanical and prescribed fire treatments on 13,428 acres of forested stands within the nonlethal and mixed1/mixed2 fire regimes, resulting in an incremental movement of affected acres toward desired vegetative conditions. The entire Project area occurs within a watershed identified as a moderate priority for active vegetative and wildlife habitat restoration.

- **Forest-wide TROB01**[2]—On a decadal basis: a) Harvest timber, other than by salvage, on at least 90,000 acres, b) Reforest at least 20,000 acres, and c) Complete timber stand improvement activities on at least 55,000 acres.
    - The Proposed Action would harvest an estimated 6–8 million board feet (MMBF) of wood products from about 4,425 acres and thin noncommercial-size trees on 3,928 acres. Wood products, as well as employment opportunities associated with this alternative, would help sustain economies in Boise County and adjacent counties.
- **Forest-wide TROB02**—On a decadal basis, make available an estimated 282 MMBF of timber, which will contribute to Allowable Sale Quantity (ASQ).

The Proposed Action would make available an estimated 6–8 MMBF of wood products to contribute to the ASQ.

The entire project area falls within Forest Plan MA 07: North Fork Boise River. MA 07 includes several objectives pertaining to restoration of watershed conditions, fish habitat and recreation management. The Proposed Action has been designed to contribute to the accomplishment of the following MA 07 objectives:

- **MA 07 Objective 0726—**Restore fish habitat by reducing sediment delivery and repairing instream structures, with emphasis on Pikes Fork, Beaver Creek, and Edna Creek.

The Proposed Action would decommission about 22.8 miles of designated NFS roads and 8.1 miles of unauthorized routes, relocate about 1.2 miles of RCA road, and repair/replace 23 aquatic organism barrier culverts. The miles of routes designated for public motorized use by about 5.3 miles.

- **MA 07 Objective 0727—**Initiate restoration of watershed conditions and fish habitat in the Pikes Fork and Upper Bear River subwatersheds to help strengthen local bull trout populations.

The Proposed Action would decommission about 22.8 miles of designated NFS roads and 8.1 miles of unauthorized routes, relocate about 1.2 miles of RCA road, and repair/replace 23 aquatic organism barrier culverts. The miles of routes designated for public motorized use by about 5.3 miles.

- **MA 07 Objective 0731—**In the Beaver-Edna, Pikes Fork, Upper Crooked River, and Lower Crooked River subwatersheds, existing roads should be reconstructed with effective cross-drain spacing and drain dip locations to route water into slope filtration rather than to first-order streams in order to reduce sediment delivery to bull trout habitat.
    - The Proposed Action would complete maintenance on about 57 miles of road to facilitate timber harvest activities.

[2] This objective contributes to the accomplishment of VEOB08 and FMOB04.

- **MA 07 Objective 0739**—Emphasize non-motorized uses on the Banner Ridge, Elkhorn, Summit, Skyline, and Beaver Creek groomed cross-country ski trails to maintain this winter recreation opportunity.
  - The Proposed Action would authorize approximately 60.2 miles of nonmotorized over snow trail associated with the existing Idaho Department of Parks and Recreation (IDPR) Park and Ski system. About 29.2 miles of these trails are groomed and 31 miles are ungroomed and managed under agreement between the Forest Service and IDPR.
- **MA 07 Objective 0751**—Use mechanical and prescribed fire treatments to thin over-stocked Douglas-fir and ponderosa pine stands. Emphasize treatments in stands that are at high risk for Douglas-fir bark beetle and Douglas-fir mistletoe by establishing and or promoting ponderosa pine.

The Proposed Action would treat a total of 13, 428 acres with prescribed fire treatments.

- **MA 07 Objective 0754**—Existing noxious weed infestations should be treated on landings, skid trails, and helibases in the project area before timber harvest activities begin in the Meadow-French, Rabbit Creek, Hungarian-Beaver, Beaver-Edna, and Pikes Fork subwatersheds.

The Proposed Action would require pre-treatment of noxious weeds infestations are present in areas proposed for areas of ground disturbing activities, such as skid trails, landings, and temporary roads, where avoidance of weed infestations would not be practicable (Design Feature IS-1).

Additionally, one Management Prescription Category applies to this project area: MPC 5.1[3]. MPC direction provides the framework for the types of tools (e.g., mechanical vegetation treatments, prescribed fire) that may be used to accomplish overall management objectives. This MPC prescription applies to lands that are predominantly (>50%) forested. Emphasis is on restoring or maintaining vegetation within desired conditions in order to provide a diversity of habitats, reduce risk from disturbance events, and provide sustainable resources for human use. Commodity production is an outcome of restoring or maintaining the resilience/resistance of forested vegetation to disturbance events; achievement of timber growth and yield is not the primary purpose. The full range of treatment activities may be used. Restoration occurs through management activities and succession. Combinations of mechanical and fire treatments are used to restore forested areas while maintaining or improving resources such as soils, water quality, fish and wildlife habitat, and recreation settings. The risk of temporary and short-term degradation to the environment is minimized, but impacts may occur within acceptable limits (i.e., consistent with Forest Plan standards and guidelines) as resources are managed to achieve long-term goals and objectives.

[3] MPC 5.1 includes the majority of active restoration areas that fall within the lands identified as suited timberlands on the Boise National Forest; MPC 5.1 encompasses about 904,000 total acres. The acres of MPC 5.1 within the project area represent about 1.7% of the total MPC 5.1 acres on the Forest.

1.8 REGULATORY REQUIREMENTS AND REQUIRED COORDINATION

As part of the analysis for this project, the IDT evaluated various alternatives under the laws, regulations, and requirements relating to federal natural resource management. The IDT developed and incorporated the design features presented in Chapter 2 to ensure that these requirements would be met. The following paragraphs summarize the results of the analysis for those concerns most often noted. Additional detail can be found in Chapters 2 and 3 and/or the project record.

1.8.1 Clean Air Act

Air quality in the Project area and the surrounding airshed would be temporarily degraded by using prescribed fire and burning of handpiles on acres on 13,428 acres; dust; and vehicle emissions. However, activities associated with the action alternatives would not noticeably affect air quality in the vicinity of any of the sensitive areas or population centers, or in any Class I Areas. Emission levels would remain below EPA-established standards (section 3.4).

1.8.2 Clean Water Act

The objective of the Clean Water Act (CWA) is to "…restore and maintain the chemical, physical, and biological integrity of the nation's waters." One of the Act's goals is to "…provide for the protection and propagation of fish, shellfish, and wildlife" and provide for "…recreation in and on the water" (33 U.S.C. 466 et seq., Title I, Section 101).

Proper application of incorporated design features would be expected to decrease the likelihood of sediment delivery to streams in quantities sufficient to impact water quality. As identified in section 3.9, all applicable Clean Water Act (CWA) 401, 402, and 404 permits will be obtained from EPA or the State of Idaho prior to implementation of applicable management activities. The watershed condition indicators (WCIs) were evaluated for the hydrology and fisheries analysis, which can be used as surrogates for the chemical, physical, and biologic integrity of the waterbodies that could be impacted by implementing the Project. This analysis indicated all of the action alternatives would maintain the existing functionalities with the exception of Physical Barrier WCI which would have an improvement. Additionally, the action alternatives would result in measurable improvement in the Sediment/Turbidity WCI in the long-term (15+ years), trending the WCI toward the next functionality class (sections 3.8 and 3.9). Implementing this project would be consistent with the Clean Water Act.

1.8.3 Endangered Species Act

The Endangered Species Act (ESA) (16 USC 35 §§1531 et seq. 1988) provides for the protection and conservation of threatened and endangered plants and animal species. The action alternatives were assessed to determine the effects on threatened and endangered plant and animal species. A project specific ESA list was generated from the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) web site (http://ecos.fws.gov/ipac) and is available in the project record. The current list identifies 2 threatened species (Canada lynx [*Lynx canadensis*] and bull trout) and

1 candidate species (whitebark pine [*Pinus albicaulis*]) (USDI FWS 2015). In addition, designated critical habitat for bull trout occurs within the analysis area. All alternatives were assessed to determine their effects on threatened and endangered plant and animal species.

The wildlife technical report and biological assessment and evaluation (BE) prepared for this project indicates that implementing any of the action alternatives would result in a "may affect but not likely to adversely affect" determination for Canada lynx (section 3.5).

No threatened or endangered plant species were identified on the project specific ESA list. However, there is one candidate plant speices, whitebark pine, on the list. The botany technical report and BE prepared for this project indicated that implementation of any of the action alternatives would result in a "may impact individuals, but will not likely contribute to a trend toward Federal Listing or loss of viability to the populations or species" determination for whitebark pine (section 3.11).

The fisheries technical report and BA/BE prepared for this project indicates that implementation of any of the action alternatives would result in a "likely to adversely affect" bull trout and bull trout designated critical habitat (section 3.8.4)

A final Biological Assessment (BA) consistent with this act is being prepared and will be submitted to USFWS. Consultation with USFWS will be completed prior to a decision on this project.

1.8.4 Idaho Forest Practices Act

Rules pertaining to the Idaho Forest Practices Act would be implemented. In addition, logging operations, road-related activities, and thinning operations would be supervised and monitored on the ground to ensure compliance with contract provisions.

1.8.5 Executive Order 13186 and the Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) decreed that all migratory birds and their parts (including eggs, nests, and feathers) were fully protected. Under the MBTA, taking, killing, or possessing migratory birds is unlawful. Take is defined in the MBTA to include any attempt at hunting, pursuing, wounding, killing, possessing, or transporting, by any means or in any manner, any migratory bird, nest, egg, or part thereof. A migratory bird is any species or family of birds that live, reproduce, or migrate within or across international borders at some point during their annual life cycle. The original intent of the act was to put an end to the commercial trade in birds and their feathers, an activity that had wreaked havoc on the populations of many native bird species. On January 17, 2001, President William Clinton signed EO 13186, directing executive departments and agencies to take certain actions to further implement the MBTA (FR Vol. 66, No.11, January 17, 2001). The Bald and Golden Eagle Protection Act affords additional protection to all bald and golden eagles.

In direct response to the executive order, the Forest Service and USFWS have entered into a memorandum of understanding (MOU) to promote the conservation of migratory birds (USDA Forest Service and USDI FWS 2008). One of the steps outlined for the Forest Service in the MOU is applicable to this analysis "Within the NEPA process,

evaluate the effects of Agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors." The Forest Service additionally agreed , to the extent practicable, to evaluate and balance benefits against adverse effects, to pursue opportunities to restore or enhance migratory bird habitat, and to consider approaches for minimizing take that is incidental to otherwise lawful activities.

All action alternatives proposed would comply with the MBTA, and the USFWS Director's Order #131 related to the applicability of the MBTA to federal agencies and requirements for permits for "take." In addition, this project complies with EO 13186 because the analysis meets agency obligations as defined in the MOU (USDA Forest Service and USDI FWS 2008) designed to complement EO 13186. However, "unintentional take" of individuals may occur during proposed activities. Migratory bird species are analyzed and discussed in the wildlife technical report, with supporting information provided in the project record. If new requirements or direction result from subsequent interagency memorandums of understanding pursuant to EO 13186, this Project would be reevaluated to ensure consistency.

1.8.6 National Forest Management Act

1.8.6.1 Forest Plan Consistency

The National Forest Management Act (NFMA) requires that projects and activities be consistent with the governing Forest Plan (16 USC 1604 (i)). The IDT initially evaluated existing resource conditions within the Becker Project area for vegetation, watershed, fisheries, wildlife, recreation, range, transportation, and fuel resources, considering each in relation to the desired conditions for these resources established in the Forest Plan. The Purpose and Need and the Proposed Action were developed in response to this evaluation (USDA Forest Service 2010a). Implementing any of the action alternatives has been determined to be consistent with the goals, objectives, standards, and guidelines in the 2010 Forest Plan (Forest Plan Consistency Table available in the project record).

1.8.6.2 Diversity Requirements

The NFMA requires the Secretary of Agriculture to specify "guidelines for land management plans developed to achieve the goals of the Program which provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives"
(16 USC § 1604(g)(3)(B)).

Because of the complexity and dynamic nature of the ecosystems managed by the Forest, no precise standards or techniques exist that guarantee planning will provide for sustainability and diversity of plant and animal species. The Committee of Scientists that advised the Forest Service on the 1982 NFMA regulations stated, "It is impossible to write specific regulations to 'provide for' diversity" and "there remains a great deal of room for honest debate on the translation of policy into management planning requirements and into management programs" (44 FR 26,600-01 and 26,608).

Moreover, the dynamic relationship between habitat conditions and species persistence is not yet well understood for many species. Data on climatic conditions, geologic events,

and other nonhabitat factors are limited, and because the understanding of complex relationships is also limited, a reliable model of the impacts of these factors is not available. Therefore, for most species, the effects analysis relies primarily on the judgments of experts regarding the projected effects the alternatives may have on habitat and individuals over time.

1.8.6.3 Timber Management

1. Suitability for Timber Production: No timber harvest, other than salvage sales or sales to protect other multiple-use values, shall occur on lands not suited for timber production (16 USC 1604(k))—Areas proposed for commercial harvest under the Proposed Action fall within Forest Plan MCP 5.1. All lands identified for commercial treatments under the Proposed Action have been determined to be suited for timber production (see sections 3.2 [Forested Vegetation], 3.9 [Hydrology], and 3.10 [Soils], as well as each associated technical report located in the project record).
2. Timber Harvest on NFS Lands (16 USC 1604(g)(3)(E)): A Responsible Official may authorize site-specific projects and activities to harvest timber on NFS lands only where:
   a. *Soil, slope, or other watershed conditions will not be irreversibly damaged (16 USC 1604(g)(3)(E)(i))*—All areas proposed for treatment are consistent with this requirement (see section 3.9 [Soils] as well as the associated technical reports available in the project record).
   b. *There is assurance that the lands can be adequately restocked within five years after final regeneration harvest (16 USC 1604(g)(3)(E)(ii))*—No regeneration harvest is proposed under the Proposed Action or any other action alternative.
   c. *Protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat (16 USC 1604(g)(3)(E)(iii))*—Proposed activities under the action alternatives will not seriously or adversely affect water conditions or fish habitat (sections 3.9 [Hydrology] and 3.8 [Fisheries] and the associated technical reports in the project record).
   d. *The harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber (16 USC 1604(g)(3)(E)(iv))*—The harvest system proposed under each action alternative was identified as the system that best accomplished the multiple resource objectives for which timber will be an outcome of these restoration efforts (section 1.4.4, Purpose and Need 4). The dollar return between alternatives varies depending on how the resource issues are addressed (i.e., the acres of vegetation management treatment, logging systems used, and road management activities).
3. Clearcutting and Even-aged Management (16 USC 1604(g)(3)(F)): Ensure that clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber will be used as a cutting method on NFS lands only where:

a. *For clearcutting, it is determined to be the optimum method, and for other such cuts it is determined to be appropriate, to meet the objectives and requirements of the relevant land management plan (16 USC 1604(g)(3)(F)(i))*—No clearcuts are proposed under any of the action alternatives (section 2.4).

b. *The interdisciplinary review as determined by the Secretary has been completed and the potential environmental, biological, esthetic, engineering, and economic impacts on each advertised sale area have been assessed, as well as the consistency of the sale with the multiple use of the general area (16 USC 1604(g)(3)(F)(ii))*—Chapter 3 discloses the potential environmental and biological, scenic (section 3.14), engineering (section 3.5), and economic (section 3.15) impacts on areas to be treated. The project has also been determined to be consistent with the multiple-use objectives for this area identified in the 2010 Forest Plan (see section 1.7, as well as the Forest Plan Consistency Table available in the project record).

c. *Cut blocks, patches, or strips are shaped and blended to the extent practicable with the natural terrain (16 USC 1604(g)(3)(F)(iii))*—Disclosures in the Visual Resources section (section 3.14) of Chapter 3 indicate that implementation of the action alternatives will meet the visual quality objectives for the area.

d. *Cuts are carried out according to the maximum size limit requirements for areas to be cut during one harvest operation, provided, that such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm (Forest Service Manual [FSM] R1 supplement 2400-2001-2 2471.1, 16 USC 1604(g)(3)(F)(iv))*—All treatments meet 2010 Forest Plan standard requirements (i.e., TRST02 and TRST03) for maximum size openings (see the Forest Plan Consistency Table available in the project record).

e. *Such cuts are carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources, and the regeneration of the timber resource (16 USC 1604(g)(3)(F)(v))*—Chapter 3 discloses that activities to be implemented in this decision are consistent with 2010 Forest Plan requirements for protection of soil (section 3.9), fish (section3.8), hydrology (section 3.7), wildlife (section 3.5), recreation (section 3.7), and esthetic (section 3.15) resources, and the regeneration of the timber resource (section 3.2). Related findings are documented in the Forest Plan Consistency Table (available in the project record).

4. <u>Stands of trees are harvested according to requirements for culmination of mean annual increment of growth (16 USC 1604(m))</u>—This requirement applies only to final regeneration harvest of even-aged stands on lands identified as suitable for timber production and where timber production is the primary purpose for the harvest. None of the action alternatives propose final regeneration harvest of even-aged managed stands on any lands, including those identified as suitable for timber production and where timber production is the primary purpose for the harvest (refer to section 3.2).

5. Construction of temporary roadways in connection with timber contracts, and other permits or leases: Unless the necessity for a permanent road is set forth in the forest development road system plan, any road constructed on land of the NFS in connection with a timber contract or other permit or lease shall be designed with the goal of reestablishing vegetative cover on the roadway and areas where the vegetative cover has been disturbed by the construction of the road, within ten years after the termination of the contract, permit, or lease either through artificial or natural means. Such action shall be taken unless it is later determined that the road is needed for use as a part of the National Forest Transportation System (16 USC 1608(b))—As disclosed in Chapter 3, all temporary roads proposed have been designed with the goal of reestablishing vegetative cover on the roadway and areas where the vegetative cover has been disturbed by the construction of the road within 10 years after the termination of the contract associated with the commercial and noncommercial vegetation activities (see sections 3.6 (Transportation) and 3.10 (Soil Resources) and the associated technical reports in the project record).
6. Standards of roadway construction: Roads constructed on NFS lands shall be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources (16 USC 1608(c))—Roads proposed to be authorized or constructed on NFS lands under the action alternatives have been designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources (see Chapter 3 for disclosure of effects by resource and the associated technical reports available in the project record and the TAP [(USDA Forest Service 2014b] prepared for this Project).

1.8.7 National Historic Preservation Act

The National Historic Preservation Act (NHPA) requires federal agencies to consider the effects of their activities and programs on historic properties. Federal activities and programs are defined as “undertakings” by the 36 CFR §800 regulations implementing NHPA Section 106. Historic properties are significant cultural resources that are included in or eligible for inclusion in the National Register of Historic Places.

None of the action alternatives would be expected to have any direct or indirect effects on historically significant sites. In addition, the District would include contract provisions that would halt all degrading activities to prevent adverse impacts to any unknown sites discovered during implementation. Any of the action alternatives would be determined to have “No Adverse Effect” to historic resources. Concurrence from the Idaho State Historic Preservation Officer (SHPO) will be obtained before a decision on this project is made. The cultural resource technical report is available in the project record.

1.8.8 Idaho Stream Alterations Act and Section 404 Permit

The action alternatives would adhere to the requirements of the Idaho Stream Alterations Act and the 404 Permit Process of the U.S. Army Corps of Engineers.

1.8.9 Floodplain Management (Executive Order 11988)

Executive Order 11988 would be met since this project would not impact floodplains in the Project area and therefore would not increase flood hazard (section 3.9 and the associated technical report available in the project record).

1.8.10 Protection of Wetlands (Executive Order 11990)

This project is consistent with Executive Order 11990 since the action alternatives would have no adverse impact to wetlands in the Project area (section 3.9 and the associated technical report available in the project record).

1.8.11 Facilitation of Hunting Heritage and Wildlife Conservation (Executive Order 13443)

On August 16, 2007, President George Bush signed an executive order directing appropriate federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat (FR Vol. 72, No. 160, August 20, 2007).

The Project area provides habitat for several game species, including deer (*Cervidae* spp.), elk (*Cervus canadensis*), black bear (*Ursus americanus*), mountain lion (*Felis concolor*), wolf (*Canis lupus*), and forest grouse. The effects to wolves and elk are considered in section 3.5. Mitigation has been included to minimize and avoid impacts to these species (section 2.4.7, “Design Features”) so that habitat is provided to support Idaho Department of Fish and Game’s population objectives. Mountain lion presence is largely tied to the presence of deer, and maintaining deer habitat is the primary consideration for this species.

Black bears are habitat generalists. While they prefer mixed deciduous-coniferous forests with thick understories, they will utilize a variety of habitats. Special habitat features include fallen logs and debris, and standing hollow trees that provide denning sites for bears. Special habitat features that may provide suitable denning sites would be maintained during treatments proposed under Alternatives B and C.

Dusky grouse (Dendragapus obscurus), spruce grouse (Falcipennis canadensis), and ruffed grouse (Bonasa umbellus) are all present in the Project area. Habitat use and needs vary between the species. Dusky grouse are found in open coniferous forests, often with a fir component. Douglas-fir provides day roosts, and the buds and needles are an important winter food. Subalpine fir (Abies lasiocarpa), with its dense foliage, is often selected as a night roost. Ruffed grouse utilize dense forests with some deciduous trees or shrubs. Aspen is an important component of habitat. Young forests provide optimum habitat for the species. Spruce grouse occupy coniferous forests that include short-needled trees (lodgepole pine, spruce-fir). Vaccinium species (huckleberry) are a common component of spruce grouse habitats. Key features for spruce grouse include forest structure that provides cover (i.e., lodgepole pine prior to self-pruning). All three grouse species are associated with forested habitats. Habitat for all three species would be maintained in the Project area. Aspen enhancements included in prescriptions would improve habitat conditions, particularly for ruffed grouse, which is often associated with this deciduous tree.

1.8.12 Prime Farmland, Rangeland, and Forest Land (USDA Regulation 9500-3)

No prime farmlands, rangelands, or forest lands are located on the Boise National Forest (USDA Forest Service 2003b, p. 3-979). Therefore, no effects to prime farmland, rangeland, or forest lands would occur with implementation of any action alternative.

1.8.13 Environmental Justice (Executive Order 12898)

EO 12898 (59 FR 7629, 1994) directs federal agencies to identify and address, as appropriate, any disproportionately high and adverse human health or environmental effects on minority populations and low income populations. Based upon the analysis disclosed in this document, the proposed alternatives would not result in unequal protection of any part of the population in Boise County in Idaho, and comply with EO 12898.

1.8.14 Travel Management Rule

Each of the action alternatives would modified the designated transportation system in the project area (Table 2-6). The Proposed Action includes proposals to close 28.1 miles of NFS roads to motorized use; reconstruct 1.8 miles of ML 1 road to ML 2 (open to public motorized use); reconstruct 3.0 miles of ML 1 road to ML 2 (closed to public motorized use); construct 1.2 miles of ML 2 road (open to public motorized use); add 2.4 miles of unauthorized routes to the transportation system as ML 1 roads and 1.9 miles as ML 2 (closed to public use); add 0.3 miles of unauthorized routes to the transportation system as ML 2 roads (open to public motorized use); decommission 22.8 miles of NFS roads; decommission 8.1 miles from 16 unauthorized routes; convert 2.1 miles of NFS roads to motorized trail; and convert 5.1 miles of NFS roads to nonmotorized trail (see Table 1-5). As summarized below, the Responsible Official has considered the potential effects of trail designations with the objective of minimizing those effects as required under 36 CFR §212.55(b).

Under 36 CFR 212.54, the Travel Rule provides for revising the Motorized Vehicle Use Map (MVUM). The following must occur to complete revisions:

- 36 CFR 212.52(a) requires a public involvement process to revise designations of NFS roads, trails, and areas for motor vehicle use on NFS lands
- 36 CFR 212.53 requires coordination with federal, State, County, and other local government entities and tribal governments when designating NFS roads, trails, and areas on NFS lands
- 36 CFR 212.55(a) provides general criteria for designation of roads, trails, and areas
- 36 CFR 212.55(b) provides specific criteria for designating trails and areas

Specifically, for designating trails and areas, 36 CFR §212.55(b) states that "…the Responsible Official shall consider effects on the following, with the objective of minimizing:

1. Damage to soil, watershed, vegetation, and other forest resources;
2. Harassment of wildlife and significant disruption of wildlife habitat;

3. Conflicts between motor vehicle use and existing or proposed recreation uses of NFS lands or neighboring Federal lands; and
4. Conflicts among different classes of motor vehicle uses of NFS lands or neighboring Federal lands.

In addition, the responsible official shall consider:

1. Compatibility of motor vehicle use with existing conditions in populated areas, taking into account sound, emissions, and other factors."

Minimization of impacts under 36 CFR 212.55(b) suggests that the Forest has a designated system to meet transportation and recreation needs, while minimizing the impacts to other resources from that designated system or area. However, minimizing effects does not mean eliminating all effects. To eliminate all effects to zero would mean to eliminate all trails and areas.

Also, minimizing effects to the extent technically feasible might not be practicable[4] given financial limitations. For example, it may be technically feasible to construct a costly engineering solution, such as a 5-mile tunnel to avoid all impacts to surface resources. A transportation analysis would indicate this engineering solution is possible, but this solution would not be financially feasible. Similarly, constructing multiple 1.0-mile-long bridges above ground would also be technically feasible, but not practicable.

Thus, the Responsible Official determined that designating trails and areas consistent with Forest Plan direction would provide the best mechanism for determining when the Forest had practicably "minimized effects" on designated trails and/or areas over technical "feasibility." The Forest Plan was revised in 2003 and amended in 2010 to facilitate implementation of the 2010 Plan Scale Wildlife Conservation Strategy for the Forested Biological Community (USDA Forest Service 2003a, 2010a). The Forest Plan was designed to provide a variety of multiple uses while providing clean water, protections for 'at-risk' ecosystems, proper ecosystem functioning, and a broad spectrum of recreational uses (USDA Forest Service 2003b, pp. 26–28; USDA Forest Service 2010b, pp. 4–5). The 2003 Forest Plan, as amended in 2010, underwent extensive environmental analysis and public process and was determined to be consistent with law, regulation, and policy (USDA Forest Service 2003b, pp. 35–39; USDA Forest Service 2010b, pp. 35-38).

The Forest Plan identifies specific 'standards' and 'guidelines' that were developed to avoid or minimize effects to resources. The Responsible Official has determined that implementing the Proposed Action would be consistent with the goals, objectives, standards, and guidelines in the 2010 Forest Plan (Forest Plan Consistency Table available in the project record). As disclosed in detail in Chapter 3 of this document and summarized in Chapter 1, proposed activities under the action alternatives have also been determined to be in compliance with laws, regulations, and policy applicable to management of NFS lands.

[4] The term *practicable* means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose. USDA EPA 2003.

The project record documents provide the detailed disclosure supporting the Responsible Official's determination of compliance with this provision of the Travel Management Rule. The "Becker Integrated Project Summary" includes discussions as to other options considered by the Responsible Official as to minimizing the effects to the extent practicable while meeting the Purpose and Need.

1.8.15 Other Disclosures

No Research Natural Areas (RNAs), Wild and Scenic Rivers, Idaho Roadless Areas, protected caves, or parklands are located within the Project area, and consequently, no effects to any of these resources will occur. These resources will not be discussed further in this document.

The existing body of national guidance and direction for managing National Forests remains in effect. The Forest Plan as amended in 2010 contributes to the Forest Service Strategic Plan for FY 2007–2012 (GPRA 2007). The Becker Integrated Project implements the Forest Plan and therefore also contributes to the Forest Service Strategic Plan goals.

1.8.15.1 Consultation with Other Federal or State Agency or Local Government

Contact, review, and involvement with other federal and State agencies indicate no major conflicts between the activities to be implemented under the Proposed Action and the goals and objectives of other federal, State, or local governmental entities. Chapter 4 summarizes the involvement that has occurred with other federal and State agencies and local governments.

Section 1.7 also identifies other federal, State, or local approvals/permits potentially applicable to all action alternatives. Finally, as described in section 1.7, the proposed restoration activities under the action alternatives have been designed to further the achievement of goals and objectives in the Forest Plan, as amended in 2010. The WCS that was integrated into the Forest Plan in 2010 has been designed to complement the Idaho Department of Fish and Game's *Idaho Comprehensive Wildlife Conservation Strategy* (IDFG 2005; USDA Forest Service 2010c, 2010 ROD for Forest Plan Amendments).

1.8.15.2 Best Available Science

The conclusions summarized in this EIS are based on a review of the project record, which considers relevant scientific information and responsible opposing views, where raised by internal or external sources, and the acknowledgement of incomplete or unavailable information, scientific uncertainty, and/or risk, where pertinent to the decision being made. Refer to the project record for Agency responses to comments received during scoping. Also see the Literature Cited section in this EIS and each project resource technical report in the project record; EIS Chapter 3 introduction; and the 2010 FEIS and technical reports supporting the 2010 Forest Plan amendments.

This document is tiered to the Final EIS and planning record for the 2003 Forest Plan. This document is also tiered to the Final Environmental Impact Statement Supporting Forest Plan Amendments to Integrate the Boise National Forest WCS, Phase 1: Forested

Biological Community (USDA Forest Service 2010b) and the 2010 Forest Plan as amended (USDA Forest Service 2010a). This documentation includes monitoring reports. Analyses from the 2003 Final EIS and the 2010 FEIS have been referenced rather than repeated in some instances. Analyses pertaining to the Final EIS for the 2003 Forest Plan and the FEIS for the 2010 amendments to the Forest Plan are contained in the planning record located at the Forest Supervisor's Office in Boise, Idaho (USDA Forest Service 2003a, 2010a). Unless specifically noted otherwise, detailed information that supports the analyses presented in this document is contained in the project planning record located at the Idaho City Ranger District Office.

1.9 PUBLIC INVOLVEMENT

The Idaho City Ranger District encouraged extensive public involvement throughout the planning process leading to this document. This project has been listed on the Forest Schedule of Proposed Actions (SOPA) since January 2006. In May 2014, the Idaho City Ranger District initiated public scoping on the Project. The Proposed Action was posted on the Forest web site on the project Web page[5] on May 1, 2014. The scoping package was mailed to 138 individuals, agencies, and/or groups on May 2, 2014. Additionally, a scoping email bulletin was sent to 57 individuals on May 7, 2014, and a press release was printed in the *Idaho Statesman* on May 7, 2014. Public meetings were held on May 20, 2014, in Idaho City and on May 21, 2014, in Boise. A total of 23 parties responded to the May 2014 scoping effort. The project record contains all comments received during the scoping period and the Forest Service responses to the comments.

A Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on August 8, 2014. The NOI described the Proposed Action and invited comments for 30 days following publication. Public notification that the Forest will prepare an EIS for the project, publication of the NOI, and a request for additional public comment were mailed to 68 individuals, agencies, and/or groups and emailed to 93 individuals on August 11, 2014. A total of 64 parties responded to the NOI comment period. The project record contains all comments received during this public involvement period and the Forest Service responses.

1.10 TRIBAL NOTIFICATION/CONSULTATION

Shoshone-Paiute tribal representatives were presented with the project proposal at Wings and Roots meetings occurring on April 1, 2012; December 12, 2013; April 13, 2014; September 11, 2014; and November 13, 2014. The tribal council of the Shoshone-Bannock Tribes was mailed and emailed the project proposal on May 2, 2014. A letter was sent to the Shoshone-Bannock Tribes on August 12, 2014, to notify the tribal council that that Forest was going to prepare an EIS for the project, that the NOI was published in the Federal Register, and to request comments. In response to the notification and/or consultation processes described above, the tribes did not identify any adverse effects specifically associated with this project that would impact tribal interests or rights.

[5] http://www.fs.fed.us/nepa/fs-usda-pop.php/?project=18922

1.11 IDENTIFICATION OF ISSUES

Through the public involvement process, the public and interested agencies raised numerous concerns in response to the Proposed Action. The IDT identified issues that would drive alternative development and/or modifications to the Proposed Action sent out for scoping by reviewing written and verbal comments, input from Forest Service resource specialists, the Forest Plan, and comments from State and other federal agencies. The IDT evaluated these comments, using the following criteria, to determine whether the concern would be a major factor in the analysis process:

- Has the concern been addressed in a previous site-specific analysis, such as in a previous environmental impact statement or through legislative action?
- Is the concern relevant to and within the scope of the decision being made, and does it pertain directly to the Proposed Action?
- Can the concern be resolved through mitigation (avoiding, minimizing, rectifying, reducing, or eliminating the proposed impact, or compensating for it) in all alternatives?
- Can the issue be resolved through project design?

In addition to identification of the above issues, several commenters identified alternatives that they would like the Agency to consider.

1.11.1 Issues and/or Concerns and Alternative Development

Issues that are points of unresolved conflict with the Proposed Action (Alternative B) were used in developing alternatives to the Proposed Action. The Proposed Action was developed by the IDT and reviewed and approved by the Responsible Official prior to scoping. Eleven issues with unresolved conflicts with the Proposed Action were identified during internal/external scoping.

Issue 1: Tractor-jammer logging destroys ground cover, exposes mineral soil to erosion, and compacts soils for reduced adsorption and increased runoff. Logging systems that result in the lightest ecological impacts on the forest should be used (e.g., helicopter and cable or skyline systems).

The commenter summarized the concern as follows:

> *Where logging is appropriate, we believe that silvicultural techniques should have the lightest ecological impact on the forest. Because of concerns over sedimentation and soil compaction, the use of helicopters and cable or skyline systems is preferable to tractor-jammer logging. Ground hauling techniques destroy ground cover, expose mineral soil to erosion, and compact soils for reduced absorption and increased runoff. We suggest that all logs need to be removed by systems that carry the entire tree without dragging it and disturbing the soils.*

Issue 2: Opening roads/trails used by mountain bikers, hikers, and equestrians and staff access for log hauling and forest thinning will change the road/trail surface and will remove existing vegetation within the road prisms, changing their overall character. These changes will impact the quality of the recreational experience for the users of these trails.

The commenter summarized the concern as follows:

> *It looks like road/trails that are used by mountain bikers, hikers and equestrians and staff access will be reopened for log hauling purposes on forest thinning. This will change the road/trail surface. We expect that the numerous water dips will be bladed flat and brush will be trimmed back and trees will be cut down for large truck access. Also some of the roads that are slated for temporary reconstruction or decommissioning will need to be accessed on old roads that have nice single-track trails already established on them. Many of these trails have fairly large trees growing on the old bed so we are concerned if they are damaged and changed. We would like to know which roads/trails you plan to use for access. We would also like to know what decommissioning methods will be used in the non-motorized trail system. The goal for reestablishing non-motorized trails is to create a meandering/rolling single-track trail on the old road bed instead straight line completely flat trail.*

Issue 3: Construction of new roads, including temporary roads, is not appropriate in already heavily roaded or degraded ecosystems.

The commenter summarized the concern as follows:

> *… the concept of "Temporary Roads," they are not appropriate in already heavily roaded and degraded ecosystems. For reference, see Potyondy, J.P., G.F. Cole, and W.F. Megahan. 1991. A procedure for estimating sediment yields from forested watersheds. Pages 12-46 to 12-54 In Proceedings: Fifth Federal Interagency Sedimentation Conference. Federal Energy Regulatory Commission, Washington, D.C. In fact, according to their research, over a seven-year period, 77% of soil loss occurs within the first two years of road construction. Therefore the impacts from road construction, even temporary ones, are significant and have very real potential to significantly impact fisheries habitat.*

Issue 4: Removing trees greater than 18 inches dbh, unless there are site-specific exceptions, may impact the retention and/or requirement of old forest habitat components such as snags, down trees, and understory vegetation.

The commenter summarized the concern as follows:

> *The large tree component should be retained to the greatest extent possible. Unless there are site-specific exceptions, we recommend leaving all trees (live or dead) over 18 inches in diameter. … It is unclear whether or not the project proposes to log unverified, tentatively identified or potential old growth. … If any cutting is proposed within old growth, the forest should ensure that components that contribute to the old growth character be protected in any prescriptions, including but not limited to snags, down trees, understory vegetation, etc.*

Issue 5: If the public access roads to the Skyline (NFS road 362F) and Stargaze (NFS road 394B) yurt summer parking spots are closed and the public has to walk in 1.5 to 2.0 miles from Highway 21, summer use will drop dramatically…The Idaho Department of Parks and Recreation recommends that seasonal closure to the Skyline yurt should be removed on NFS road 366F to allow motor vehicle access to the yurt in the spring, summer, and fall.

The commenters summarized the concern as follows:

Commenter 1:

The public access roads to the Skyline (Road 362F) and Stargaze (Road 394B) yurt summer parking spots will be closed. Summer use will drop dramatically if the public has to walk in 1.5 to 2 miles from Highway 21. It is also a 600 to 800 foot climb to get to the yurts from the highway. The yurts were specifically located for good views on high points. The biggest problem for summer users is water. It is nearly impossible to carry 5 to 10 gallons of water in to drink, bathe and wash dishes. The traditional summer users are not the backpacker types and are often senior citizens and young families. All of the yurts except Elkhorn were set up so the public can drive within a few hundred yards and park. A non-motorized access trail was then built so the users could walk in a short distance with their water and gear. We ask that these proposed access roads closures be open to the public as they have been in the past. It is interesting to note that the Elkhorn is the lowest use yurt in the summer and we think that is attributed the one mile hike in. … Historically the USFS staff allowed the public driving access to the Skyline yurt from when the snowfall allowed in the spring until Sept 15th each year. The Idaho City Ranger District then closed the gate to Road 366F next to the highway on Sept 15th. The Department recommends that season closure to the Skyline be removed on Road 366F to allow motor vehicle access to the yurt in the spring, summer and fall on Forest Road 366F.

Commenter 2:

Summer road to the yurts should remain open, as many families bring children with them to enjoy the backcountry and driving to the yurt is a must.

Commenter 3:

I am not in favor of closing road access to the area as that access makes the use of the forest and yurts in the area available to more people. There are many people that can only access the area via car or atv but they should be able to enjoy the forest as well as the people that can walk the longer distances.

Issue 6: Imposing a 50-inch width limit on proposed ATV trails does not consider the increased popularity of UTV vehicles. UTVs are not limited to utilitarian duties any longer. Most manufacturers produce popular sport versions. Most ATV users are migrating to UTV usage. The vast majority of UTVs produced have a 55- to 61-inch width. Failing to plan for UTVs is failing to plan for future usage.

The commenter summarized the concern as follows:

50" width limit on proposed atv trails does not take into account the increased popularity of UTV vehicles. UTV's are not limited to utilitarian duties any longer. Most manufacturers produce sport versions with high popularity. Most ATV users are migrating to UTV usage. The vast majority of UTV's produced have a 55-61 inch width. Failing to plan for UTV's is failing to plan for future usage. Extensive research and planning needs to be performed before spending tax dollars to build trails for a select group of people. Instead of constructing a trail system, roads should be left unmaintained and the USFS should work with area ATV/UTV groups to allow

those groups to build the trails on those roads that do not see high passenger vehicle use at no cost to the public.

Issue 7: New trails in the RCA will impact riparian function and process, particularly given the existing high road densities in the project area.

The commenter summarized the concern as follows:

… the designation of new motorized trails includes an additional 6.5 miles of trail within Riparian Conservation Areas (Scoping, Table 1-7*). We are concerned about the impact of new trails in the RCA, given the existing high road densities in the project area.*

Issue 8: Designation of a motorized trail that overlaps portions of the non-motorized trails to be authorized will result in user conflicts and reduce the quality of experience for the non-motorized users.

The commenter summarized the concern as follows:

We do not support converting old road 362E2 and 362G to an ATV trail because these roads connect into the summer non-motorized trail system.

Issue 9: Designation of the proposed motorized trail will not be consistent with wildlife and aquatic resource objectives.

The commenter summarized the concern as follows:

Commenter 1: (Idaho Department of Fish and Game follow-up meeting on July 17, 2014)

Transportation System and vulnerability to hunting mortality/disturbance – re-iterated correlation between open road density and hunting mortality – consistent with research/science. Greatest concern associated with calving/fawning season (May 1-June 30) and hunting seasons (Sept 1-Nov 30). Concur that effective seasonal road closure helps to mitigate those concerns (PA/Alts). Still some concern with the summer period with high open road density compounded by the added motor vehicle trails and the added traffic in areas otherwise experiencing less motor vehicle disturbances.

Commenter 2:

The EA should evaluate overall whether the increase in authorized motorized trails will be consistent with wildlife and aquatic objectives.

Issue 10: Use of the non-motorized trail system during the spring results in big game disturbance during critical periods (e.g., calving).

The commenter summarized the concern as follows:

Commenter 1:

IDFG did not express specific concerns regarding non-moto recreation (as identified for the motorized trail additions), but acknowledged it is a concern for the department, given the extent of the non-moto trail system, yurt use, etc. and would desire seeing that accounted for in the analysis of wildlife effects.

Issue 11: Winter travel restrictions should not be a part of this project...No evidence is shown that a need to designate nonmotorized areas exists.

The commenter summarized the concern as follows:

> *Winter travel restrictions should not be a part of this project. Subpart C of the travel management plan has not been finalized in the BNF. No evidence is shown that there is a need to designate nonmotorized areas. This aspect of the project should be eliminated*

1.11.2 Requested Alternatives

Commenters during scoping also suggested specific alternatives be considered.

Alternative 1: An alternative that emphasizes resource benefits/watershed improvement should be considered.

The commenter summarized the alternative as follows:

> *The scoping notice discusses three purposes of the project, which include; Purpose 1- restore vegetation conditions to meet desired future conditions, Purpose 2- improved watershed conditions, and Purpose 3- improve recreation opportunities. We generally support the purposes and encourage the USFS to include an alternative that emphasizes resource benefits/watershed improvements. The EA should also demonstrate how the project purposes would be met by the alternatives analyzed*

Alternative 2: An alternative that eliminates commercial logging (i.e., trees >8 inches DBH) and allows miscellaneous wood products only should be considered.

The commenter summarized the alternative as follows:

> *There is another reason for including this "benefit the local economy by logging" goal in most P&N statements in EAs and EISs for commercial timber sales. Most members of the public are unaware this is happening. By including "Support the local and regional economies by providing enhanced recreational opportunities, by utilizing wood products from the suited timber base, and by implementing forest restoration activities" you think you are legally justified when you exempt all alternatives to your Proposed Action that do not involve commercial logging. This especially damages the proper functioning of the Idaho City District when you display P&N statements that identify legitimate other resource restoration goals that commercial logging will never achieve and probably harm.*

Alternative 3: To maintain suitable water quality standards for sensitive fish species, an alternative that limits all logging, road construction, and trail development in RCAs should be considered.

The commenter summarized the alternative as follows:

> *To maintain suitable water quality standards for sensitive fish species, an alternative that limits all logging, road construction, and trail development in riparian conservation areas should be considered.*
>
> *We are particularly concerned about the proposal to conduct commercial logging within Riparian Conservation Areas (RCAs). Table 1 in the scoping notice indicates*

that up to 1,375 acres within RCAs will have trees logged and removed. While, we can appreciate the need to reduce stand densities in some specific circumstances, we are concerned by the broadscale application of riparian logging in this proposal and look forward to robust dialogue on this issue. We welcome the opportunity to visit this project in the field and look forward to seeing some of these areas firsthand to get a better sense of the forest's intent. In particular, we point to the Forest Plan requirement that you 1) demonstrate how the project will not degrade or retard attainment of properly functioning soil, water, riparian and aquatic desired conditions, and 2) that trees felled within RCAs must be left unless determined not to be necessary for soil, water, riparian or aquatic desired conditions. As such, the EA or EIS should have a thorough discussion about this issue, and should consider an alternative that avoids logging in these sensitive areas

Alternative 4: An alternative that maximizes the economic benefit for the local communities should be considered.

The commenter summarized the alternative as follows:

In developing additional alternatives, please develop an alternative that maximizes the economic benefit for the local communities. By maximizing the economic benefits, the Forest Service will ultimately reap the rewards through increased return on investment.

Infrastructure should be a key issue for this project. Without proper infrastructure the Forest Service will not be able to truly treat the current project area or future project areas, in order to keep the infrastructure viable, the Forest Service needs to consider commercially treating additional acreage. The Forest Service should also consider treating the identified acreage in a very aggressive manner to make this project more economically viable.

Alternative 5: An alternative that does not decommission any NFS or unauthorized roads and opens all roads to public motorized use, including unauthorized roads should be considered. Closed roads slow down search and rescue operations, discriminate against disabled and elderly, and slow down fire crews.

The commenter summarized the alternative as follows*:*

Commenter 1:

Road decisions are being made based on BNF "management needs". Roads are about more than just the USFS needing them for management uses. Closing 55 miles of roads does not improve public safety. Closing roads limits and slows down search and rescue operations. Closing roads discriminates against the disabled and elderly citizens. Closing roads slows down fire crew response times which allows fires to grow larger before suppression efforts can be started by ground crews. Closing roads eliminates dead timber removal through the public gathering firewood. Roads should be modified or rerouted to eliminate safety and erosion concerns. Effects on wildlife has not been proven and models have been shown to be inaccurate and biased. Current road systems should be modified and left open even if those roads are not maintained. Unauthorized" roads should be reevaluated and the need that necessitated those routes should be identified and included in this project.

Commenter #2:

> *I would also like to voice my opinion on the closing of our road system (open and usable now. I am 63 yrs. Of age and disabled. Most of my life I have used these roads to access points of interest to me, i.e. hunting, fishing spots, etc. The U.S. forest service has up to date closed down my access to approx.. 80% of my best and favorite spots. Places that took me 40-50 years to locate and take for granted. As I can no longer ride horses, bike, ski, or afford a dependable snow machine or hike, my ability to enjoy our mountain grandeur is in jeopardy. The closing of these roads still open at this time will almost certainly stop me and many injured people and people with disabilities the opportunity to enjoy our mountains and valleys, by closing off our only way of access. What at one time we took for granted, through age, injury or accident we find ourselves bound to the use of the motorized vehicle as our only way to access only a minor part of our great and wonderful land. Please don't take the rest of it away from us. For 63 yrs. I've lived in Idaho, I was born here. The fish and the white-headed woodpecker were here, they still are. The only thing different now is we're loosing our access to our land and we now have wolves and more people to share them with.*

Alternative 6: An alternative that connects the proposed ATV trail to the Banner Ridge Road (NFS road 385) should be considered.

The commenter summarized the alternative as follows*:*

Commenter 1:

> *This ATV trail system also needs to be connected to Banner Ridge Road 385. Connecting it to the road would offer even more of a looping opportunity and provide spatial separation between motorized and non-motorized recreationists.*

Commenter 2:

> *We do have one suggestion. Please consider connecting the ATV trail system to Banner Ridge Road 385. This would provide even more of a loop opportunity and a buffer between motorized and nonmotorized users*

1.12 DOCUMENT ORGANIZATION

This EIS consists of the following chapters and appendices:

- **Chapter 1—Purpose and Need**: Describes the relationship of this project to the Forest Plan; purpose and need for the action; the Proposed Action; decisions to be made; Forest Plan direction; regulatory requirements and required coordination; public involvement efforts; and identification of significant issues
- **Chapter 2—Alternatives**: Includes descriptions of alternatives considered but eliminated from detailed study; descriptions of the alternatives considered in detail; design features associated with the alternatives; and a comparative summary of the environmental consequences, activities, and outputs
- **Chapter 3—Affected Environment and Environmental Consequences**: Describes the existing conditions of the resources within the analysis area(s) and the environmental impacts of the alternatives on those resources

- **Chapter 4—Consultation and Coordination:** Includes a list of the primary preparers of this document; a summary of the scoping and public involvement efforts; a brief summary of the public comments received; changes made to the Proposed Action Report in preparation of the EIS; and a list of agencies, organizations, and individuals who received copies of the EIS and Record of Decision
- **Appendices**
  - **Appendix A—**Roads Table by Alternative
  - **Appendix B—**Cumulative Effects: Past, Present and Reasonably Foreseeable Actions
  - **Appendix C—**Riparian Conservation Area Tables and Schematics
  - **Appendix D—**Analysis for Detrimental Soil Disturbance and total Soil Resource Commitment
  - **Appendix E—**Detailed description of the Forest's Integrated Weed Management Program and Standard Operating Features for Application of Herbicides
  - **Appendix F—**Programmatic Culvert Replacement Biological Assessment and Biological Opinion Requirements
  - **Appendix G**—Detailed Schematics of Proposed Trailhead Facilities
  - **Appendix H**—Pikes Fork Trailhead Rehabilitation and Monitoring Plan
  - **Appendix I**—Project-specific Non-significant Amendment and Corrections (i.e., Errata) of Boise National Forest Land and Resource Management Plan
  - **Appendix J**—Maps

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CHAPTER 2 ALTERNATIVES

2.1 INTRODUCTION

This chapter describes in detail the No Action Alternative (Alternative A), the Proposed Action (Alternative B), and four additional action alternatives (Alternatives C–F). Also presented are alternatives that were considered but eliminated from detailed study and the reasons for their elimination. This chapter concludes with a comparative summary of the alternatives considered in detail (section 2.5). This comparison, combined with the more detailed disclosure in Chapter 3, provides the information necessary for the Responsible Official to make an informed choice between alternatives.

2.2 DEVELOPMENT OF ALTERNATIVES

Issues identified in Chapter 1 were used to generate a preliminary set of alternatives, which are divided into "alternatives considered but eliminated from detailed study" and "alternatives considered in detail". Both sets of alternatives are included in the reasonable range of alternatives.

The Proposed Action (PA) was developed by the IDT and was reviewed and approved by the Responsible Official prior to scoping. As disclosed in Chapter 1 of this document, 11 issues with the PA were identified during internal/external scoping, and commenters requested consideration of an additional 11 alternatives to all or portions of the PA (section 1.11.1).

2.3 ALTERNATIVES ELIMINATED FROM DETAILED STUDY

In addition to the alternatives evaluated in detail, other alternatives were considered by the IDT in response to concerns generated from internal and external scoping of the PA. The alternatives that were considered but not studied in detail are briefly described in this section; the rationale for their elimination from detailed study is provided.

2.3.1 Eliminate commercial logging (i.e., trees greater than 8 inches diameter at breast height) other than miscellaneous wood products

The commenter summarized the alternative as follows:

There is another reason for including this "benefit the local economy by logging" goal in most P&N statements in EAs and EISs for commercial timber sales. Most members of the public are unaware this is happening. By including "Support the local and regional economies by providing enhanced recreational opportunities, by utilizing wood products from the suited timber base, and by implementing forest restoration activities" you think you are legally justified when you exempt all alternatives to your Proposed Action that do not involve commercial logging. This especially damages the proper functioning of the Idaho City District when you display P&N statements that identify legitimate other resource restoration goals that commercial logging will never achieve and probably harm.

This alternative was dropped from detailed study because of the following rationale:

- This alternative would not meet P&N 1 (restore low- to mid-elevation forests). While the Council on Environmental Quality (CEQ) regulations do not specifically define what a "reasonable" alternative is, it is generally understood to mean those that are technically and economically feasible project alternatives that would satisfy the primary objectives of the project defined in the Purpose and Need statement. In this case, to accomplish Purpose and Need #1, both commercial and noncommercial vegetation management (i.e., timber harvest) would be required to restore low-to mid-elevation forests in the project area.

  The majority of the project area falls within MPC 5.1 under the Forest Plan. This management prescription applies to lands that are predominantly (>50percent) forested. Emphasis is on restoring or maintain vegetation within the desired conditions in order to provide a diversity of wildlife habitats, reduce risk from disturbance events, and provide sustainable resources for human use. Not providing for opportunities for commodity production as an outcome of restoring or maintaining the resilience/resistance of forested vegetation within this allocation unit, when it can accomplish restoration objectives while meeting other resource sustainability goals would not be reasonable.
- This alternative would not fully meet P&N 4 (support local economies). Without commercial timber harvest on forested lands within MPC 5.1, Purpose and Need # 4 would not be met. Not providing for opportunities for commodity production as an outcome of restoring or maintaining resilience/resistance of forested vegetation within the allocation unit, when it can accomplish restoration objectives while meeting other resource sustainability goals, would not be reasonable.
- Timber harvest is an appropriate tool to accomplish vegetation restoration objectives on MPC 5.1. Forestlands within MPC 5.1, other than PVGs 1 and 11, are classified as suited forestland under the Forest Plan and are available for timber production. Thus, timber volume from this Forest Plan MPC allocation unit is included in the base schedule where regular and predictable wood product outputs are planned and contribute to the Forest's Allowable Sale Quantity (ASQ). Use of timber harvest to accomplish restoration objectives in this MPC was part of the intended uses in this allocation unit under the Forest Plan. Thus, where timber harvest is an appropriate tool to accomplish restoration objectives within this allocation unit and contribute to the Forest ASQ, it would be unreasonable to not consider such a tool.
- Commercial harvest would accomplish some of the transportation management actions as part of the contract. The timber sale contract provides opportunity to accomplish restoration objectives associated with modification to the transportation system in the project area. Not providing for opportunity to accomplish these objectives through commercial timber harvest would not be reasonable given that road reconstruction, road realignment and road decommissioning are expected to have measurable beneficial effects to other resources.

2.3.2 Maintain suitable water quality standards for sensitive fish species; limit all logging, road construction, and trail development in Riparian Conservation Areas

The commenter summarized the alternative as follows:

To maintain suitable water quality standards for sensitive fish species, an alternative that limits all logging, road construction, and trail development in riparian conservation areas should be considered.

We are particularly concerned about the proposal to conduct commercial logging within Riparian Conservation Areas (RCAs). Table 1 in the scoping notice indicates that up to 1,375 acres within RCAs will have trees logged and removed. While, we can appreciate the need to reduce stand densities in some specific circumstances, we are concerned by the broadscale application of riparian logging in this proposal and look forward to robust dialogue on this issue. We welcome the opportunity to visit this project in the field and look forward to seeing some of these areas firsthand to get a better sense of the forest's intent. In particular, we point to the Forest Plan requirement that you 1) demonstrate how the project will not degrade or retard attainment of properly functioning soil, water, riparian and aquatic desired conditions, and 2) that trees felled within RCAs must be left unless determined not to be necessary for soil, water, riparian or aquatic desired conditions. As such, the EA or EIS should have a thorough discussion about this issue, and should consider an alternative that avoids logging in these sensitive areas.

Alternatives C, E and F were developed to address this suggested alternative in varying degrees. Each of these alternatives reduce new trail development in RCAs, Alternatives E and F reduce the miles of road within or adjacent to RCAs due to use of helicopter logging systems, and Alternative E does not include the proposed motorized trail and trailhead which resulted in varying levels of impacts to RCAs.

However, an alternative to limit or eliminate vegetative and fuels treatments within RCAs was dropped from detailed study because of the following rationale:

As stated by Powell (2014) in New Perspectives in Riparian Management: Why Might we Want to Consider Active Management for Certain Portions of Riparian Habitat Conservation Areas [RCAs], "[r]iparian areas represent a dynamic interface or ecotone between water- and land-based ecosystems, where components of both systems interact. Native disturbance events (e.g., flood-ing, erosion, and sedimentation) are regular and predictable phenomena in these areas, causing fluctuations in plant communities, and in fish and wildlife populations." Some wildlife species use riparian corridors as a way to migrate from one area to another, but others find their primary habitat in a riparian zone because its greater diversity of plant species provides a wide variety of habitat conditions and niches (Voller and Harrison 1998).

The management strategy most likely to sustain high levels of ecosystem integrity and resilience is emulation of natural disturbance processes. A disturbance emulation strategy outlines objectives and practices resulting in the least possible difference between active management practices and natural disturbance. A fundamental principle of disturbance emulation is that silvicultural practices, including prescribed fire and other management

activities, should mimic the natural disturbance regime – and not just the fire characteristics, but all aspects including consideration of wind and other processes.

While a safe presumption is that active management will never function as a perfect surrogate for disturbance, presumably because nature has tremendous inherent variability and no two successive disturbance events will ever be identical anyway, it is also true that silvicultural interventions can effectively mimic certain aspects of disturbance regimes. "The object of dis-disturbance emulation is … to recognize and understand the differences between management and natural disturbance, and to use that know-ledge to improve harvest methods so as to impair ecosystems and their processes as little as possible" (Thompson 2002).

Pre-settlement forest structure and composition along first and second order streams in the Mixed Conifer zone resembled upland forests in the region. Given the historic continuity of fire disturbance between riparian forests and the adjacent uplands (Everett et al. 2003, Olson and Agee 2005), it is believed to be beneficial to permit partial harvest treatments and prescribed fire in some riparian areas to allow the restoration of desirable characteristics of the pre-settlement forest structure and composition. Treatments may include the creation of large canopy gaps, untreated 'islands', clumps, and irregularly spaced trees. Because most riparian forests have not burned for 70-100 years, many trees that would have been killed by low- or moderate-severity fires are now too large to be killed by low-severity prescribed fires" (Messier et al. 2012).

As Olson noted in her thesis: "Keeping fire out of the ecosystem will not only continue to alter the structure and vegetational composition of these riparian forests, but will also allow the buildup of fuels that could result in unprecedented fire intensities, and subsequently higher fire severities, than were present in the system historically. If the goal of forest management is to restore historical disturbance regimes to these forests, results from this study indicate riparian forests should be managed according to the historical fire regime of the forest type rather than distance from a stream" (Olson 2000, p. 78).

Thus, all action alternatives assessed in detail for the Becker Integrated Resource project include treatments in RCAs. Consistent with the science discussed above, Need statements #6 (Non-lethal Fire Regime) and #12 (Mixed1 Fire Regime) under Purpose 1 for this project, identify that "Restoration objectives to achieve functioning vegetation and terrestrial habitat conditions associated with departed forest stand and landscape patch condition necessitates the need to consider the disturbance regimes and patch dynamics of upland vegetation communities that fall within the RCAs. These upland RCAs are transition zones that influence the functions and ecological processes of both the upland terrestrial and true riparian/aquatic settings. Restoration actions within RCAs are needed to develop structure and function that facilitate terrestrial and riparian/aquatic processes and to establish conditions that have a gradual, diverse transition zone with greater integrity and resiliency when subjected to physical events and natural disturbance processes."

Thus, the Responsible Official believes that treatments in the RCAs are important to include in all action alternatives in order to meet restoration objectives in the short to long-term and has included design features outlined in Chapter 2 to, in part, minimize any

impacts to RCAs in the temporary to short term. Therefore, including no treatments in RCAs or modified treatments that would not contribute as well to accomplishment of restoration objectives under Purpose 1 and Purpose 2 in an action alternative is not warranted from comparison purposes.

For purposes of this assessment, the No Action alternative will provide an indicator of how departed forest stand and landscape patch conditions would continue to result in loss of vegetative integrity, and resiliency, should the landscapes within the Becker project area be subjected to physical events and natural disturbance processes (e.g. wildfire). Where warranted, resource assessments will discuss effects for both uplands and RCAs resulting from treatment (all action alternatives) versus no treatments (no action) to provide the reader within an indication of each area contributes to overall effects.

2.3.3 Do not decommission any NFS or unauthorized roads, open all roads to public motorized use, including unauthorized roads. Closed roads slow down search and rescue operations, discriminate against disabled and elderly, and slow down fire crews.

The commenter summarized the alternative as follows*:*

Commentor #1:

Road decisions are being made based on BNF "management needs". Roads are about more than just the USFS needing them for management uses. Closing 55 miles of roads does not improve public safety. Closing roads limits and slows down search and rescue operations. Closing roads discriminates against the disabled and elderly citizens. Closing roads slows down fire crew response times which allows fires to grow larger before suppression efforts can be started by ground crews. Closing roads eliminates dead timber removal through the public gathering firewood. Roads should be modified or rerouted to eliminate safety and erosion concerns. Effects on wildlife has not been proven and models have been shown to be inaccurate and biased. Current road systems should be modified and left open even if those roads are not maintained. Unauthorized" roads should be reevaluated and the need that necessitated those routes should be identified and included in this project.

Commentor #2:

I would also like to voice my opinion on the closing of our road system (open and usable now. I am 63 yrs. of age and disabled. Most of my life I have used these roads to access points of interest to me, i.e. hunting, fishing spots, etc. The U.S. forest service has up to date closed down my access to approx.. 80% of my best and favorite spots. Places that took me 40-50 years to locate and take for granted. As I can no longer ride horses, bike, ski, or afford a dependable snow machine or hike, my ability to enjoy our mountain grandeur is in jeopardy. The closing of these roads still open at this time will almost certainly stop me and many injured people and people with disabilities the opportunity to enjoy our mountains and valleys, by closing off our only way of access. What at one time we took for granted, through age, injury or accident we find ourselves bound to the use of the motorized vehicle as our only way to access only a minor part of our great and wonderful land. Please don't take the rest of it away from us. For 63 yrs. I've lived in Idaho, I was born here. The fish and the white-headed woodpecker were here, they still are. The only thing

different now is we're loosing our access to our land and we now have wolves and more people to share them with.

This alternative was dropped from detailed study because of the following rationale:

- The transportation analysis report process (TAP) report completed for this project recommended a minimum transportation system for the project area that would be needed to long-term management in the project area. The analysis took into account the transportation system needs and concerns of multiple resource areas including emergency access and wildfire suppression. The recommended transportation system provides for long-term access for land management activities, emergency access, public motorized access while reducing negative impacts to watershed, aquatic, and terrestrial resources. It was identified in the TAP that closed and gated roads with administrative access would provide emergency access in the project area and would only negligibly affect response time. The TAP is available in the Project Record.
- The transportation system recommended by the TAP would reduce the annual maintenance costs for the Forest Service transportation system from the current estimated cost of $133,776 down to an estimated $112,700. These savings would be realized by a reduction in the road maintenance frequency needed by decommissioning roads and reducing the maintenance level for other roads. The IDT considered both costs and the benefits of an efficient transportation system that could facilitate future land management needs such as vegetation restoration and emergency/wildfire suppression.
- This alternative would not fully meet Purpose and Need #2 (section 1.4.2.1). Without addressing resource concerns associated with the transportation system, Purpose and Need # 2 would not be met. Road decommissioning and road closures would help accomplish the Forest Plan objective, FROB04 to manage the transportation system to reduce degrading effects to resources and help achieve other resource objectives (USDA Forest Service 2010a, p. III-60). This alternative would not accomplish watershed, aquatic, and terrestrial restoration activities to reduce total road/route density, reduce RCA road/route density, improve soil productivity, reduce sediment delivery to streams, and improve fish habitat. Not providing for opportunities to restore watershed, aquatic and terrestrial resource conditions while maintaining a minimum transportation system for future land management activities and public access would not be reasonable.

2.3.4 Connect the proposed ATV trail to the Banner Ridge Road 385

The commenter summarized the alternative as follows*:*

Commentor #1:

This ATV trail system also needs to be connected to Banner Ridge Road 385. Connecting it to the road would offer even more of a looping opportunity and provide spatial separation between motorized and non-motorized recreationists.

Commentor #2:

We do have one suggestion. Please consider connecting the ATV trail system to Banner Ridge Road 385. This would provide even more of a loop opportunity and a buffer between motorized and nonmotorized users.

This alternative was dropped from detailed study because the current proposals under the action alternatives for motorized trail uses meet Purpose 3 in a manner that contribute to accomplishment of Purpose 2. As stated in Chapter 1, Purpose 3 of this project is to, in part, improve the variety of year-round recreational experiences, while reducing motorized mixed use safety concerns and conflicts between motorized and nonmotorized users; Purpose 2 identifies needs to reduce impacts of recreational uses to desired watershed conditions. Adding the proposed connection of the proposed ATV trail to the Banner Ridge Road 385, would not further key aspects of Purposes 2 and 3 for this project, including:

- The culvert at Sawmill Creek which would be needed to connect the proposed ATV trail to the Banner Ridge Road is proposed for removal to address water quality and fish passage needs within the Pikes Fork subwatershed. Thus, if this connection was provided, it would leave a route within an RCA important for to meeting restoration objectives identified in Purpose 2, Need 3:, which states, "A need exists to reduce road/route density and RCA road/route density within the project area to reduce road/route-related effects on water quality and aquatic, riparian, and terrestrial species and their habitats". This need is identified in the Forest Plan as Forest-wide objectives SWOB18 and WIOB16 (USDA Forest Service 2010a, p. III-21 and III-26). Direction specific to Management Area (MA) 7 (North Fork Boise River) indicates that watershed restoration should be initiated in the Pikes Fork subwatershed to improve watershed conditions and fish habitat related to roads (MA 7 Objectives 0726, 0727, and 0728; USDA Forest Service 2010a, p. III-189).
- Connecting the proposed ATV trail and the Banner Ridge Road 389 would also require opening a closed Maintenance Level 1 road to motorized trail use and constructing an extension to this route, which would be contrary to Purpose 2, Need 2 and 6 which state, "Need #2: need exists to decommission authorized roads and unauthorized routes within the project area to reduce effects on soil productivity." Roads are considered TSRC as defined by converting a productive site to an essentially nonproductive site for more than 50 years (USDA Forest Service 2010a, p. GL-50). Reducing road/route effects on soil productivity is identified in the Forest Plan as a Forest-wide objective SWOB18 (USDA Forest Service 2010a, p. III-21).

  Need #6: "A need exists to close project area roads to public motorized access that have been identified as needed to only support restoration activities to reduce impacts such as sediment delivery to streams, removal of snags and down logs important to wildlife, and noxious weed spread and introduction. Forest-wide objective FROB04 states that the transportation system should be managed to reduce degradation of resources (FROB04; USDA Forest Service 2010a, p. III-60)."

- Connecting the proposed ATV trail and the Banner Ridge Road 389 would also not be consistent with Recreation Purpose 3, Need 5, to reduce mixed use issues. As stated in Need 5, "A need exists to provide designated motorized recreational opportunities within the project area for vehicles 50 inches or less in width to reduce the potential for mixed use interactions and conflicts between different classes of motorized vehicles that can affect overall user safety." The project area neither manages for nor offers opportunities for vehicles 50 inches or less in width off of the current NFS road system, which is open to all motor vehicles (i.e., mixed use). A mixed use transportation system increases the risk of accidents between full-sized vehicles and OHVs. Designating a motorized loop trail system would allow the Forest to expend motorized trail maintenance dollars to maintain trails to standard, which is important for addressing user safety, and apply best management practices, which are important to minimizing effects to resources such as soil, water, vegetation, and wildlife.

2.4 ALTERNATIVES ANALYZED IN DETAIL

2.4.1 Alternative A—No Action

Alternative A is a required alternative that provides a baseline against which impacts of the Proposed Action can be measured and compared. Under Alternative A, no new vegetation, transportation, recreation, or fish habitat restoration management activities would occur. Existing ongoing activities such as road maintenance[6], recreational activities, public fuelwood gathering, mining, and motorized travel consistent with the District Motor Vehicle Use Map (MVUM) would continue in the area. Suppression of wildfires within the project area would also continue, consistent with direction in the Forest Plan.

Appendix J, Map 1and Appendix J, Map 2 provide a spatial overview of the existing transportation system and the roads open to public motorized use (MVUM). As discussed in Chapter 1, numerous aquatic organism passage (AOP) barriers caused by the transportation system exist throughout the Becker project area (Appendix J, Map 1). Of the 31 known barriers within the project area, 9 occur on Highway 21 outside of Forest Service road management jurisdiction. AOP barriers within the project area primarily affect Beaver, Edna, Sawmill, and Banner creeks. These affected creeks include habitat patches important to Endangered Species Act (ESA) listed bull trout. Under the No Action Alternative, these AOP passage barriers would remain.

Appendix J, Map 3 and Appendix J, Map 4provide a spatial overview of the summer and winter recreational opportunities within the project area. The following recreational activities would continue within the Becker project area under Alternative A: developed and dispersed uses, including the Whoop-Um-Up and Edna Creek campgrounds; the Beaver Creek rental cabin; six rental yurts; four park and ski parking lots/trail heads; four summer and winter nonmotorized trails that allow for Nordic skiing, snowmobiling, snow

[6] Refer to Footnote 5 for road maintenance activities that are identified under Alternatives B and C that may also occur under Alternative A if funding becomes available. Those maintenance actions that fall under Categorical Exclusion 36 CFR 220.6(d)(4), and that do not require authorization through the Decision Notice/FONSI to be issued for this project, may be implemented at any time.

shoeing, mountain biking, hunting, and horseback riding; and a small amount of dispersed camping that mainly occurs during the big game hunting season and is concentrated along the roadways within the project area. Four Nordic ski trail systems overlap the project area: Whoop-Um-Up, Gold Fork, Beaver Creek Summit, and Banner. These trail systems include about 60.2 miles of ski trail, in the project area. Each of the four winter ski trail systems has a parking area that is operated under the Idaho Parks and Recreation Park N' Ski permit system. Six rental yurts occur within the project area: Banner Ridge, Whispering Pine, Stargaze, Skyline, Rocky Ridge, and Elkhorn. While not officially authorized as part of the Forest-managed trail system, the Idaho Department of Parks and Recreation would continue to operate these yurts and associated non-motorized trails in partnership with the Forest.

2.4.2 Alternative B: Proposed Action

2.4.2.1 Purpose and Need

Alternative B (Proposed Action) was developed to meet the Project's Purposes and Needs presented in Chapter 1, section 1.4. The Proposed Action includes activities described below as well as the project design features identified in section 2.4.7. The Proposed Action would implement the following vegetation, transportation, recreation, and fisheries management activities within the project area to address Purposes 1 through 4.

Purpose 1—Vegetation Management):

To address Purpose 1 (see section 1.4) in the *non-lethal* fire regime, Alternative B would accomplish the following:

- **Outside of plantations**—Alternative B would promote medium-to-large ponderosa pine or Douglas-fir trees while reducing subalpine fir, lodgepole pine, smaller Douglas-fir, and ponderosa pine trees in areas outside of plantations. This change in species composition would improve the health and vigor of the residual forest and reduce ladder fuels in order to reduce the risk of undesirable outcomes from natural disturbance. This change would promote large tree development and begin to move the stand composition and structure toward the desired condition (Forest Service 2010b, Appendices A and E)..

  Approximately 3,691 acres of vegetation proposed to be treated under this alternative are classified in the non-lethal fire regime and are located outside of plantations (Appendix J, Map 5). The following vegetation treatments are proposed outside of plantations:

  - Thinning with no commercial product removal would be conducted on about 1,243 acres.
  - Thinning with optional miscellaneous commercial product, such as commercial firewood or post and pole, would be implemented on approximately 987 acres.
  - Thinning with commercial product removal (e.g. traditional forest products) would be conducted on about 1,350 acres.
  - Mixed commercial vegetation treatments would be implemented on approximately 111 acres,

- **Within plantations—**Alternative B would reduce overall stocking levels, remove undesirable species (favor ponderosa pine and Douglas-fir while reducing lodgepole pine and subalpine fir), reduce the number of dwarf mistletoe infected trees, and establishing nonuniform tree spacing for future large tree clump development.

  Approximately 1,781 acres of vegetation proposed to be treated under this alternative are classified in the non-lethal fire regime and are located within plantations. The following vegetation treatments are proposed within plantations:
  - Thinning with no commercial product removal would be conducted on about 997 acres.
  - Thinning with no commercial product removal with optional mastication treatment would occur on about 625 acres.
  - Thinning with optional miscellaneous commercial product removal, such as firewood or post and pole, would be implemented on approximately 159 acres.
- **Throughout the project area—**Alternative B would reduce surface fuel loading and continuity, increase canopy base height, and decrease ladder fuel densities to increase stand resiliency and reduce the risk of undesirable overstory mortality for the nonlethal fire regime. Refer to Table 2-1for acres of treatments to address activity fuels, as well as other fuels throughout the project area. Refer to Appendix J, Map 6 for a spatial display of the location of these fuel treatments.
- **Throughout the project area—**Alternative B would maintain old forest[7] and wildlife source habitat components characteristic of the fire regime where present; where not present, restoration would be promoted through proposed mechanical and fire management activities.
- **In and around higher use recreational areas (e.g., yurts, trails, campgrounds, Highway 21)—**Alternative B would promote vegetation conditions important to providing a quality recreational experience for users that frequent the project area. Vegetative conditions remaining following treatment would be consistent with the two proposed amendments to Forest Plan Standard 0763 concerning VQOs around these areas See section 2.4.2.2.

To address Purpose 1 (see section 1.4) in the *mixed1* fire regime, Alternative B would accomplish the following:

- **Outside of plantations—**Alternative B would reduce stand densities and restore structure and species composition to desired conditions. Specifically, the relative abundance of lodgepole pine and subalpine fire would be reduced while healthy, larger ponderosa pine, Douglas-fir, and Engelmann spruce would be retained. Promoting this species composition would increase forest resilience, reduce the risk of undesirable outcomes from natural disturbance, promote large tree development, and begin to move the stand composition and structure toward the desired condition (Forest Service 2010b, Appendices A and E).

[7] Old forest habitat components are described in Appendix E of the Forest Plan (Forest Service 2010b, p. E-25) and include tree size class, canopy cover, species composition, snags, and coarse woody debris desired conditions by Potential Vegetation Group (PVG). Other stand structural components are also important (Forest Service 2010b, pp. E-24 through E-28) but are not easily derived from data, including within-stand patchiness, canopy gaps, and decadence.

Approximately 2,315 acres of vegetation proposed to be treated under this alternative are classified in the mixed 1 fire regime and are located outside of plantations. The following vegetation treatments are proposed outside of plantations (Table 2-2 and Table 2-3).

- Thinning with no commercial product removal would be conducted on about 523 acres.
- Thinning with optional miscellaneous commercial product, such as commercial firewood or post and pole, would be implemented on approximately 118 acres.
- Thinning with commercial product removal (e.g. traditional forest products) would be conducted on about 854 acres.
- Mixed commercial vegetation treatments would be implemented on approximately 820 acres.

Table 2-1. Summary of the fuels treatments under each alternative, including acres treated within and outside of Riparian Conservation Areas (RCAs)

Treatment Description	Alternative B—Proposed Action (acres)			Alternative C (acres)			Alternative D (acres)			Alternative E (acres)			Alternative F (acres)		
	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA
Natural Fuels Treatment Blocks															
Direct application of fire	501	375	126	501	375	126	501	375	126	501	375	126	501	375	126
Indirect application of fire	936	742	193	936	742	193	936	742	193	936	742	193	936	742	193
Totals	1437	1117	319	1437	1117	319	1437	1117	319	1437	1117	319	1437	1117	319
Activity and Natural Fuels Treatment Blocks															
Chip; lop and scatter; handpile and burn; and/or burn concentrations	2717	1969	748	2717	1969	748	2717	1969	748	3848	2794	1054	3063	2203	860
Whole-tree yard; lop and scatter; handpile and burn; and/or burn concentrations	3065	2177	889	3065	2177	889	3065	2177	888	1935	1353	582	2719	1943	776
Yard; lop and scatter; handpile and burn; and/or burn concentrations	1174	872	302	1174	872	302	1174	872	302	1174	872	302	1174	872	302
Totals	6956	5018	1938	6956	5018	1938	6956	5018	1938	6956	5018	1938	6956	5018	1938
Activity Fuels Only Treatment Bocks															
Chip; lop and scatter; and handpile and burn concentrations	1230	879	352	1230	879	352	1230	879	352	1267	904	362	1262	900	361
Whole-tree yard and handpile and burn concentrations	128	96	31	128	96	31	310	257	53	91	70	21	96	74	22

Yard; handpile and burn concentrations; and lop and scatter	40	33	6	40	33	6	40	33	6	40	33	6	40	33	6
Totals	1398	1008	389	1398	1008	389	1580	1169	411	1397	1008	389	1397	1008	389
Natural Fuels Restoration Fire Treatments Only															
Natural fuels treatment—3 to 5 years after activity fuels treatments	2396	1155	1241	2396	1155	1241	2396	1155	1241	2396	1155	1241	2396	1155	1241
Totals	2396	1155	1241	2396	1155	1241	2396	1155	1241	2396	1155	1241	2396	1155	1241

Table 2-2. Perennial streams—outside plantations

Perennial Streams – Outside Plantations	
Distance from edge of stream	**Activity**
0-50 ft	No non-commercial thinning treatment, backing fire allowed
50-75 ft	Non-Commercial Thinning allowed with 8 inch diameter limit, pile burning allowed, no broadcast burn ignitions, backing fire allowed
75 ft-1 Site Potential Tree Height	Non-Commercial Thinning allowed with 8 inch diameter limit, pile burning allowed, broadcast burn ignitions allowed
1 Site Potential Tree Height – 2 Site Potential Tree Height	Non-Commercial Thinning and Commercial Thinning allowed but no associated equipment allowed off of existing roads

Table 2-3 Intermittent streams (both inside and outside plantations)

Intermittent Streams (both inside and outside plantations)	
Distance from edge of stream	**Activity**
0-15 ft	No non-commercial thinning treatment, backing fire allowed
15-50 ft	Non-Commercial Thinning allowed with 8 inch diameter limit, lop and scatter only, no pile burning allowed, no broadcast burn ignitions, backing fire allowed
50-75 ft	Non-Commercial Thinning allowed with 8 inch diameter limit, pile burning allowed, no broadcast burn ignitions, backing fire allowed
75 ft-1 Site Potential Tree Height	Non-Commercial Thinning allowed with 8 inch diameter limit, pile burning allowed, broadcast burn ignitions allowed

- **Within plantations—**Alternative B would reduce stand densities to improve tree vigor and growth and reduce the relative abundance of lodgepole pine and subalpine fir while retaining healthy and larger ponderosa pine or Douglas-fir. Alternative B would also reduce dwarf mistletoe–infected trees where they would impact achieving restoration objectives. Refer to Table 2-4 for acres of treatments within plantations and Appendix J, Map 5 for a spatial display of these treatments.
    1. Approximately 567 acres of vegetation proposed to be treated under this alternative are classified in the non-lethal fire regime and are located within plantations. The following vegetation treatments are proposed within plantations (Table 2-3 and Table 2-5).
- Thinning with no commercial product removal would be conducted on about 481 acres.
- Thinning with no commercial product removal with optional mastication treatment would occur on about 59 acres.
- Thinning with commercial product removal (e.g. traditional forest products) would be conducted on about 27 acres.

Table 2-4. Summary of the vegetation treatments under each alternative, including acres treated within and outside of Riparian Conservation Areas (RCAs)

Treatment Description	Alternative B—Proposed Action (acres)			Alternative C (acres)			Alternative D (acres)			Alternative E (acres)			Alternative F (acres)		
	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA
Thinning with no product removal	3245	2277	968	3245	2277	968	3245	2277	968	3245	2277	968	3245	2277	968
Thinning (optional mastication) with no product removal	683	544	139	683	544	139	683	544	139	683	544	139	683	544	139
Thinning with optional miscellaneous wood product removal	1264	954	310	1264	954	310	1264	954	310	1264	954	310	1264	954	310
Thinning with product removal	2231	1611	620	2231	1611	620	2318	1684	634	2231	1611	620	2231	1611	620
Mixed treatment with product removal	930	640	290	930	640	290	1025	728	297	930	640	290	930	640	290
Totals	8353	6026	2327	8353	6026	2327	8535	6187	2348	8353	6026	2327	8353	6026	2327

Table 2-5. Perennial streams—inside plantations

Perennial Streams – Inside Plantations	
Distance from edge of stream	**Activity**
0-1 shade tree height (modeled as 35 ft)	No non-commercial thinning treatment, backing fire allowed
1 shade tree height (modeled as 35 ft) -50 ft	Non-Commercial Thinning allowed, 8 inch diameter limit, lop and scatter only, no pile burning allowed, no broadcast burn ignitions, backing fire allowed
50-75 ft	Non-Commercial Thinning allowed with 8 inch diameter limit, pile burning allowed, no broadcast burn ignitions, backing fire allowed
75 ft-1 Site Potential Tree Height	Non-Commercial Thinning allowed with 8 inch diameter limit, pile burning allowed, broadcast burn ignitions allowed
1 Site Potential Tree Height – 2 Site Potential Tree Height	Non-Commercial Thinning and Commercial Thinning allowed but no associated equipment allowed off of existing roads

Alternative B would retain all trees greater than or equal to the diameter at breast height (d.b.h.) displayed in Table 2-6 in forested stands proposed to be treated, except where removal is required for safety mitigation or operational purposes, such as landings, yarding trail/corridors, and/or road activities.

Table 2-6. Summary of diameter cut limits by vegetation treatment, location, and tree species

Vegetation Treatment	Ponderosa Pine (inches at d.b.h)	Douglas-Fir (inches at d.b.h)	Lodgepole Pine (inches at d.b.h)
Uplands and Perennial Stream RCAs[a]			
Non-Commercial Thinning Activities	12	12	12
Thinning with Optional Wood Product Removal	12	12	14
Commercial Thinning	20	—[c]	—[c]
Mixed Treatment with Wood Product Removal	20	—[c]	—[c]
Perennial and Intermittent Stream RCAs[b]			
Non-Commercial Thinning Activities	8	8	8

[a]Perennial Stream RCAs between one and two site potential tree heights as defined in Table 2-2
[b]Perennial stream RCAs between 50 feet and 1 site potential tree height as defined by Table 2-2. Intermittent stream RCAs between 15 feet and 1 site potential tree height as defined in Table 2-3
[c]No limit on the size of tree removed. Size of tree removed is based on what is needed to meet restoration objectives and must be consistent with design feature VM-3 and VW-5.

- **Throughout the project area—**Alternative B would reduce surface fuel loading and continuity, increase canopy base height, and decrease ladder fuel densities to increase stand resiliency and reduce the risk of undesirable overstory mortality for the mixed1 fire regime. While similar to the nonlethal fire regime, the mixed1 fire regime will generally have more pockets of slightly higher fuel loading and ladder fuels. Refer to Table 2-1 for acres of treatments to address activity fuels, as well as other fuels throughout the project area. Refer to Appendix J, Map 6 for a spatial display of the location of these fuel treatments.
- **Throughout the project area—**Alternative B would maintain old forest[8] and wildlife source habitat components characteristic of the fire regime where present; where not present, restoration would be promoted through proposed mechanical and fire management activities.
- **In and around higher use recreational areas (e.g., yurts, trails, campgrounds, Highway 21)—**Alternative B would promote vegetation conditions important to providing a quality recreational experience for users that frequent the project area. Vegetative conditions remaining following treatment would be consistent with the two proposed amendments to Forest Plan Standard 0763 concerning VQOs around these areas (see section 2.4.2.2).

[8] Old forest habitat components are described in Appendix E of the Forest Plan (Forest Service 2010b, p. E-25) and include tree size class, canopy cover, species composition, snags, and coarse woody debris desired conditions by Potential Vegetation Group (PVG). Other stand structural components are also important (Forest Service 2010b, pp. E-24 through E-28) but are not easily derived from data, including within-stand patchiness, canopy gaps, and decadence.

To address Purpose 1 (see section 1.4) within RCAs in both the *non-lethal* and *mixed1* fire regime, Alternative B would accomplish the following:

- Alternative B would implement restoration actions within RCAs to develop structure and function that facilitate terrestrial and riparian/aquatic processes and establish conditions that promote a gradual, diverse transition zone with greater integrity and resiliency when subjected to physical events and natural disturbance processes.
- The following RCA definitions would be applicable to all management activities (Appendix C; Figure 2-1):
    - **Perennial streams and intermittent streams providing seasonal rearing and spawning habitat:** For these streams, the RCA will be defined as two site-potential tree heights (SPTH). The dominant PVG from the stand shall be used to delineate RCA boundaries and will range from 160 to 260 feet (Figure 2-1). See Table B-5 of the Forest Plan for PVG-specific SPTHs (Forest Service 2010b, Appendix B, p. B-36).
    - **Intermittent streams not providing seasonal rearing and spawning habitat:** For these streams, the RCA will be defined as one SPTH. The dominant PVG from the stand shall be used to delineate RCA boundaries and will range from 80 to 130 feet (Figure 2-1). See Table B-5 of the Forest Plan for PVG-specific SPTHs (Forest Service 2010b, Appendix B, p. B-36).
    - **Ponds, lakes, reservoirs, and wetlands:** For these waterbodies, the RCA will be defined as one SPTH. The dominant PVG from the stand shall be used to delineate RCA boundaries and will range from 80 to 130 feet. See Table B-5 of the Forest Plan for PVG-specific SPTHs (Forest Service 2010b, Appendix B, p. B-36).

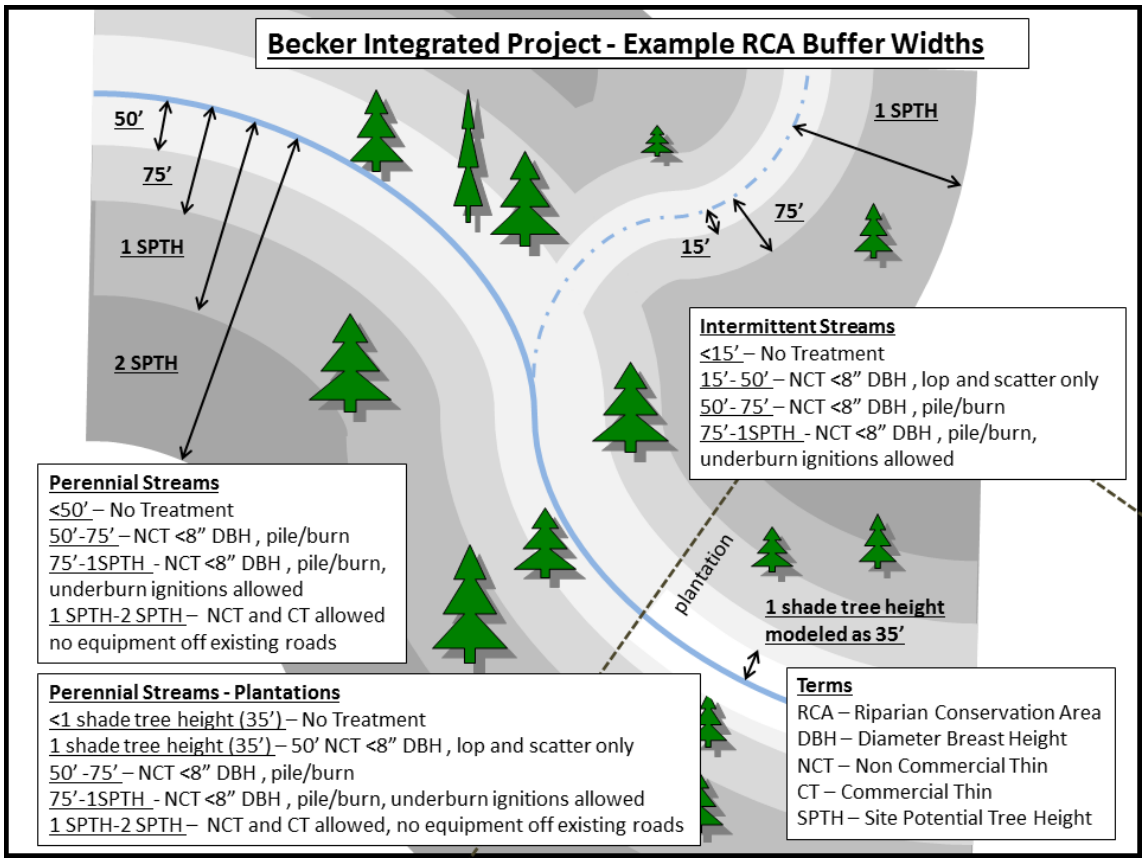

Figure 2-1. RCA buffer widths

The activities described in Table 2-1 and Table 2-4 (mechanical) and Table 2-7 through Table 2-9 would be allowed within RCAs as defined under Design Feature FH-1.

To address Purpose 1 (see section 1.4), the following logging systems and temporary roads would be used:

- Under Alternative B, ground-based logging systems would be used and temporary roads built. Refer to Table 2-7 for miles of temporary roads proposed to be built and Appendix J, Map 7 for a spatial location of these proposed temporary roads. Table 2-8 provides a summary of acres to be treated by logging system and Appendix J, Map 5 provides a spatial location of logging system to be used.

Table 2-7. Summary of temporary road construction to facilitate vegetation management actions under each alternative, within and outside of Riparian Conservation Areas (RCAs)

Treatment Description	Alternative B—Proposed Action (miles)			Alternative C (miles)			Alternative D (miles)			Alternative E (miles)			Alternative F (miles)		
	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA
Temporary road construction	5.8	5.2	0.6	5.8	5.2	0.6	6.5	5.9	0.6	1.5	1.5	0	4.3	4.1	0.2

Table 2-8. Summary of logging systems to facilitate vegetation management actions under each alternative (includes miscellaneous forest products), within and outside of Riparian Conservation Areas (RCAs)

Treatment Description	Alternative B—Proposed Action (acres)			Alternative C (acres)			Alternative D (acres)			Alternative E (acres)			Alternative F (acres)		
	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA
Tractor/Jammer	3736	2709	1027	3736	2709	1027	3919	2870	1049	2570	1860	710	3359	2453	906
Light Cable	612	446	166	612	446	166	612	446	166	612	446	166	612	446	166
Helicopter Logging															
With pre-bunching	0	0	0	0	0	0	0	0	0	961	686	275	0	0	0
No pre-bunching	0	0	0	0	0	0	0	0	0	205	163	42	377	256	121
Total Acres	4348	3155	1193	4348	3155	1193	4531	3316	1215	4348	3155	1193	4348	3155	1193

Table 2-9. Summary of Landings to facilitate vegetation management actions under each alternative, within and outside Riparian Conservation Areas (RCAs)

Landings	Alternative B—Proposed Action (number)			Alternative C (number)			Alternative D (number)			Alternative E (number)			Alternative F (number)		
	Total (new landings)	Outside RCA (new landings)	Within RCA (new landings)	Total (new landings)	Outside RCA (new landings)	Within RCA (new landings)	Total (new landings)	Outside RCA (new landings)	Within RCA (new landings)	Total (new landings)	Outside RCA (new landings)	Within RCA (new landings)	Total (new landings)	Outside RCA (new landings)	Within RCA (new landings)
Tractor/Jammer Landings	133 (20)	119 (20)	14 (0)	133 (20)	119 (20)	14 (0)	140 (20)	126 (20)	14 (0)	108 (5)	97 (5)	11 (0)	114 (13)	102 (13)	12 (0)
Helicopter Landings	0	0	0	0	0	0	0	0	0	20 (4)	20 (4)	0	7 (2)	7 (2)	0
Total Landings	133 (20)	119 (20)	14 (0)	133 (20)	119 (20)	14 (0)	140 (20)	126 (20)	14 (0)	128 (9)	117 (9)	11 (0)	121 (15)	109 (15)	12 (0)

Purpose 2—Watershed Restoration

To address Purpose 2 (see section 1.4), Alternative B would accomplish the following:

- Decommission authorized roads and unauthorized routes (Table 2-10 and Appendix J, Map 7) within the project area to:
    - Reduce sediment to streams, improve wildlife habitat, and decrease noxious weed spread, thereby improving watershed, aquatic, and terrestrial resource conditions (FROB04; Forest Service 2010b, p. III-61).
    - Reduce effects on soil productivity. Roads are considered TSRC as defined by converting a productive site to an essentially nonproductive site for more than 50 years (Forest Service 2010b, p. GL-50). Reducing road/route effects on soil productivity is identified in the 2010 Forest Plan as Forest-wide objective SWOB18 (Forest Service 2010b, p. III-21).
    - Reduce road/route-related effects on water quality and aquatic, riparian, and terrestrial species and their habitats within RCAs. MA 7 (North Fork Boise River) objectives 0726, 0727, and 0728 indicate that watershed restoration should be initiated in the Pikes Fork subwatershed to improve watershed conditions and fish habitat related to roads (Forest Service 2010b, p. III-189).

Close NFS roads in the project area open to public motorized use that have been identified as only needed to support restoration activities (Forest Service 2014b) in order to reduce impacts such as sediment delivery to streams, removal of snags and down logs important to wildlife, and spread and/or introduction of noxious weeds. This need is identified in the 2010 Forest Plan as Forest-wide objectives WIOB16 (Forest Service 2010b, p. III-21 and III-26). Refer to Table 2-11 and Table 2-12 for miles of roads open to public motorized use (ML 2, ML 3 and ML 5) and Appendix J, Map7 and Map 8 for their spatial location.

- Reduce undesirable impacts to stream systems, aquatic habitat, and wildlife habitat through road reconstruction and relocation to more suitable locations, reducing road-related effects while providing access to meet long-term management objectives. The 2010 Forest Plan states that the transportation system should be managed to reduce degradation of resources (FROB04; Forest Service 2010b, p. III-60). Refer to Table 2-10 for miles of authorized roads and unauthorized routes to be decommissioned and Appendix J, Map 7 for their spatial location.
- Replace existing culvert structures that do not provide AOP with structures that do provide AOP or, alternatively, modify habitat below these culverts to provide AOP. The 2010 Forest Plan states that roads and facilities identified as a potential concern or problem that is contributing to degradation of water quality or aquatic, wildlife, or plant habitats should be evaluated for opportunities to mitigate effects (FBOB12; Forest Service 2010b, p. III-61). Restoring migration connectivity for bull trout throughout MA 7 (North Fork Boise River) by removing migration barriers caused by existing road design is identified in MA 7 objective 0725 (Forest Service 2010b, p. III-189). Refer to Table 2-13 for the number of AOPs to be replaced or modified Appendix J Map 9 for their spatial location.

- Maintain access to two active mining claims as noted below (see Table 2-10 for miles of authorized roads and unauthorized routes to be decommissioned and Appendix J, Map7 and Map 8 or their spatial location):
    - NFS road 393 would not be fully decommissioned to address access to IMC #211651 and IMC #211374 mining claims. For approximately 0.75 miles past NFS road 393d, NFS road 393 would be changed to ML2, administrative access only. Beyond this point the remainder of NFS road 393 would be decommissioned.(Appendix J Map 7 and Map 8)
    - Designate 0.5 miles of the proposed temporary road for vegetative management which accesses the IMC #200373 mining claim as a ML 2 road, administrative access only.

Table 2-10. Summary of the transportation system by alternative, within and outside of Riparian Conservation Areas (RCAs)

Treatment Description	Alternative B—Proposed Action (miles)			Alternative C (miles)			Alternative D (miles)			Alternative E (miles)			Alternative F (miles)		
	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA	Total	Outside RCA	Within RCA
Travel Management Changes—Closures to Motorized Use															
NFS roads changed from ML 2 (open to public motorized use) to ML 2 Administrative Use Only (closed to public motorized use)	19.8	11.9	7.9	15.5	8.7	6.8	15.5	8.7	6.8	19.8	11.9	7.9	15.5	8.7	6.8
NFS roads changed from ML 2 (open to public motorized use) to ML 1 (closed to all motorized use/state of storage)	8.3	7.2	1.1	8.3	7.2	1.1	8.3	7.2	1.1	7.9	6.8	1.1	7.9	6.8	1.1
Totals	28.1	19.1	9.0	23.8	15.9	7.9	23.8	15.9	7.9	27.7	18.7	9.0	23.4	15.5	7.9
Road Reconstruction															
NFS road reconstruction of ML 1(closed to all motorized use/state of storage) to ML 2 (open to public motorized use) as part of the realignment of NFS Road 393	1.8	1.2	0.6	1.9	1.3	0.6	1.9	1.3	0.6	1.8	1.2	0.6	1.9	1.3	0.6
NFS Road Reconstruction of ML 1(closed to all motorized use/state of storage) to ML 2 Administrative Use Only (closed to public motorized use)	3.0	2.7	0.3	2.9	2.6	0.3	2.9	2.6	0.3	3.0	2.7	0.3	2.9	2.6	0.3
Totals	4.8	3.9	0.9	4.8	3.9	0.9	4.8	3.9	0.9	4.8	3.9	0.9	4.8	3.9	0.9
New Road Construction															
Construct 2 road segments as part of the realignment of NFS Road 393 that will be ML 2 (open to public motorized use)	1.2	1.1	0.1	1.2	1.1	0.1	1.2	1.1	0.1	1.2	1.1	0.1	1.2	1.1	0.1
Construct 1 road segment as a realignment of NFS Roads 362D1 and 362D6 that will be ML 2 Admin Use Only (closed to public motorized use)	<0.1	<0.1	0.0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
Totals	1.2	1.1	0.1	1.2	1.1	0.1	1.2	1.1	0.1	1.2	1.1	0.1	1.2	1.1	0.1
Addition of Unauthorized Routes to the Transportation System															
Add unauthorized routes to the transportation system as ML 1 roads (closed to all motorized use/state of storage)	2.4	2.1	0.3	2.4	2.1	0.3	2.4	2.1	0.3	2.4	2.1	0.3	2.4	2.1	0.3
Add unauthorized routes to the transportation system as ML2 roads (open to public motorized use) as part of the realignment of NFS Road 393	0.3	0.3	0	0.3	0.3	0	0.3	0.3	0	0.3	0.3	0	0.3	0.3	0
Add unauthorized routes to the transportation system as ML 2 Administrative Use Only (closed to public motorized use)	1.9	1.5	0.4	1.9	1.5	0.4	1.9	1.5	0.4	1.9	1.5	0.4	1.9	1.5	0.4
Totals	4.6	3.9	0.7	4.6	3.9	0.7	4.6	3.9	0.7	4.6	3.9	0.7	4.6	3.9	0.7
Road Decommissioning—NFS Roads and Unauthorized Routes															
Decommissioning of NFS roads	22.8	12.5	10.3	22.8	12.5	10.3	22.8	12.5	10.3	24.8	13.8	11.0	23.6	13.2	10.4
Decommissioning of 16 unauthorized routes	8.1	4.6	3.5	8.1	4.6	3.5	8.1	4.6	3.5	8.1	4.6	3.5	8.1	4.6	3.5
Total	30.9	17.1	13.8	30.9	17.1	13.8	30.9	17.1	13.8	32.9	18.4	14.5	31.7	17.8	13.9
Conversion of NFS Roads to Trail															
Converting NFS roads to motorized trail designated for vehicles 50 inches wide or less	2.1	1.4	0.7	2.1	1.4	0.7	0	0	0	0	0	0	0	0	0
Converting NFS roads to motorized trail designated for vehicles 60 inches wide or less	0	0	0	0	0	0	2.1	1.4	0.7	0	0	0	1.3	0.7	0.6
Converting NFS roads to nonmotorized trail	5.1	1.7	3.4	5.1	1.7	3.4	5.1	1.7	3.4	8.0	3.8	4.2	8.0	3.8	4.2
Totals	7.2	3.1	4.1	7.2	3.1	4.1	7.2	3.1	4.1	8.0	3.8	4.2	9.3	4.5	4.8

Note: NFS = National Forest System and ML = Maintenance Level

Table 2-11. National Forest System transportation summary, including current miles of road, current miles of road within the Riparian Conservation Areas (RCAs), miles of road after implementing the Proposed Action, and the change in miles after implementation

Maintenance Level (ML)	Alternative A—No Action		Alternative B—Proposed Action				Alternative C				Alternative D				Alternative E				Alternative F			
	Total Current Miles	Current Miles within RCAs	Total Miles After Proposed Action	Mileage within RCAs after Proposed Action	Change in Total Road or Trail Miles	Change in RCA Road/ Trail Miles	Total Miles After Alt. C	Mileage within RCAs after Alt. C	Change in Total Road or Trail Miles	Change in RCA Road/ Trail Miles	Total Miles After Alt. D	Mileage within RCAs after Alt. D	Change in Total Road or Trail Miles	Change in RCA Road/ Trail Miles	Total Miles After Alt. E	Mileage within RCAs after Alt. E	Change in Total Road or Trail Miles	Change in RCA Road/ Trail Miles	Total Miles After Alt. F	Mileage within RCAs after Alt. F	Change in Total Road or Trail Miles	Change in RCA Road/ Trail Miles
ML1—closed to all motorized use /state of storage	73.7	25.5	53.4	14.4	–20.3	–11.1	53.4	14.4	–20.3	–11.1	53.4	14.4	–20.3	–11.1	50.5	13.7	–23.2	–11.8	50.5	13.7	–23.2	–11.8
ML 2—high clearance vehicles	72.5	32.8	43.8	21.6	–28.7	–11.2	48.3	22.7	–24.2	–10.1	48.3	22.7	–24.2	–10.1	43.8	21.6	–28.7	–11.2	48.3	22.7	–24.2	–10.1
ML 2 Administrative Use Only—closed to public motorized use	0	0	24.8	8.6	+24.8	+8.6	20.3	7.5	+20.3	+7.5	20.3	7.5	+20.3	+7.5	24.8	8.6	+24.8	+8.6	20.3	7.5	+20.3	+7.5
ML 3—suitable for passenger cars	6.1	4.5	6.1	4.5	0	0	6.1	4.5	0	0	6.1	4.5	0	0	6.1	4.5	0	0	6.1	4.5	0	0
ML 5—high degree of user comfort	8.4	6.6	8.4	6.6	0	0	8.4	6.6	0	0	8.4	6.6	0	0	8.4	6.6	0	0	8.4	6.6	0	0
Totals	160.7	69.4	136.5	55.7	–24.2	–13.7	136.5	55.7	–24.2	–13.7	136.5	55.7	–24.2	–13.7	133.6	55.0	–27.1	–14.4	133.6	55.0	–27.1	–14.4

[a]Approximately 8.4 miles of Highway 21 is within the project area. Highway 21 is a ML 5 road under the jurisdiction of the State of Idaho.

Table 2-12. Summary of NFS Transportation system open to public motorized use (per Motor Vehicle Use Map [MVUM] Routes), including current miles of road, current miles of road within the riparian conservation areas (RCAs), and miles of road after implementation

Route Description	Alternative A—No Action			Alternative B—Proposed Action			Alternative C			Alternative D			Alternative E			Alternative F		
	Total Miles Before	Current Miles within RCAs	Change in Total Road or Trail Miles	Total Miles After Alt. B	Miles within RCAs after Alt. B	Change in Total Road or Trail Miles	Total Miles After Alt. C	Miles within RCAs after Alt. C	Change in Total Road or Trail Miles	Total Miles After Alt. D	Miles within RCAs after Alt. D	Change in Total Road or Trail Miles	Total Miles After Alt. E	Miles within RCAs after Alt. E	Change in Total Road or Trail Miles	Total Miles After Alt. F	Miles within RCAs after Alt. F	Change in Total Road or Trail Miles
Miles of road open to full sized motor vehicles	86.9	43.8	0	58.3	32.7	–28.6	62.8	33.8	–24.1	62.8	33.8	–24.1	58.3	32.7	–28.6	62.8	33.8	–24.1
Designated motorized trail: vehicles 50 inches or less in width	0	0	0	23.3	6.6	+23.3	22.0	6.6	+22.0	0	0	0	0	0	0	0	0	0
Designated motorized trail: vehicles 60 inches or less in width (UTV)	0	0	0	0	0	0	0	0	0	22.0	6.6	+22.0	0	0	0	18.8	5.6	+18.8

[a]Approximately 8.4 miles of State Highway 21 are within the project area; State Highway 21 is a Management Level 5 road under the jurisdiction of the State of Idaho.

Table 2-13. Summary of Aquatic Organism Passage barrier treatments (total culverts) under each alternative

Aquatic Organism Passage Proposed Activity	Alternative A—No Action	Alternative B—Proposed Action	Alternative C	Alternative D	Alternative E	Alternative F
Priority critical bull trout habitat culvert treatments[a]	0	7	7	7	7	7
Culvert treatments[a]	0	15	15	15	15	15
Culvert—outlet pool modification	0	1	1	1	1	1
Total	0	23	23	23	23	23

[a]Culvert treatments may include culvert replacements or removal

Purpose 3—Recreation

To address Purpose 3 (see section 1.4), Alternative B would accomplish the following:

- Reduce risks of uncharacteristic or undesirable disturbance events that would reduce forested overstory cover important to the quality of the recreational experience in the project area. The project area is surrounded by historic wildfire areas where forested overstory cover has been substantially reduced or eliminated. Retaining forested overstory cover not only contributes to the quality of the recreational experience, but also is important for retaining snow cover, particularly on nonmotorized winter cross-country ski trails managed in partnership with Idaho Parks and Recreation and local user groups. Purpose 1 describes the vegetation restoration needs that would result in reduced risk of an undesirable disturbance event in the project area, while providing for the visual quality around high use recreation areas important to the quality of the recreation experience. Refer to Table 2-1 and Table 2-4 and Appendix J, Map 10 and Appendix J, Map 11.
- Modify the transportation system to improve the quality and diversity of the recreational experience in the project area through the following activities (see Table 2-10 for miles of roads converted to trails and miles of authorized roads designated as ML 2 to provide access to yurts and Appendix J, Map 7 for their spatial location):
    - Converting roads determined to be unnecessary through the TAP for long-term management to motorized or non-motorized trails to meet recreation opportunity objectives and reduce the potential for conflict between full-sized vehicles and recreationists.
    - Designating unauthorized roads as ML 2 (Administrative Use Only) roads to provide access to the yurts, managed in partnership with Idaho Parks and Recreation, for maintenance purposes.
    - Eliminate public motorized access to the Skyline and Stargazer Yurts managed by Idaho Department of Parks and Recreation by agreement. Idaho Department of Parks and Recreation would have administrative access to the yurts.
- Authorize summer nonmotorized trails in the project area to improve opportunities for hiking, mountain biking, and/or horseback riding during the snow-free season. The proposed summer trail system would provide a variety of nonmotorized recreational opportunities from the yurts located in the project area. Providing an authorized nonmotorized trail system would move the area toward meeting the Forest Plan objective to identify, evaluate, and improve recreation opportunities and experiences along the Highway 21 corridor (Forest Service 2010b, p. III-205). Refer to Table 2-16 for miles of summer nonmotorized trails authorized, and Appendix J, Map 10 for their spatial location.

  Authorization of a summer nonmotorized trail system would also allow the Forest to expend trail maintenance dollars to maintain trails to standard, which is important for addressing user safety, and apply best management practices, which is important for minimizing effects to resources such as soil, water, vegetation, and wildlife.

- Authorize and relocate trailhead facilities at Beaver Creek Summit to support the nonmotorized trail system and provide a safe parking location off of Highway 21. Refer to Table 2-18 for the number of trailheads authorized, and Appendix J, Map 7 and Appendix J, Map 10 for their spatial location.
- Authorize a system of over-snow or winter nonmotorized trails in the project area to provide a good mix of groomed and ungroomed routes on nonmotorized trails that would provide separation between motorized and nonmotorized winter uses, thus reducing the potential for conflict between motorized and nonmotorized recreationists. A winter nonmotorized trail system would provide groomed and ungroomed over-snow opportunities from the yurts located in the project area. Refer to Table 2-15 for miles of groomed and ungroomed winter nonmotorized trails authorized, and Appendix J, Map 11 for their spatial location.

  Authorizing winter nonmotorized trails in the project area would move the area toward meeting Forest Plan objectives to emphasize winter nonmotorized uses, minimize conflicts between backcountry skiers and snowmobilers, continue coordination with counties and other groups related to grooming trails, protect the groomed cross-country ski system from the Gold Fork Trailhead to Beaver Creek Summit from unauthorized damage by unauthorized snowmobile use, and continue coordination with Idaho Parks and Recreation on management of the park and ski areas to maintain winter recreation opportunities (Forest Service 2010b, pp. III-190, III-205, and III-206).
- Designate a motorized loop trail system for vehicles 50 inches or less in width within the project area to enhance designated motorized trail opportunities currently not available in the project area. Designating this trail system would reduce the potential for mixed use interactions and conflicts between different classes of motorized vehicles that can affect overall user safety. Designating a motorized loop trail system would also allow the Forest to expend motorized trail maintenance dollars to maintain trails to standard, which is important for addressing user safety, and apply best management practices, which are important to minimizing effects to resources such as soil, water, vegetation, and wildlife. Refer to Table 2-12 for miles of motorized trails designated for vehicles 50 inches or less, and Appendix J, Map 10 for their spatial location.
- Construct and authorize trailhead facilities at the junction of NFS roads 312 and 385 to support the motorized trail system and provide a safe parking location off of NFS roads systems open to public motorized use. Refer to Table 2-18 for number of trailheads authorized, and Appendix J, Map 7 and Appendix J, Map 10 for the spatial location.
- Establish VQOs for all new summer and winter non-motorized and motorized trails (see proposed Forest Plan amendments below) important to the recreational experience desired by users of these trails.

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Table 2-14. Summary of motorized trail designation, by alternative, including miles within and outside of Riparian Conservation Areas (RCAs)

	Alternative A—No Action (miles)			Alternative B—Proposed Action (miles for vehicles 50 inches or less)			Alternative C (miles for vehicles 50 inches or less)			Alternative D (miles for vehicles 60 inches or less)			Alternative E (miles)			Alternative F (miles for vehicles 60 inches or less)		
Trail Designation Proposed Activity	Total)	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs
Trail construction—new construction	0	0	0	1.5	1.1	0.4	1.3	1.2	0.1	1.3	1.2	0.1	0	0	0	1.2	1.1	0.1
Trail construction—new construction with visible prism	0	0	0	0.6	0.3	0.3	0.6	0.3	0.3	0.6	0.3	0.3	0	0	0	0.4	0.2	0.2
Existing road (ML 2 Administrative Use Only) with mixed use as motorized	0	0	0	6.3	4.1	2.2	6.3	4.1	2.2	6.3	4.1	2.2	0	0	0	5.6	3.8	1.8
Existing road (ML 1)—Designated as motorized trail	0	0	0	12.8	9.8	3.0	11.7	8.4	3.3	11.7	8.4	3.3	0	0	0	10.3	7.4	2.9
Convert existing road (ML 1) to motorized trail	0	0	0	2.1	1.4	0.7	2.1	1.4	0.7	2.1	1.4	0.7	0	0	0	1.3	0.7	0.6
Totals	0	0	0	23.3	16.7	6.6	22.0	15.4	6.6	22.0	15.4	6.6	0	0	0	18.8	13.2	5.6

Table 2-15. Summary of the winter nonmotorized trail system, including miles within and outside of Riparian Conservation Areas (RCAs)

	Alternative A—No Action (miles)			Alternative B—Proposed Action (miles)			Alternative C (miles)			Alternative D (miles)			Alternative E (miles)			Alternative F (miles)		
Trail Authorization Proposed Activity	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs
Groomed route, nonmotorized trail	0	0	0	29.2	13.2	16.0	29.2	13.2	16.0	29.2	13.2	16.0	29.2	13.2	16.0	29.2	13.2	16.0
Ungroomed route, nonmotorized trail	0	0	0	31.0	21.5	9.5	31.0	21.5	9.5	31.0	21.5	9.5	31.0	21.5	9.5	31.0	21.5	9.5
Totals	0	0	0	60.2	34.7	25.5	60.2	34.7	25.5	60.2	34.7	25.5	60.2	34.7	25.5	60.2	34.7	25.5

Table 2-16. Summary of the summer nonmotorized trail system, including miles within and outside of Riparian Conservation Areas (RCAs)

	Alternative A—No Action (miles)			Alternative B—Proposed Action (miles)			Alternative C (miles)			Alternative D (miles)			Alternative E (miles)			Alternative F (miles)		
Trail Designation Proposed Activity	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs	Total	Outside RCAs	Within RCAs
Authorize nonmotorized trail on unauthorized routes	0	0	0	19.8	13.6	6.2	19.8	13.6	6.2	19.8	13.6	6.2	19.8	13.6	6.2	19.8	13.6	6.2
Authorize nonmotorized trail on existing road (ML 1 [closed to all motorized use])	0	0	0	8.70	6.5	2.2	9.0	6.8	2.2	9.0	6.8	2.2	9.0	6.8	2.2	9.0	6.8	2.2
Authorize nonmotorized trail on existing road (ML 2 Administrative Use Only [closed to public motorized use])	0	0	0	7.7	4.50	3.2	4.0	1.9	2.1	4.0	1.9	2.1	9.3	5.1	4.2	4.0	1.9	2.1
Convert existing road (ML 2 [open to all motorized use]) to authorized non-motorized trail	0	0	0	1.2	0.2	1.0	1.2	0.2	1.0	1.2	0.2	1.0	1.5	0.5	1.0	1.5	0.5	1.0
Convert existing road (ML 1 [closed to all motorized use]) to authorized non-motorized trail	0	0	0	3.9	1.5	2.4	3.9	1.5	2.4	3.9	1.5	2.4	6.5	3.3	3.2	6.5	3.3	3.2
Totals	0	0	0	41.3	26.3	15.0	37.9	24.0	13.9	37.9	24.0	13.9	46.1	29.3	16.8	40.8	26.1	14.7

Table 2-17. Summary of National Forest System road/trail system shared motorized and nonmotorized uses

Description of Shared Use	Alternative A—No Action (miles)	Alternative B—Proposed Action (miles)	Alternative C (miles)	Alternative D (miles)	Alternative E (miles)	Alternative F (miles)
Miles of shared use traffic where nonmotorized recreational and/or motorized recreational (unlicensed motor vehicles) traffic share ML 2 roads open to all motor vehicles	72.5	43.8	48.3	48.3	43.8	48.3
Miles of shared use traffic where nonmotorized recreational and or motorized recreational (motor vehicles 50 inches or less in width) traffic share motor vehicle trails	0	1.9	1.6	1.6	0	1.6
Totals	72.5	45.7	49.9	49.9	43.8	49.9

Table 2-18. Summary of Trailheads established to support trail opportunities

Trailheads	Alternative A—No Action	Alternative B—Proposed Action	Alternative C	Alternative D	Alternative E	Alternative F
Number of new or relocated trailheads	0	2	2	2	1	2
Number of existing authorized trailheads	6	6	6	6	6	6

Purpose 4—Support to Local and Regional Economies

To address Purpose 4 (see section 1.4) Alternative B would accomplish the following:

- Maintain and improve recreational opportunities in the project area to support the local economy. Purpose 3 identifies the recreational opportunities that would be maintained or enhanced in the project area (Forest Service 2010b, pp. III-64 and III-79).
- Provide wood products from vegetation restoration activities to local and regional economies. Forested lands within the project area are classified as MPC 5.1 in the 2010 Forest Plan. Most forestlands in MPC 5.1 have been identified in the Forest Plan as suitable for timber management where wood products produced from treatments are an outcome of achieving restoration objectives. MPC 5.1 emphasizes restoring or maintaining vegetation within desired conditions to provide a diversity of wildlife habitats, reduce risk from undesirable disturbance events, and support sustainable human uses of resources (Forest Service 2010b, p. III-90). Purpose 1 identifies the vegetation restoration needs that would result in commercial wood products in the project area. Refer to Table 2-19 for the estimated volume of various would products anticipated to result from implementation of Alternative B.

Table 2-19. Summary of the commercial production under the Proposed Action

Type of Production	Million Board Feet (MMBF)
Commercial Sawtimber	5.5
Misc. Wood Products[a]	2.9
Total	8.4

[a]Misc. wood products may include commercial fuelwood, post and pole and/or biomass.

- Provide additional economic opportunities to local and regional economies through other forest restoration activities. These activities benefit local and regional economies by creating demand for supplies and materials and a labor force. Purposes 1, 2, and 3 identify the needs for non-commercial vegetation and transportation and aquatic resource restoration and management in the project area that are anticipated to generate additional revenues in support of local and regional economies (Forest Service 2010b, p. III-79).

  The estimated job creation from the American Recovery and Reinvestment Act of 2009 (US President 2009) was that $92,000 of government spending created 1 job/year, and that 64% of jobs created were from direct or indirect employment. The following restoration activities are expected to generate additional direct and indirect support to local and regional economies include:

  - Road realignment, construction, reconstruction, and maintenance
  - Motorized and nonmotorized recreation trail realignment, construction, reconstruction, and maintenance
  - AOP culvert replacement or improvements
  - Precommercial thinning
  - Installation of road closure devices (seasonal or long term)
  - Activity fuel treatments, both mechanical and prescribed fire

2.4.2.2 Proposed Forest Plan Amendments

Proposed Forest Plan Amendment #1

MA 7 VQO table (Table 2-20) associated with Forest Plan standard 0763 would be amended (bolded portion) to provide the following VQOs for the 23.3 miles of designated motorized trail for vehicle less than or equal to 50 inches width, 60.2 miles of authorized nonmotorized over-snow tail route miles, and 41.3 miles of authorized nonmotorized trails for non-snow period use**.** In addition, VQO objectives will also be assigned to the areas as viewed from the existing yurt system.

Table 2-20. Proposed Amendments to standard 0763 in the Forest Plan concern Visual Quality Objectives around visually sensitive areas. This table displays additions proposed and does not change the existing requirements in the Table displayed in Forest Plan Management Area 07

Sensitive Travel Route Or Use Area	Sensitivity Level	Visual Quality Objective								
		Fg			Mg			Bg		
		Variety Class			Variety Class			Variety Class		
			B	C	A	B	C	A	B	C
Forest Trails, non-motorized summer: 700 - 730	2	PR	PR	M	PR	M	M	PR	M	MM
Forest Trails, non-motorized winter: 700-730	2	PR	PR	M	PR	M	M	PR	M	MM
Forest Trails, motorized summer:,731-769	2	M	M	M	M	M	M	M	M	MM
Yurts: Whispering Pine, Stargazer, Skyline, Banner Ridge and Elkhorn	2	PR	PR	M	PR	M	M	PR	M	MM

Proposed Forest Plan Amendment #2: To further achievement of Purpose 1 along Highway 21, MA 7 VQO retention requirements along Highway 21 would be amended to allow for partial retention requirements for that section of the highway that fall between Banner Ridge south to Whoop-um Up. The retention requirement would continue to apply for all other activities along Highway 21 outside north and south of this segment of the highway.

Sensitive Travel Route Or Use Area	Sensitivity Level	Visual Quality Objective								
		Fg			Mg			Bg		
		Variety Class			Variety Class			Variety Class		
		A	B	C	A	B	C	A	B	C
Highway 21 (Banner Ridge South to Whoop-um Trailhound	1	PR	PR	PR	PR	PR	PR	PR	PR	M

Proposed Forest Plan Errata: The following Management Area objectives currently located in Management 8 should have been included only in Management Area 07 or in both management areas. Thus, the following updates to Forest Plan Management Area 7 direction would be completed as part of Alternative B.

MA 08, Recreation Objective 0844 should have been applied to both MA 7 and MA 8 based on the area/location description in the objective.

Objective	0770	Identify and evaluate opportunities along the Highway 21 corridor to improve recreation opportunities and experiences through additional parking, trails and trailhead facilities, and yurts, as well as improvements to existing recreation facilities.

MA 08, Recreation Objective 0841 should have been applied to both MA 7 and MA 8 based on the area/location description in the objective.

Objective	0771	Minimize conflicts between backcountry skiers and snowmobilers arising from increased winter recreation use in the upper Mores Creek/Pilot Peak area.

MA 08, Recreation Objective 0843 should have been applied to both MA 7 and MA8 based on the area/location description in the objective.

Objective	0772	Continue to coordinate with Counties (Boise/Elmore) and other groups related to grooming trails for over-snow activities to maintain these winter recreation opportunities.

MA 08, Recreation Objective 0845 should have been in MA 7 and not in MA8 based on the area/location description in the objective.

Objective	0773	Protect the groomed cross-country ski system from the Gold Fork parking lot to Beaver Creek Summit from damage by unauthorized snowmobile use.

MA 08, Recreation Objective 0850 should have been applied to both MA 7 and MA8 based on the area/location description in the objective.

Guideline	0774	Continue coordination with the State of Idaho on management of park-and-ski areas to maintain winter recreation opportunities.

2.4.3 Alternative C

Alternative C was developed in response to updates recommended by the IDT in response to comments received, as well as to fully or partially address Issues 5, 7 and 11 identified in Chapter 1 (section 1.11).

2.4.3.1 Purpose and Need

Changes between the Proposed Action and Alternative C directly affect actions proposed under Purpose 3 and indirectly affect actions proposed under Purpose 2.

Purpose 1—Vegetation Management

To address Purpose 1 (see section 1.4), Alternative C would accomplish the following:

- Implement the same actions as described under Alternative B for the *non-lethal* fire regime
- Implement the *same* actions as described under Alternative B for the *mixed1* fire regime
- Implement the *same* actions as described under Alternative B within RCAs in the non-lethal and mixed1 fire regimes
- Implement the *same* actions as described under Alternative B for logging systems and temporary road construction

Refer to Table 2 1 and Table 2 4. for acres of fire and mechanical vegetation treatments and Figures 2-5 and 2-6 for a spatial display of the location of these treatments. Refer to Table 2-2, Table 2-3, and Table 2-5 for treatments pertaining riparian conservation areas. Refer to Table 2-7 and Table 2-8 for miles of temporary roads and acres of logging systems, and Appendix J, Map 12 for their spatial location.

Purpose 2—Watershed Restoration

To address Purpose 2 (see section 1.4), Alternative C would accomplish the following:

- Decommission authorized roads and unauthorized routes within the project area the *same* as described under Alternative B (Table 2-10 and Appendix J, Map 12).
- Close NFS roads in the project area open to public motorized use that have been identified as only needed to support restoration activities (Forest Service 2014b) in order to reduce impacts such as sediment delivery to streams, removal of snags and down logs important to wildlife, and spread and/or introduction of noxious weeds similar to Alternative B, with the following change:

In response to Issue 5[9] identified in Chapter 1 (section 1.11), Alternative C would maintain the current seasonal closure on NFS road 362F, and access on NFS road 394B would include a seasonal closure that would allow public motor vehicle access to the Skyline and Stargazer Yurts from June 16 to September 14. Idaho Department of Parks and Recreation would have administrative access during the seasonal closure period.

- Alternative C would close about 4.3 fewer miles Alternative B of NFS roads to public motorized use.
- Reduce undesirable impacts to stream systems, aquatic habitat, and wildlife habitat through road reconstruction and relocation to more suitable locations, thus reducing road-related effects while providing access to meet long-term management objectives the *same* as described for Alternative B (Table 2-10 and Appendix J, Map 9.

[9] If the public access roads to the Skyline (Road 362F) and Stargaze (Road 394B) yurt summer parking spots are closed, summer use will drop dramatically if the public has to walk in 1.5 to 2 miles from Highway 21. … The Department recommends that season closure to the Skyline be removed on Road 362F to allow motor vehicle access to the yurt in the spring, summer and fall on Forest Road 362F.

Alternative C would replace existing culvert structures that do not provide AOP with structures that do provide AOP or, alternatively, modify habitat below these culverts to provide AOP the *same* as Alternative B (Table 2-13 and Appendix J, Map 12).

- Maintain access to two active mining claims same as identified under Alternative B (Table 2-10 and Appendix J, Map 12 and Map 13).

Purpose 3—Recreation

To address Purpose 3 (see section 1.4), Alternative C would accomplish the following:

- Reduce risks of uncharacteristic or undesirable disturbance events that would reduce forested overstory cover important to the quality of the recreational experience in the project area the *same* as described under Alternative B (Table 2-1 and Table 2-4 and Appendix J, Map 14 and Appendix J, Map 15).
- Modify the transportation system to improve the quality and diversity of the recreational experience in the project area similar to that done under Alternative B with the following exception:

As discussed under Purpose 2, in response to Issue #5[10] identified in Chapter 1 (section 1.11), Alternative C would keep the current seasonal closure (September 15–June 15) on NFS road 362F, and access on NFS road 394B would include a seasonal closure (May 1–June 15) that would allow public motor vehicle access to Skyline and Stargazer Yurts outside the seasonal closure period. Idaho Parks and Recreation would have administrative access during the seasonal closure period. (Table 2-11).

- Authorize summer nonmotorized trails in the project area to improve opportunities for hiking, mountain biking, and/or horseback riding, during the snow-free season. Alternative C would authorize approximately 3.4 miles of summer nonmotorized trails less than Alternative B (Table 2-16 and Appendix J, Map 14).
- Authorize and relocate trailhead facilities at Beaver Creek Summit to support the nonmotorized trail system and provide a safe parking location off of Highway 21 the *same* as Alternative B (Table 2-18 and Appendix J, Map 12 and Appendix J, Map 14).
- Authorize a system of over-snow or winter nonmotorized trails in the project area to provide a good mix of groomed and ungroomed routes on nonmotorized trails that would provide a separation between motorized and nonmotorized winter uses, thus reducing the potential for conflict between motorized and nonmotorized recreationists, the *same* as Alternative B.

[10] If the public access roads to the Skyline (Road 362F) and Stargaze (Road 394B) yurt summer parking spots are closed, summer use will drop dramatically if the public has to walk in 1.5 to 2 miles from Highway 21. … The Department recommends that season closure to the Skyline be removed on Road 362F to allow motor vehicle access to the yurt in the spring, summer and fall on Forest Road 362F.

However, unlike Alternative B, Alternative C would include a new winter motorized restriction area. Alternative B was supposed to include this over snow vehicle (OSV) restriction, however, the scoping document that was sent out did not include a discussion about this restriction. Some commenters during scoping were aware of the Agency's interest to propose the restriction, which resulted in Issue 11[11] (section 1.11). Because the Proposed Action was supposed to include this restriction, Alternative C adds approximately 3,309 acres of winter OSV restriction to the south and west of Highway 21 (east of the highway currently includes a winter closure) (Table 2-15 and Appendix J, Map 15).

- Designate a motorized loop trail system for vehicles 50 inches or less in width within the project area to enhance designated motorized trail opportunities currently not available in the project area similar to that proposed under Alternative B, with the following exception:

In partial response to Issue 7 identified in Chapter 1 (section 1.11) Alternative C would reduce the miles of new trail construction within RCA by 0.3 miles , utilize existing road/trail prisms to reduce new ground disturbance, and reduce the number of new trail/stream crossings (Table 2-12 and Appendix J, Map 14).

- Construct and authorize trailhead facilities at the junction of NFS roads 312 and 385 to support the motorized trail system and provide a safe parking location off of NFS roads open to public motorized use the *same* as under Alternative B (Table 2-18 and Appendix J, Map 12 and Appendix J, Map 14).
- Establish VQOs for all new summer and winter non-motorized and motorized trails (see proposed Forest Plan amendments below) important to the recreational experience desired by users of these trails the *same* as under Alternative B.

Purpose 4—Support to Local and Regional Economies

To address Purpose 4 (see section 1.4), Alternative C would accomplish the following:

- Maintain and improve recreational opportunities in the project area to support the local economy. Changes in how the issues altered the actions proposed under Alternative B compared to Alternative C are identified above under the Purpose 3 discussion for Alternative C.
- Provide wood products from vegetation restoration activities to local and regional economies the same as Alternative B.
- Provide additional economic opportunities to local and regional economies through the following forest restoration activities similar to Alternative B as noted below:
    - Road realignment, construction, reconstruction, and maintenance—Minimal change per items addressing issues under Purpose 3
    - Motorized and nonmotorized recreation trail realignment, construction, reconstruction, and maintenance—Minimal change per items addressing issues under Purpose 3

[11] Winter travel restrictions should not be a part of this project. ... No evidence is shown that there is a need to designate nonmotorized areas.

- AOP culvert replacement or improvements—No change
- Precommercial thinning—No change
- Installation of road closure devices (seasonal or long term)—Minimal change per items addressing issues under Purpose 3
- Activity fuel treatments, both mechanical and prescribed fire—No change

2.4.3.2 Proposed Forest Plan Amendments under Alternative C

Alternative C addresses the Forest Plan amendments as noted below:

- Proposed Forest Plan Amendment 1—No Change from Alternative B
- Proposed Forest Plan Amendment 2—No Change from Alternative B
- Proposed Forest Plan Errata—No Change from Alternative B

2.4.4 Alternative D

Alternative D was developed to fully or partially address commenter-requested Alternative 4 and Issues 5, 6 and 7 as identified in Chapter 1 (sections 1.11 and 1.12).

2.4.4.1 Purpose and Needs

Alternative D directly affects actions proposed under Purposes 1 through 4.

Purpose 1—Vegetation Management

To address Purpose 1 (see section 1.4) in the *non-lethal* fire regime, Alternative D would do the following:

- Implement the *same* actions as described under Alternative B
- Treat an additional 22 acres in the non-lethal fire regime in response to commenter-requested Alternative 4. The vegetation treatment for the additional 22 acres would be thinning with commercial product removal.

To address Purpose 1 (see section 1.4) in the *mixed1* fire regime, Alternative D would do the following:

- Implement the same actions as described under Alternative B
- Treat an additional 160 acres in the mixed1 fire regime in response to commenter-requested Alternative 4. The vegetation treatments for the additional 160 acres include about 65 acres of thinning with commercial product removal and approximately 95 acres of mixed treatment located outside of plantations.

To address Purpose 1 (see section 1.4) within RCAs in both the non-lethal and mixed1 fire regime, Alternative D would do the following:

- Implement the same actions as described under Alternative B
- Treat an additional 21 RCA acres in the non-lethal and mixed1 fire regime in response to commenter requested Alternative 4

To address logging systems and temporary road construction for Purpose 1 (see section 1.4), Alternative D would accomplish the following:

- Implement the *same* actions as described under Alternative B
- Add acres of ground-based logging and miles of temporary road construction to treat the additional 182 acres in the non-lethal and mixed1 fire regime identified above in response to commenter-requested Alternative 4

Refer to Table 2-4 for acres of mechanical and fire vegetation treatments and Appendix J, Map 16 and Appendix J, Map 17 for a spatial display of the location of these treatments. Refer to Table 2-2, Table 2-3, and Table 2-5 for treatments pertaining riparian conservation areas. Refer to Table 2-7 and Table 2-8 for acres of logging systems and miles of temporary roads, and Appendix J, Map 18 and Appendix J, Map 19 for their spatial location.

Purpose 2—Watershed Restoration

To address Purpose 2 (see section 1.4), Alternative D would accomplish the following:

- Decommission authorized roads and unauthorized routes within the project area the *same* as described under Alternative B (Table 2-10 and Appendix J, Map 18)
- Close NFS roads in the project area open to public motorized use that have been identified as only needed to support restoration activities (Forest Service 2014b) in order to reduce impacts such as sediment delivery to streams, removal of snags and down logs important to wildlife, and spread and/or introduction of noxious weeds similar to Alternative B, with the following change:

In response to Issue 5[12] identified in Chapter 1 (section 1.11), Alternative D would remove the seasonal closure on NFS road 362F and access on NFS road 394B would remain the same as the current condition, which would allow motor vehicle access to the yurts during the snow-free season (Table 2-11 andTable 2-12 and Appendix J, Map 18).

- Alternative D would close approximately 4.3 fewer miles NFS roads to public motorized use.
- Reduce undesirable impacts to stream systems, aquatic habitat, and wildlife habitat through road reconstruction and relocation to more suitable locations, thus reducing road related effects while providing access to meet long-term management objectives the *same* as described for Alternative B (Table 2-10 and Appendix J, Map 18)
- Replace existing culvert structures that do not provide AOP with structures that do provide AOP or, alternatively, modify habitat below these culverts to provide AOP the *same* as Alternative B (Table 2-13 and Appendix J, Map 9)
- Maintain access to two active mining claims same as identified under Alternative B (Table 2-10 and Appendix J, Map 18)

[12] If the public access roads to the Skyline (Road 362F) and Stargaze (Road 394B) yurt summer parking spots are closed, summer use will drop dramatically if the public has to walk in 1.5 to 2 miles from Highway 21. … The Department recommends that season closure to the Skyline be removed on Road 362F to allow motor vehicle access to the yurt in the spring, summer and fall on Forest Road 362F.

Purpose 3—Recreation

To address Purpose 3 (see section 1.4), Alternative D would accomplish the following:

- Reduce risks of uncharacteristic or undesirable disturbance events that would reduce forested overstory cover important to the quality of the recreational experience in the project area the *same* as described under Alternative B *plus* reduce the risk of uncharacteristic or undesirable disturbance events that would reduce forested overstory cover important to the quality of the recreational experience on the additional acres identified under Purpose 1 above (Table 2-1 and Table 2-4 and Appendix J, Map 20 and Appendix J, Map 21).
- Modify the transportation system to improve the quality and diversity of the recreational experience in the project area *similar* to Alternative B with the following exception:

As discussed under Purpose 2, ***in response to Issue #5***[13] identified in Chapter 1 (section 1.11), Alternative D would remove the seasonal closure on NFS road 362F, and access on NFS road 394B would remain the same as the current condition, which would allow motor vehicle access to the yurts during the snow-free season (Table 2-11 and Appendix J, Map 18).

- Authorize 37.9 miles of summer nonmotorized trails in the project area to improve opportunities for hiking, mountain biking, and/or horseback riding, during the snow-free season.(Table 2-16 and Appendix J, Map 20)
- Construct and authorize trailhead facilities at Beaver Creek Summit to support the nonmotorized trail system and provide a safe parking location off of Highway 21 the *same* as Alternative B (Table 2-16 and Appendix J, Map 18 and Appendix J, Map 20)
- Authorize a system of over-snow or winter nonmotorized trails in the project area to provide a good mix of groomed and ungroomed routes on nonmotorized trails that would provide separation between motorized and nonmotorized winter uses, thus reducing the potential for conflict between motorized and nonmotorized recreationists the *same* as Alternative B (Table 2-15 and Appendix J, Map 21). Like Alternative B, Alternative D would not include a new winter motorized restriction area.
- Designate motorized loop trail system within the project area to enhance designated motorized trail opportunities currently not available in the project area similar to Alternative B with the following exceptions:
    - ***In partial response to Issue 7*** identified in Chapter 1 (section 1.11), Alternative D would reduce the miles of new trail construction within RCA by 0.3 miles , utilize existing road/trail prisms to reduce new ground disturbance, and reduce the number of new trail/stream crossings (Table 2-12 and Appendix J, Map 20).

[13] If the public access roads to the Skyline (Road 362F) and Stargaze (Road 394B) yurt summer parking spots are closed, summer use will drop dramatically if the public has to walk in 1.5 to 2 miles from Highway 21. … The Department recommends that season closure to the Skyline be removed on Road 362F to allow motor vehicle access to the yurt in the spring, summer and fall on Forest Road 362F.

- ***In response to Issue #6***[14], Chapter 1 (section 1.11), the designated motorized trail system under Alternative D would be designated as a special use trail and would allow vehicles ≤60 inches, thus accommodating ATVs and most UTV vehicles (Table 2-12 and Appendix J, Map 20).

- Construct and authorize trailhead facilities at the junction of NFS roads 312 and 385 to support the motorized trail system and provide a safe parking location off of NFS roads systems open to public motorized use the *same* as under Alternative B (Table 2-18 and Appendix J, Map 18 and Appendix J, Map 20).
- Establish VQOs for all new summer and winter non-motorized and motorized trails (see proposed Forest Plan amendments below) important to the recreational experience desired by users of these trails the *same* as under Alternative B.

Purpose 4—Support to Local and Regional Economies

To address Purpose 4 (see section 1.4), Alternative D would accomplish the following:

- Maintain and improve recreational opportunities in the project area to support the local economy. Changes in how issues affected the actions proposed under Alternatives B and C compared to Alternative D are identified above under the Purposes 1 and 3 discussions
- Provide wood products from vegetation restoration activities to local and regional economies. Under Alternative D, the volume of wood products would increase due to the additional treatment acres identified under Purpose 1 compared to Alternatives B and C (Table 2-21).

Table 2-21.Summary of the commercial production under Alternative D

Type of Production	Million Board Feet (MMBF)
Commercial Sawtimber	5.5
Misc. Wood Products[a]	3.2
Total	8.7

[a]Miscellaneous forest products may include fuelwood, post and pole, and/or optional biomass

- Provide additional economic opportunities to local and regional economies through other forest restoration activities similar to Alternative B as noted below:
    - Road realignment, construction, reconstruction, and maintenance—Minimal change per items addressing issues under Purposes 1, 2, and 3
    - Motorized and nonmotorized recreation trail realignment, construction, reconstruction, and maintenance—Minimal change per items addressing issues under Purpose 3
    - AOP culvert replacement or improvements—No change
    - Precommercial thinning—Additional acres added in response to new acres treated (refer to Table 2-4)

[14] 50" width limit on proposed ATV trails does not take into account the increased popularity of UTV vehicles. UTVs are no longer limited to utilitarian duties. Most manufacturers produce sport versions with high popularity. Most ATV users are migrating to UTV usage. The vast majority of UTV's produced have a 55-61 inch width. Failing to plan for UTV's is failing to plan for future usage

- Installation of road closure devices (seasonal or long term)—Minimal change per items addressing issues under Purpose 3
- Activity fuel treatments, both mechanical and prescribed fire—Additional acres added in response to new acres treated (refer to Table 2-1)

Proposed Forest Plan Amendments under Alternative D

Alternative D addresses the Forest Plan amendments as noted below:

- Proposed Forest Plan Amendment 1—No Change from Alternative B
- Proposed Forest Plan Amendment 2—No Change from Alternative B
- Proposed Forest Plan Errata—No Change from Alternative B

2.4.5 Alternative E: Emphasis on resource benefits/watershed improvement while providing for social and economic benefits (i.e., recreation uses, wood products, etc.)

Alternative E was developed in response to updates to fully or partially address commenter requested Alternatives 1 and 3 and Issues 1, 2, 3, 4, 7, 9, and 10 identified in Chapter 1 (sections 1.11 and 1.12).

2.4.5.1 Purpose and Need

Alternative E directly affects actions proposed under Purposes 1 through 4.

Purpose 1—Vegetation Management

To address Purpose 1 (see section 1.4) in the *non-lethal* fire regime, Alternative E would do the following:

- Implement the *same* mechanical treatment actions as described under Alternative B
- Apply an 18-inch diameter limit for all species to all commercial treatment acres in response to Issue 4. Diameter limits within the RCAs would be the same as displayed in Table 2-6.

To address Purpose #1 (see section 1.4) in the *mixed1* fire regime, Alternative E would do the following:

- Implement the *same* mechanical treatment actions as described under Alternative B
- Apply an 18-inch diameter limit to all commercial treatment acres in response to Issue #4.

To address Purpose #1 (see section 1.4) within riparian conservation areas (RCAs) in both the non-lethal and mixed1 fire regime, Alternative E would implement the same mechanical treatment actions as described under Alternative B, except in response to Issue #4 a 18” diameter limit would be applied on all commercial treatment acres. In addition; adjustments in activity fuels treatments acres were made due to the activity fuel and access changes resulting for logging systems changes from ground-based to helicopter.

Logging Systems and Temporary Road Construction.

In response to commenter requested Alternatives #1 and #3, and Issues #1, #2, #3 and #7, Alternative E would change a number of ground-based logging system acres to helicopter logging. Moving to helicopter logging systems would also reduce the number of temporary road miles needed to support mechanical treatments and impacts to the non-motorized trail system. In addition, activity fuels treatment acres were adjusted because of the activity fuels and access changes that resulted when logging system were changed from ground-based to helicopter. Refer to Table 2-4 and

for acres of mechanical and fire vegetation treatments and Appendix J, Map 22 and Appendix J, Map 23 for a spatial display of the location of these treatments. Refer to Table 2-2, Table 2-3, and Table 2-5 for treatments pertaining riparian conservation areas. Refer to Table 2-7 and Table 2-8 for acres of logging systems and miles of temporary roads, and Appendix J, Map 24 and Appendix J, Map 25 for their spatial location.

Purpose 2—Watershed Restoration

To address Purpose #2 (see section 1.4) Alternative E would:

- Decommission about 24.8 miles of authorized roads and 8.1 miles of unauthorized routes within the project area or approximately 2 miles more than Alternative B.

  Refer to Table 2-10 for miles of authorized roads and unauthorized routes to be decommission, and Appendix J, Map 24 for their spatial location.

- Close approximately 0.4 additional miles of NFS roads in the project area open to public motorized use that have been identified as only needed to support restoration activities (2014 TAP) in order to reduce impacts such as sediment delivery to streams, removal of snags and down logs important to wildlife, and spread and/or introduction of noxious weeds. Refer to Table 2-11 and Table 2-12 for miles of roads open to public motorized use (ML2, ML3 and ML5, and Appendix J, Map 24 for their spatial location
- Reduce undesirable impacts to stream systems, aquatic habitat, and wildlife habitat through road reconstruction and relocation to more suitable locations, reducing road related effects while providing access to meet long-term management objectives the *same* as described for Alternative B.

  2. Refer to Table 2-10 for miles of authorized roads and unauthorized routes to be decommission, and Appendix J, Map 24 for their spatial location.

- Replace existing culvert structures that do not provide AOP with structures that do provide AOP or, alternatively, modify habitat below these culverts to provide AOP the same as Alternative B.

3. Refer to Table 2-13 for the number of AOPs to be replaced or modified, and Appendix J, Map 9 for their spatial location.

- Maintain access to two active mining claims that same as identified under Alternative B.

  Refer to Table 2-10 for miles of authorized roads and unauthorized routes to be decommission, and Appendix J, Map 24 for their spatial location.

Purpose 3—Recreation

To address Purpose #3 (see section 1.4) Alternative E would:

- Reduce risks of uncharacteristic or undesirable disturbance events that would reduce forested overstory cover important to the quality of the recreational experience in the project area the *same* as described under Alternative B (Table 2-4 and Appendix J, Map 26 and Appendix J, Map 27).
- Alternative E would reduce the transportation system authorized for public motorized to 58.3 miles (Map 25 in Appendix J and Table 2-11).

  Refer to Table 2-11 andTable 2-12 for miles of roads open to public motorized use (ML2, ML3, and ML5) and Appendix J, Map 24 for their spatial location.
- Authorize 46.1 miles of summer nonmotorized trails in the project area to improve opportunities for hiking, mountain biking, and/or horseback riding, during the snow-free season the *same* as Alternative B, except ***in response to Issue #10***, Alternative E will include a seasonal closure of all mechanized equipment east of Highway 21 and north of Beaver Creek. This includes both motorized and non-motorized mechanized equipment (e.g. mountain bikes). Closure is from May 1 to June 15 to address big game concern. Yurts can still be rented out and trails can still be used by non-mechanized equipment, hiking, and horseback riding.
- In addition, ***in response to Issue #2,*** acres surrounding non-motorized trails were moved from ground based logging systems to helicopter to reduce the need to open roads and routes used by mountain bikers, hikers and equestrians and staff in order to support log hauling and forest thinning. The issue raised was that opening these roads/routes would change the road/trail surface, remove existing vegetation, and change the overall character of the route and, thus the quality of the experience for the recreation user.

  Refer to Table 2-16 for miles of summer nonmotorized trails authorized, and Appendix J, Map 26 for their spatial location.
- Eliminate public motorized access to the Skyline and Stargazer Yurts managed by Idaho Department of Parks and Recreation by agreement the same as Alternative B. Idaho Department of Parks and Recreation would have administrative access to the yurts.
- Relocate and authorize trailhead facilities at Beaver Creek Summit to support the nonmotorized trail system and provide a safe parking location off of Highway 21 the *same* as Alternative B.

  Refer to Table 2-18 for the number of trailheads authorized, and Appendix J, Map 24 and Appendix J, Map 26 for their spatial location
- In addition, ***in response to Issue #8***, unlike any of the other action alternatives, Alternative E would not include designation of the motorized trail system to reduce conflicts with non-motorized trail users.

  Refer to Table 2-10 and Table 2-12 for miles of motorized trails designated for vehicles 60 inches or less in and out of RCAs, and Appendix J, Map 30 for their spatial location.

- Authorize a system of over-snow or winter nonmotorized trails in the project area to provide a good mix of groomed and ungroomed routes on nonmotorized trails that would provide separation between motorized and nonmotorized winter uses, reducing the potential for conflict between motorized and nonmotorized recreationists. The *same* as Alternative B.

  However, unlike Alternative B, Alternative E would include a new winter motorized restriction area. Thus, like Alternative C, Alternative E adds a winter motorized restriction to the south and west of Highway 21 (east of the highway currently includes a winter closure).

  Refer to Table 2-15 for miles of groomed and ungroomed winter nonmotorized trails authorized, and Appendix J, Map 27 for their spatial location, including the proposed winter motorized restriction area.
- ***In response to Issue #9,*** Chapter 1, Section 1.11, designation of a motorized loop trail system would not be included under Alternative E.
- ***In response to Issue #9,*** Chapter 1, Section 1.11, an authorize trailhead facilities at the junction of NFS roads 312 and 385 to support the motorized trail system would not be established because no motorized trail loop would be designated under Alternative E.
- Establish visual quality objectives (VQOs) for all new summer and winter non-motorized trails (see proposed Forest Plan amendments below) important to the recreational experience desired by users of these trails the *same* as under Alternative B. However, no VQOs would be established for a motorized trail because it is not part of Alternative E.

Purpose 4—Support to Local and Regional Economies

To address Purpose 4 (see section 1.4) Alternative E would:

1. Maintain and improve recreational opportunities in the project area to support the local economy. Changes in how issues affect actions proposed under Alternatives B and C compared to Alternative E are identified above under the Purposes #1 and #3 discussions. Removal of the motorized trail, seasonal restrictions and access changes to Yurts are the most substantial impacts. However, moving to helicopter logging systems around the non-motorized trail system would have a different effect on the vegetation surrounding single track trails than had the area been logged with ground based systems requiring development of temporary roads.
2. Provide wood products from vegetation restoration activities to local and regional economies would decrease due to the addition of helicopter acres and application of the 18 inch diameter limit on commercial treatment acres identified under Purpose #1 compared to Alternatives B, C, or D (Table 2-22).

Table 2-22. Summary of the commercial production under Alternative E

Type of Production	Million Board Feet (MMBF)
Commercial Sawtimber	3.3
Misc. Wood Productsa	2.9
Total	6.2

[a]Miscellaneous forest products may include fuelwood, post and pole, and/or optional biomass

3. Provide additional economic opportunities to local and regional economies through other forest restoration activities similar to that described under Alternative B:

- Road realignment, construction, reconstruction, and maintenance: Minimal change per items addressing issues under Purposes #1, #2 and #3.
- Motorized and nonmotorized recreation trail realignment, construction, reconstruction, and maintenance: Minimal change per items addressing issues under Purpose #3.
- AOP culvert replacement or improvements: No change
- Precommercial thinning: Additional acres added in response to new acres treated (refer to Table 2-4)
- Installation of road closure devices (seasonal or long term): Minimal change per items addressing issues under Purpose #3.
- Activity fuel treatments, both mechanical and prescribed fire: Additional acres added in response to new acres treated (refer to Table 2-1)

Proposed Forest Plan Amendments Under Alternative E:

Proposed Forest Plan Amendment #1: No Change from Alternative B for non-motorized trails. However, because there would be no motorized trail established under this alternative, no amendment to VQOs are proposed for a motorized trail.

Proposed Forest Plan Amendment #2: No Change from Alternative B

Proposed Forest Plan Errata: No Change from Alternative B

2.4.6 Alternative F: Recreation Emphasis. Balancing motorized and non-motorized uses while addressing biophysical restoration needs.

Alternative D was developed to fully or partially address commenter requested Alternatives 1 and 3, as well as Issues 1, 2, 3, 5 and 7 and 8 identified in Chapter 1, sections 1.11 and 1.12. These changes directly affect actions proposed under Purposes 1 through 4.

Purpose 1—Vegetation Management

To address Purpose #1 (see section 1.4) in the non-lethal fire regime, Alternative F would implement the *same* mechanical treatment actions as described under Alternative B, except adjustments in activity fuels treatments acres were made due to the activity fuel and access changes resulting for logging systems changes from ground-based to helicopter.

To address Purpose #1 (see section 1.4) in the mixed1 fire regime, Alternative F would implement the *same* mechanical treatment actions as described under Alternative B, except adjustments in activity fuels treatments acres were made due to the activity fuel and access changes resulting for logging systems changes from ground-based to helicopter.

To address Purpose #1 (see section 1.4) within riparian conservation areas (RCAs) in both the non-lethal and mixed1 fire regime, Alternative F would implement the *same* mechanical treatment actions as described under Alternative B, except adjustments in activity fuels treatments acres were made due to the activity fuel and access changes resulting for logging systems changes from ground-based to helicopter.

*Logging Systems and Temporary Road Construction. I**n response to commenter requested Alternatives #1 and #3, and Issues #1, #2, #3 and #7***, Alternative F would change a number of ground-based logging system acres to helicopter logging. Moving to helicopter logging systems would also reduce the number of temporary road miles needed to support mechanical treatments and impacts to the non-motorized trail system.

Refer to Table 2-1 and Table 2-4 for acres of fire and mechanical vegetation treatments and Appendix J, Map 28 and Appendix J, Map 29 for a spatial display of the location of these treatments. Refer to Table 2-2, Table 2-3, and Table 2-5 for treatments pertaining riparian conservation areas. Refer to Table 2-7 and Table 2-8 for miles of temporary roads and acres of logging systems and Appendix J, Map 30 and Appendix J, Map 31 for their spatial location.

Purpose 2—Watershed Restoration

To address Purpose #2 (see section 1.4) Alternative Fwould:

- Decommission about 23.6 miles of authorized roads and 8.1 miles of unauthorized routes within the project area or approximately one mile more than Alternative B.

  Refer to Table 2-10 for miles of authorized roads and unauthorized routes to be decommission, and Appendix J, Map 30 for their spatial location.

- Close NFS roads in the project area open to public motorized use that have been identified as only needed to support restoration activities (2014 TAP) in order to reduce impacts such as sediment delivery to streams, removal of snags and down logs important to wildlife, and spread and/or introduction of noxious weeds similar to Alternative B, with the following change:

4. ***In response to Issue #5***[15] identified in Chapter 1, section 1.11, Alternative F would keep the current seasonal closure on Road 362F, and access on Road 394B will include a seasonal closure allowing public motor vehicle access to the yurt

[15] If the public access roads to the Skyline (Road 362F) and Stargaze (Road 394B) yurt summer parking spots are closed, summer use will drop dramatically if the public has to walk in 1.5 to 2 miles from Highway 21. … The Department recommends that season closure to the Skyline be removed on Road 362F to allow motor vehicle access to the yurt in the spring, summer and fall on Forest Road 362F.

outside the seasonal closure period. IDPR will have administrative access during the seasonal closure period. Under Alternative B these roads are closed year-round to public motorized use, though available to IDPR for administrative use.

Refer to Table 2-11 andTable 2-12 for miles of roads open to public motorized use (ML2, ML3 and ML5) and Appendix J, Map 30 for their spatial location

- Alternative F would close 4.7 miles less than Alternative B of NFS roads to public motorized use.
- Reduce undesirable impacts to stream systems, aquatic habitat, and wildlife habitat through road reconstruction and relocation to more suitable locations, reducing road related effects while providing access to meet long-term management objectives the *same* as described for Alternative B.

5. Refer to Table 2-10 for miles of authorized roads and unauthorized routes to be decommission, and Appendix J, Map 30for their spatial location.

- Replace existing culvert structures that do not provide AOP with structures that do provide AOP or, alternatively, modify habitat below these culverts to provide AOP the *same* as Alternative B.

6. Refer to Table 2-13 for the number of AOPs to be replaced or modified, and Appendix J, Map 9 for their spatial location.

- Maintain access to two active mining claims that same as identified under Alternative B.

  Refer to Table 2-10 for miles of authorized roads and unauthorized routes to be decommission, and Appendix J, Map 30 for their spatial location.

Purpose 3—Recreation

To address Purpose #3 (see section 1.4) Alternative C would:

- Reduce risks of uncharacteristic or undesirable disturbance events that would reduce forested overstory cover important to the quality of the recreational experience in the project area the *same* as described under Alternative B (Table 2-1 and Table 2-4 and Appendix J, Map 32 and Appendix J, Map 33).
- Modify the transportation system to improve the quality and diversity of the recreational experience in the project area similar to that done under Alternative B with the following exception:

    7. ***As discussed under Purpose #2, in response to Issue #5***[16] identified in Chapter 1, section 1.11, Alternative C would keep the current seasonal closure on Road 362F and access on Road 394B will include a seasonal closure allowing public motor vehicle access to the Yurt outside the seasonal closure period. IDPR will have administrative access during the

[16] If the public access roads to the Skyline (Road 362F) and Stargaze (Road 394B) yurt summer parking spots are closed, summer use will drop dramatically if the public has to walk in 1.5 to 2 miles from Highway 21. … The Department recommends that season closure to the Skyline be removed on Road 362F to allow motor vehicle access to the yurt in the spring, summer and fall on Forest Road 362F.

seasonal closure period. Under Alternative B these roads are closed year round to public motorized use, though available to IDPR for administrative use.

Refer to Table 2-11 and Table 2-12 for miles of roads open to public motorized use (ML2, ML3, and ML5) and Appendix J, Map 30 for their spatial location.

- Authorize 40.8 miles of summer nonmotorized trails in the project area to improve opportunities for hiking, mountain biking, and/or horseback riding, during the snow-free season

  Refer to Table 2-16 for miles of summer nonmotorized trails authorized, and Appendix J, Map 32 for their spatial location.

- Authorize trailhead facilities at Beaver Creek Summit to support the nonmotorized trail system and provide a safe parking location off of Highway 21 the *same* as Alternative B.

  Refer to Table 2-18 for the number of trailheads authorized, and Appendix J, Map 30 and Appendix J, Map 32 for the spatial location

- Authorize a system of over-snow or winter nonmotorized trails in the project area to provide a good mix of groomed and ungroomed routes on nonmotorized trails that would provide separation between motorized and nonmotorized winter uses, reducing the potential for conflict between motorized and nonmotorized recreationists. The *same* as Alternative B.

  However, unlike Alternative B, Alternative F would include a new winter motorized restriction area. Alternative B was supposed to include this restriction, however, the scoping document that was sent out did not include a discussion about this. Some commenters during scoping were aware of the Agency's interest to propose the restriction which resulted in Issue #11[17], Chapter 1, section 1.11. Thus, in response to the fact that the PA was supposed to include this, Alternative F adds the winter restriction to the south and west of Highway 21 (east of the highway currently includes a winter closure).

  Refer to Table 2-15 for miles of groomed and ungroomed winter nonmotorized trails authorized, and Appendix J, Map 33 for their spatial location, including the proposed winter motorized restriction area.

- Designate motorized loop trail system within the project area to enhance designated motorized trail opportunities currently not available in the project area similar to that proposed under Alternative C, which:

  In partial response to Issue #7 identified in Chapter 1, section 1.11, like Alternative C and D, Alternative F, would reroute portions of the proposed motorized trail to reduce miles in RCAs. Alternative C would reduce the miles of new trail construction within RCA by 0.3 miles, utilize existing road/trail prisms to reduce new ground disturbance, and reduce the number of new trail/stream crossings .

[17] Winter travel restrictions should not be a part of this project. ... No evidence is shown that there is a need to designate nonmotorized areas

However, like Alternative D, ***in response to Issue #6***[18], Chapter 1, section 1.11, the designated motorized trail system would be designated as a special use trial allowing vehicles ≤ 60 inches, accommodating ATV and most UTV vehicles under Alternative F.

- Construct and authorize trailhead facilities at the junction of NFS roads 312 and 385 to support the motorized trail system and provide a safe parking location off of NFS roads systems open to public motorized use the *same* as under Alternative B.

  Refer to Table 2-18 for number of trailheads authorized, and Appendix J, Map 30 and Appendix J, Map 32 for their spatial location.
- Establish visual quality objectives (VQOs) for all new summer and winter non-motorized and motorized trails (see proposed Forest Plan amendments below) important to the recreational experience desired by users of these trails the *same* as under Alternative B.

Purpose 4—Support to Local and Regional Economies

To address Purpose 4 (see section 1.4) Alternative F would:

- Maintain and improve recreational opportunities in the project area to support the local economy. Changes in how issues affect actions proposed under Alternative B compared to Alternative F are identified above under the Purpose 3 discussion.
- Provide wood products from vegetation restoration activities to local and regional economies similar to that identified under Alternative B.
- Provide additional economic opportunities to local and regional economies through other forest restoration activities similar to that described under Alternative B:
- Road realignment, construction, reconstruction, and maintenance: Minimal change per items addressing issues under Purpose #3.
- Motorized and nonmotorized recreation trail realignment, construction, reconstruction, and maintenance: Minimal change per items addressing issues under Purpose #3.
- AOP culvert replacement or improvements: No change
- Precommercial thinning: No change
- Installation of road closure devices (seasonal or long term): Minimal change per items addressing issues under Purpose #3.
- Activity fuel treatments, both mechanical and prescribed fire: Some changes as a result of changes from ground-based logging to helicopter logging discussed under Purpose #1 above.

2.4.6.1 Proposed Forest Plan Amendments under Alternative F

Proposed Forest Plan Amendment #1: No Change from Alternative B

[18] 50" width limit on proposed A TV trails does not take into account the increased popularity of UTV vehicles. UTV's are not limited to utilitarian duties any longer. Most manufacturers produce sport versions with high popularity. Most ATV users are migrating to UTV usage. The vast majority of UTV's produced have a 55-61 inch width. Failing to plan for UTV's is failing to plan for future usage

Proposed Forest Plan Amendment #2: No Change from Alternative B

Proposed Forest Plan Errata**:** No Change from Alternative B

2.4.7 Design Features Common to All Action Alternatives

In addition to 2010 Forest Plan standards and guidelines designed to mitigate resource impacts, the IDT identified design features for the action alternatives. The following design features were incorporated to either avoid or minimize undesirable effects or to achieve a desired outcome when implementing the activities proposed for this project.

2.4.7.1 Cultural Resources (CR)

CR-1 Avoid and protect all known historic properties during Project implementation.

CR-2 Design contracts implementing this Project to prevent adverse impacts to any unknown cultural sites discovered during Project implementation. In the event of an inadvertent discovery of a new cultural site, ground-disturbing activities in the immediate vicinity of the discovery would cease until the Forest Archeologist is notified and the Idaho SHPO and potentially affected Indian tribes are consulted.

2.4.7.2 Fire and Fuels (FF)

FF-1 A Prescribed Fire Burn Plan would be written according to the guidelines found in the Interagency Prescribed Fire Management Handbook and FSM 5140. The Burn Plan would specify weather parameters to ensure that fire behavior and effects are within a desired range. The Burn Plan would incorporate mitigations to ensure proper air mixing heights and transport winds to protect air quality and environmental parameters that would safely meet management objectives.

FF-2 Post public notification in periodicals, on the Forest website, and/or on onsite kiosks and post cautionary signage on primary access routes and State Highway 21 prior to implementing any prescribed burn activities. These notifications would inform the public of planned activities, potential smoke effects, and impacts to recreational use of the Project area.

FF-3 To minimize the potential for increased erosion and sediment delivery to adjacent streams, no fireline and/or handline to facilitate prescribed fire activities would be constructed within RCAs unless needed to control fire spread. If needed within the RCA, handlines would be promptly (within 1 month) reclaimed following burn activities. Reclamation may include pulling back vegetation and/or slash over mineral soil to provide sediment obstructions and/or installing waterbars.

FF-4 Slash generated from whole-tree yarding activities shall be piled. Piles shall be compact and free of soil, stumps, snow, and non-woody organic material.

FF-5 Handpiles generated from thinning within RCAs would be limited to <6 feet in diameter and up to 60 piles per acre distributed across the burn unit to

provide unburned vegetative buffers and located outside wetlands/seeps and riparian/wetland plant communities.

FF-6 Slash created by Project activities would be removed, burned, chipped, or lopped and scattered to a height of 2 feet or less. Slash piling would occur concurrently with thinning operations or within one season of treatment, weather permitting.

2.4.7.3 Air Quality (AQ)

AQ-1 Ensure atmospheric conditions are within prescription when a burn is ignited and monitor smoke dispersal and impacts throughout ignition. If there is potential for the smoke to cause unacceptable impacts to transportation safety or public health and safety in surrounding communities, ignition would cease, provided control of the burn is not compromised.

AQ-2 Coordinate and cooperate with the Idaho/Montana Airshed Group (USDA Forest Service 2010a) to help ensure that smoke emissions from all cooperators remain below National Ambient Air Quality particulate thresholds for sensitive receptors.

AQ-3 Contact individuals residing in Idaho City, Lowman, or affected areas who are known to be sensitive to smoke at least 2 days prior to burning activities to allow adequate time for these residents to take the necessary precautions.

2.4.7.4 Fisheries, Hydrology, and Soil Resources (FH)

FH-1 Store no fuel in RCAs (Forest Plan Standard SWST11, USDA Forest Service 2010a. p. III-22). Refueling or servicing of vehicles or equipment would not take place within RCAs. All equipment shall be in good repair and free of leakage of lubricants, fuels, coolants, and hydraulic fluid.

FH-2 Waste resulting from road and trail activities, logging operations, and burning operations such as crankcase oil, filters, grease tubes, oil containers, or other nonbiodegradable waste shall be removed from the operating area and disposed of properly.

FH-3 Ensure that a spill containment kit, commensurate with the amount of fuel stored, and supplies, such as shovels, absorbent pads, straw bales, and/or booms, are on-site when equipment or service vehicles are within the project area. If a spill should occur, State and Federal regulations regarding spills would be followed (e.g., any spills resulting in a detectable sheen on water shall be reported to the EPA National Response Center (1-800-424-8802) and IDEQ (1-800-632-800), and cleanup would be initiated within 24 hours of the spill).

FH-4 Coordinate water drafting locations, methods, and timing between the noxious weed specialist and fisheries biologist and/or hydrologist (Forest Plan Guideline FRGU01, USDA Forest Service 2010a, p. III-62). Screen opening size for intake hoses shall be the standard 3/32 inch or smaller and

the appropriate surface area for the volume being pumped (Forest Plan Standard FRST01, USDA Forest Service 2010a, p. III-61).

FH-5 No construction of new landings within RCAs (Forest Pan Guideline FRGU06, USDA Forest Service 2010a, p. III-62). If using existing landings located within the RCA, erosion control devices such as erosion cloth, biologs, slash filter windrows, and/or certified weed seed-free straw bales would be installed between the landing and the stream to prevent delivery of sediment (Burroughs and King 1989). Forest Service watershed specialist or fisheries biologist would assist the Timber Sale Contract Administrator in determining the most effective sediment control method. Soil erosion control measures would be allowed to deteriorate in place.

FH-6 Upon completion of project activities, landings used for this Project would be reshaped to provide adequate surface water drainage. Landings would be ripped to a depth of 12–18 inches, slash would be spread over at least 30 percent of the landing and associated disturbed area, and a Forest Service-approved seed mixture applied to the entire disturbed area (Design Feature IS-5).

FH-7 Remove culverts on NFS roads and routes to be decommissioned or converted to trails to provide a stable, self-maintaining site. IDT analysis may determine culverts may be left when risks and consequences are weighed against the costs of culvert removal (see Region 4 Policy on Treatment of Culverts for Decommissioned and Obliterated Roads, File Code 2520, letters of August 14 and December 13, 2000). Other site-specific actions would be performed to reduce risks from erosion, flooding, or road prism failure.

FH-8 Design new stream crossing structures to accommodate 100-year flow and associated debris (Forest Plan Standard FRST02, USDA Forest Service 2010a, p. III-61). The Forest Service watershed or fisheries personnel and engineering staff would determine 100-year flow estimates and proper structure type and sizing during Project implementation. Design and implementation would ensure unobstructed passage of all aquatic-dependent species. New structures would simulate bed material and structure, bankfull cross-section, and slope of the natural channel to provide passage by aquatic organisms. Culverts would be designed to sufficient length to avoid fill failures or chronic erosion from fill.

FH-9 New culvert installations and/or replacements would be completed during low stream flow periods. All instream and channel rehabilitation activities would be completed within one work season although subsequent seeding and revegetation may be necessary in following years.

FH-10 Designate boundaries of staging areas and stockpile areas to be used during stream crossing structure replacements. Existing disturbed areas, such as road prisms and landings, would be utilized whenever possible. Development of new staging and stockpile areas would use the smallest area possible. If using staging or stockpile areas within the RCA, erosion control

devices such as erosion cloth, biologs, slash filter windrows, and/or certified weed seed-free straw bales would be installed between the landing and the stream to prevent delivery of sediment (Burroughs and King 1989)

FH-11 Fish at the stream crossing location would be removed and relocated to clear the area for structure reconstruction or replacement.

FH-12 Should migrating or spawning listed fish or redds of listed fish species be observed within the culvert area during implementation, or 600 feet downstream of the culvert area, consult the Level 1 team for an appropriate course of action or initiate emergency consultation.

FH-13 Handling of fish would be conducted by or under the direction of a fisheries biologist using methods directed by the following; NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act; Idaho Department of Fish and Game Scientific Collection Permit; or NMFS steelhead collection permits, if applicable.

FH-14 Stream crossing structure sites would be dewatered and completely bypassed prior to excavation for reconstruction or replacement of structure. Dewatering would be accomplished slowly to capture and move stranded fish and other aquatic organisms to the extent possible. Dewatering activities would include the following:

a. Prior to constructing a water diversion, a fisheries biologist would conduct or direct an inspection of the stream and identify the appropriate means necessary to minimize the potential for fish to enter a constructed diversion and associated dewatering conveyance.

b. A diversion dam may be used to dewater the worksite. Diversion dams would not be constructed with material mined from the stream or floodplain. Flow diversion around project site would be constructed using non-erodible material, such as a pipe, plastic to line a channel, or revegetated abandoned stream channel of appropriate size to accommodate peak flows that may be expected during construction may be used (including storm events).

c. If a diversion channel is excavated, material would be stored at designated stockpile areas, for use in rehabilitating the excavated channel.

d. If streamflow is rerouted to one side of the existing channel, diversion structures, such as sandbags, cofferdams, or portable bladders constructed of non-erodible materials would be used.

e. If diversion inlet is not screened, the diversion outlet would be placed in a location that facilitates safe reentry of fish into the stream channel.

f. Pumps used for dewatering would have a fish screen installed, and operated and maintained in accordance with NMFS fish screen criteria

g. Diversion outflow would be directed to an area that minimizes or prevents erosion. If appropriate, water from the dewatering activities

may be pumped to a temporary storage/treatment site, or into upland areas, and allowed to filter through vegetation prior to water reentering the stream channel.

FH-15 In-channel sediment abatement barriers, such as Sedimats, would be used to capture sediment that is liberated during Project activities. Sediment control barriers would be maintained throughout the construction period, and then removed and disposed of properly.

FH-16 Excavation at stream crossing sites would have minimal impact to the active stream channel. Machinery would operate from the road fill and cross streams at dewatered areas, temporary bridges, or designated temporary crossings. Machinery, equipment, and materials would be stored in the staging areas when not in use.

FH-17 Temporary crossing may be utilized if needed. Existing roadways or travel paths would be used to access or cross streams as necessary .Temporary crossings would not increase risks of channel rerouting under high flow conditions during activity implementation. Temporary crossings shall be constructed at right angles to the main channel where possible. Rubber matting, temporary bridges, or other means, would be utilized if the stream channel needs further protection.

FH-18 All excavated material would be stored in designated stockpile areas. Native materials (e.g., substrate, riparian vegetation, rock, woody debris) excavated onsite would be conserved and stockpiled at designated location for later use in channel reconstruction or other site rehabilitation. Waste materials and other stockpiled material would be stored separately from the native materials at stockpile area and end hauled to an approved disposal site.

FH-19 To reduce impacts to riparian vegetation apply the following mitigation:

a. Limit live vegetation removal to the minimum necessary to accomplish work.

b. Onsite seed collection from sedges and grasses may also be conducted when seed is ready for harvest.

c. Riparian shrubs and wetland sod adjacent to stream crossing structure sites that need to be removed as part of the construction or water diversion process should be extracted and saved for replacement after construction is complete. Extracted plant materials should be placed on/wrapped in water-permeable geotextile material, placed in the shade, and kept damp. Plant materials should be replanted as soon as possible and watered thoroughly to promote rerooting.

FH-20 In the event of local precipitation events or high flows, all stream-crossing activities would cease except efforts to minimize storm damage or excessive erosion.

FH-21 Stream channel and floodplain would be reconstructed in a manner that matches channel dimension, pattern, and profile for the stream type above

and below the crossing. Large wood and/or boulders may be placed in the reconstructed stream channel and floodplain where natural conditions possess these attributes.

FH-22 Material placed in reconstructed stream channel would be washed in place prior to rewatering stream channel to settle fine sediment into substrate material and catch mobilized sediment in Sedimats placed downstream.

FH-23 Rewatering of the stream channel would be done slowly in order to minimize in sudden increases in turbidity and a large pulses of sediment downstream.

FH-24 Disturbed areas would be rehabilitated to conditions similar to pre-work conditions by spreading stockpiled native materials (e.g., substrate, riparian vegetation, rock, woody debris), seeding, and/or planting with certified weed free native seed mixes or native cultivars as required by design feature IS-5).

FH-25 To minimize impacts to riparian processes and functions, road activities, construction of trailhead facilities, and trail construction resulting in ground disturbance within RCAs would employ the following:

a. Coordinate with a fisheries biologist and/or hydrology when activities occur in designated critical bull trout habitat

b. Erosion control measures (silt fences or straw wattles) shall be used during and following construction/reconstruction of these facilities when site-specific evaluations conclude sediment travel distances from ground disturbance would deliver displaced (or eroded) soils to adjacent streams. Erosion control measures would remain in place and their effectiveness would be maintained until disturbed areas have sufficiently recovered and stabilized as determined by the Forest Service Engineering or Watershed Specialist.

c. No felling of Trees >12 inches d.b.h. for trail construction within the RCA unless approved by the Forest Service Hydrologist or Fish Biologist. Felled trees or existing down CWD >12 inches d.b.h. shall not be removed from the RCA flood-prone area unless mobilization of that material poses a threat to the facility.

d. Utilize natural moisture or delivered water in blading operations to ensure rapid consolidation and compaction of the disturbed surface material.

e. Do not side cast waste material within RCAs. Waste material should be loaded and hauled to an appropriate disposal location. Outside of RCAs, side casting of minor amounts of material, such as oversize rock, may occur if no other practical solution exists. In no instance should side cast material be placed in a manner that results in over steepened fill slopes, additional road width or impede proper drainage.

f. Remove and re-incorporate material from the outside edges of the roadway that may result in the formation of a barrier to provide dispersal of water were appropriate.

FH-26 To avoid and prevent increasing the occurrence of landslides initiated by management activities, slope stability hazards were identified using a coarse-filter GIS analysis (SINMAP). Use the SINMAP results in addition to guidelines developed by Chatwin et al. (1994) during Project implementation to field verify or identify moderate- and high-hazard landslide prone areas where commercial timber harvest, new and temporary road construction, and trail construction is proposed. Site-specific management measures or mitigations would be required where proposed activities increase the probability of landslide occurrence.

FH-27 Harvest systems used for the removal of commercial-sized trees, including skidders, cable yarders, and other similar equipment would be confined to existing NFS roads or temporary roads within RCAs. Skid trails would be located only outside of RCAs. Commercial-sized trees felled and located within RCAs not needed to meet riparian function and process would be removed with cable winches or other similar cable systems to equipment on NFS roads, temporary roads, or outside of RCA boundary.

FH-28 Operations using ground-based equipment during wet conditions shall not be conducted if it would cause excessive rutting, deep soil disturbance, or accelerated erosion.

FH-29 Log hauling would be restricted when road surface rutting exceeds 1 inch in depth for 100 feet of length.

FH-30 All trees felled within the RCA would be felled away from or parallel to stream channels.

2.4.7.5 Invasive Species (IS) (Non-native Plants/Noxious Weeds/Aquatic Invasive Species)

IS-1 The Weed Specialist or Botanist will assist other relevant Project specialists (e.g., Sale/Contract Administrator, Fuels, Recreation) in identifying for use, where practicable[19], weed-free locations for temporary roads, trails and trailheads, landings, skid trails, staging areas, water drafting sites, parking areas, or other areas of ground disturbance associated with all proposed implementation activities (Forest Plan Standard NPST10, USDA Forest Service 2010a, p. III-39). Where avoidance is not practicable[1], proposed activity implementation sites would be pretreated using appropriate treatment methods (See Appendix E, Part 1) to the maximum extent practicable[1] to prevent spread of noxious weeds or undesirable non-native species. This assessment would extend to roads undergoing a status change that would affect later access.

[19] Maximum Extent Practicable or Practicable – Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (40 CFR 230.10(a)(2)).

IS-2 Revegetate soil exposed by ground-disturbing activities (e.g., skid trails, landings, temporary roads, cut and fill slopes, decommissioned roads, culvert removal or replacement sites, pile burning) to prevent the invasion and/or expansion of noxious weeds with an approved seed mix and/or plant materials as required by Design Feature IS-4 (Forest Plan Standard NPST03, USDA Forest Service 2010a, p. III-38). Re-vegetate disturbed soil in a manner that optimizes plant establishment for that specific site. Post-implementation areas of disturbance would be evaluated by the Weed Specialist or Botanist in conjunction with the other relevant Project specialists (e.g., Sale/Contract Administrator, Silviculturist, Biologist, Hydrologist) to determine degree of revegetation efforts appropriate on a site-specific level to ensure that weeds do not become re-established or established on the site and promote the return of the desired native plant community

IS-3 Ensure seed mixes and/or plant materials used during project implementation are certified and documented as Idaho-listed noxious weed free according to Association of Seed Technologist and Analysts (AOSTA) standards and comprised of native or desirable species (including native cultivars), as recommended by the Botanist (Forest Plan Standard NPST02, USDA Forest Service 2010a, p. III-38). Local site conditions would be used by the Botanist in conjunction with other relevant project specialists (e.g., Sale/Contract Administrator, Silviculturist, Biologist, Hydrologist) to develop revegetation guidelines to determine detailed procedures and appropriate mixes of seed or plant materials.

IS-4 Require all straw, hay, and/or mulch material used in Project implementation to be certified and documented as Idaho-listed noxious weed free (Forest Plan Standards NPST01 and NPST06, USDA Forest Service 2010a, p. III-38).

IS-5 Contract Administrators shall report the identification of undocumented noxious weed populations in the Project area to the Weed Specialist or Botanist for inclusion in noxious weed treatment plans.

IS-6 Fuels Specialists will coordinate activities with Weed Specialist or Botanist to identify noxious weed infested areas within burn blocks to determine whether mitigations are needed to reduce the risk of spread or introduction to weed-free areas. Mitigations may include such actions as avoidance of infested areas, equipment cleaning, pre- or post-burning treatments and post-burn monitoring (See Design Features IS-1, IS-2 and IS-3; Appendix C, Part 1).

IS-7 Evaluate aggregate source(s) from NFS lands that would be used in project implementation for noxious weed presence under the direction of the Weed Specialist or Botanist. If noxious weeds are present at the aggregate source(s), treat noxious weeds, remove and set aside the material to a depth of 6 inches, and use aggregate from depths greater than 6 inches for project activities (Forest Plan Standards NPST07, USDA Forest Service 2010a,

p. III-39). For off-site sources of aggregate, the provider is required to provide certification of Idaho-listed noxious weed free status.

IS-8 In conjunction with motorized and non-motorized trail development, mitigate the risk of noxious weeds establishment and spread by motorized and non-motorized vehicles through educational materials produced for public use (Forest Plan Objective NPOB06, USDA Forest Service 2010a, p. III-38).

IS-9 All in-stream equipment (including that used for water drafting and dust abatement) and personal gear would be inspected and cleaned to prevent aquatic invasive species transmission and establishment. Sanitation would be required (as per Fisheries Biologist or Hydrologist) if equipment or gear has been used in an area known to be contaminated with aquatic invasive species. Cleaning/sanitizing stations should be located (1) where they are easily accessible and useable, (2) on gravelly or well-drained soils, (3) where wash water runoff will not carry seeds away from site, (4) where wash water runoff will not directly enter streams, and (5) where they may be used repeatedly for several projects or activities within the area (Adapted from Resource Mitigations For Wildfire Activities and Forest Plan Objective NPGU03, USDA Forest Service 2010a, p. III-39).

IS-10 Avoid or reduce the introduction of weed seeds and propagules by including provisions in all contracts to ensure earth disturbing, construction, and road maintenance equipment is cleaned. All contractors and/or purchaser of any timber sale would be required to ensure that, prior to moving on the project area, all equipment is free of soil, seeds, vegetative matter, or other debris that could contain seeds (Forest Plan Standard NPST03 (b) and NPST04, USDA Forest Service 2010a, p. III-38).

2.4.7.6 Minerals and Geology (MG)

MG-1 Mining claimants within and adjacent to the project area would be informed of the proposed project activities. Responses from claimants could result in adjustments to the proposed activities to avoid potential conflicts and to maintain consistency with federal mining laws.

MG-2 Reasonable access would be maintained for all mining claimants within or adjacent to the project boundary. “Reasonable access” would be determined on a case by case basis by the district Minerals Administrator.

2.4.7.7 Range Management (RM)

RM-1 Notify the Range Management Specialist of the timing of Project activities, including timber harvest, prescribed fire, noncommercial thinning, and road activities. Inform permittee(s), through the allotment annual operating instructions (AOI), of pending Project activities to minimize the potential for conflicts and allow for short-term modification of grazing practices where necessary. Short-term modifications of grazing practices during project implementation would be coordinated with the hydrologist, fish biologist, and soil scientist to ensure compliance with the Forest Plan Rangeland Resource direction.

2.4.7.8 Rare Plants (RP)

RP-1 Once final locations of ground disturbing activities with expected long-term impacts have been identified, e.g. new roads, temporary road construction, road reconstruction/relocation, and new landings, trained and qualified Forest Service personnel would survey areas to determine if potential habitat and/or occupied habitat are present for species on the Boise National Forest Rare Plant Survey List (USDA Forest Service, 2014b). If occupied habitat is identified, it will be avoided to the maximum extent practicable[20] during project implementation.

RP-2 No project activities would occur in known occupied and/or field verified high potential habitat of Sacajawea's Bitterroot or whitebark pine. Occupied Sacajawea's bitterroot habitat located within the Becker project area would have plant consideration area (PCA) developed by a Forest Service Botanist. The PCA shall be a 300-meter zone from the outside edge of the occupied habitat area. No project activities would occur within Sacajawea's Bitterroot PCA.

RP-3 Disjunct whitebark pine discovered during layout of mechanical vegetation treatment units would be avoided and protected to the maximum extent practicable[21].

2.4.7.9 Recreation Management (RE)

RE-1 Identify Project area authorized trails in the timber sale contract. For the authorized trails that fall within or immediately adjacent to harvest/thinning units, specific contract provisions would be included that protect National Forest improvements, maintain access or use, and address public safety to protect or minimize impacts to trail surfaces, trail heads, trail access, and recreational opportunities. Sale administrator shall designate all skid trails that cross the designated trails and shall consult with recreation staff on appropriate repair or reconstruction needs to return trail to its preexisting condition. Damage to or loss of NFS trail facilities, such as trail head

[20] Maximum Extent Practicable – Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (40 CFR 230.10(a)(2))

[21] Maximum Extent Practicable – Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (40 CFR 230.10(a)(2))

features, trail/stream crossings, and trail markers, from Project activities would be repaired or replaced by the appropriate party (Forest Plan Guideline REGU22, USDA Forest Service 2010a, p. III-68 and FSH 2309.11 and FSH 7720, sections 102 and 103).

RE-2 A closure order would be issued for public safety when logging operations are occurring within unit area

RE-3 Coordinate Purchaser/Contractor campsites with the Recreation Specialist to avoid or minimize impacts to dispersed recreation users

RE-4 Thinning treatments would be designed to provide shade for snow retention and visual quality objectives adjacent to designated Nordic ski trails. Specifically, no trees would be cut within a variable 15- to 30-foot-wide buffer on the southeast-to-west sides of the trails. No more than 30 percent of the canopy cover would be removed from a variable 15- to 30-foot wide buffer on the northwest to east sides of Nordic ski trails. On all other designated NFS trails, a variable 15- to 30-foot-wide reduced-cut buffer would be maintained in which no more than 30 percent of the trees would be cut.

RE-5 Prohibit snow plowing on established groomed ski and snow machine trails within the Project area and on all haul routes from December 15 to April 15.

RE-6 All logging operations, including hauling, would cease by December 15 in areas with winter recreation facilities/trails in order to allow for winter trail use by skiers and snowmobilers.

RE-7 Skiing and snowmobiling routes would be closed routes used for haul until December 15th .

RE-8 Trees would be directionally felled away from trails where possible. Any stumps within 36 inches from the edge of the tread of the trail would be flush cut to meet NFS trail standards

RE-9 No burning would occur within 300 feet of yurts and trailheads.

RE-10 Notification to Idaho Department of Parks and Recreation (IDPR) would occur prior to project implementation to allow for closure of facilities and public notification of project activities.

a. Notify IDPR of areas proposed for prescribed fire activities annually to allow IDPR complete public notification about the trails and yurts that could be affected by prescribed fire activities.

b. Notify IDPR of vegetation management contract award in the project area to allow IDPR to complete public notification about trails and yurts that could be affected by vegetation management activities including timber harvest and non-commercial thinning.

c. IDPR would notify users of the yurts and trails, that would be impacted by prescribed fire activities and/or vegetation management activities.

Notifications shall include timing and restrictions required for public safety.

d. The Forest Service would post the road, trail, and yurt restrictions resulting from prescribed fire and vegetation management activities on the Boise National Forest website.
e. In coordination with IDPR, trails that could be impacted by prescribed fire and vegetation management activities would be posted at least a week prior to implementing activities.
f. IDPR would be notified weather conditions are favorable for implementation of prescribed fire activities.

g. Yurts and trails would be closed a least one day prior to implementation of prescribed burn and vegetation management activities. Yurts along haul routes in active timber sales would be closed.

RE-11 When implementing ground disturbing activities during the conversion of the National Forest System Roads to motorized and non-motorized trail routes utilize standard trail construction and maintenance specifications, (USDA Forest Service, Standard Specifications for the Construction and Maintenance of the Trails, EM 7720-103.) When trail maintenance is performed following project activities, utilize standard trail maintenance specifications (EM 7720-103).

RE-12 Appropriate barriers and signs shall be installed on non-motorized trail according to the Sign and Poster Guidelines for the Forest Service (EM 7100-15) and the San Dimas—Vehicle Barriers: Their Use and Planning Considerations (USDA Forest Service, SDTDC 2006). Signs would indicate "bike or foot travel welcome, no motorized vehicles allowed during winter seasons" when NFS roads are converted to non-motorized trail routes. Trenches or tank traps would not be utilized to restrict motor vehicles use on authorized non-motorized routes.

RE-13 During the conversion of NFS roads to motorized or non-motorized trails, adequate drainage would be installed where necessary to control surface water on trails.

RE-14 NFS roads would be converted to non-motorized trails that serve as ungroomed Nordic ski/mountain bike trails with a minimum width of 24 inches through the following activities:

a. Recontour access points the first 100–200 feet or sight distance, whichever is less, or block the entrance with rocks to deter unauthorized motorized access

b. Evaluate all existing culverts to determine if needed for trail management. Remove those culverts that are determined to not be needed.

c. Rip the road prism, not in clearing width stated above, to a minimum depth of 6–12 inches to address soil compaction and initiate soil restoration

d. Construct waterbars or cross-ditches where needed to provide adequate drainage, and install erosion control measures to minimize sediment delivery.

e. Apply approved certified weed-free seed mix and or plant materials, as required in design feature IS-5, to affected road segments

f. Outslope to a minimum of 5 percent

RE-15 NFS roads would be converted to non-motorized trails that also serve as winter groomed non-motorized over snow routes with an authorized groomed Nordic ski trail prism to continue to accommodate grooming through the activities listed below. In gentle terrain, existing tread width for groomed ski trail prism shall be maintained at a minimum of 12 feet wide to allow for double track grooming. On steeper up or downhill sections, existing tread width for groomed ski trails prism shall be maintained at a minimum of 14–16 feet. Keep a non-motorized summer trail tread width of at least 24 inches.

a. Evaluate all existing culverts to determine if needed for trail management. Remove those culverts that are determined to not be needed.

b. Rip the road prism, not in clearing width stated above, to a minimum depth of 6–12 inches to address soil compaction and initiate soil restoration

c. Construct waterbars or cross-ditches where needed to provide adequate drainage, and install erosion control measures to minimize sediment delivery.

d. Apply approved certified weed-free seed mix and or plant materials, as required in design feature IS-5, to affected road segments

2.4.7.10 Scenic Environment and Visual Quality (SE)

SE-1 Within 100 feet of Highway 21, pile all activity slash and burn piles within one year of completion of project activities.

SE-2 In FSVeg polygons 003502-646 and 3502-901 and areas adjacent motorized trails, lop and scatter slash to a maximum height of 12 inches. (These polygons are located in the north end of the project area and are visible from Highway 21).

SE-3 Within 100 feet of Highway 21, stumps less than 8 inches in diameter shall be flush cut and stumps 8.0 inches and greater shall be cut to 6 inches or less in height measured on the uphill side.

SE-4 Within 100 feet of recreational facilities, yurts, campgrounds, and summer non-motorized trails (existing and proposed), stumps less than 8 inches in diameter shall be flush cut and stumps 8.0 inches and greater shall be cut to 6 inches or less in height measured on the uphill side. Within 100 feet of

these features, directionally fell trees away from the feature to minimize visible cut faces on stumps.

SE-5 Within 100 feet of publicly managed recreation facilities, retain approximately 70 percent of trees less than 12 inches dbh (except for hazard trees).

SE-6 Shape of Individual Units—The goal is natural appearing opening(s) when viewed individually and a natural appearing mosaic when viewed within the broader landscape.

a. Created openings and treatment units shall not be symmetrical in shape.

b. Straight lines and right angles should be avoided.

c. Created openings shall resemble the shape of those found in the surrounding natural landscape.

d. Boundaries of created openings should not coincide with ridgelines

SE-7 Edges of Individual Units—To create natural-appearing transition between treated and untreated vegetation, edges shall be irregularly shaped and/or feathered to avoid a shadowing effect in the cut unit.

SE-8 A Forest Service landscape architect or qualified scenic environment specialist would be consulted for identification of road, skid trail and landing locations in order to minimize long-term visual impacts of these features from sensitive travel routes and use areas.

a. Where temporary roads and skid trails meet a primary travel route, they should curve (135 degrees) within 100 feet of the primary travel route to minimize the length of the route visible from the primary travel route.

b. To the maximum extent practicable[1], landings should be placed in locations not visible from campgrounds or other recreational facilities using natural screening features.

c. Cut and fill banks shall be sloped to accommodate natural revegetation and be revegetated with native species, as identified in Design Feature IS-5 where practicable[1].

SE-9 Unit Marking—The goal is to minimize the visibility of tree markings post treatment.

a. Use *cut tree* (as opposed to *leave tree*) marking in visually sensitive areas where practicable[1].

b. If leave trees or boundaries are marked in the visible foreground next to sensitive travel routes, mark the tree on the side facing away from the road, recreational facilities, or campground. In the campground and recreational facilities areas, use *cut tree* (as opposed to *leave tree*) markings where practicable[1].

SE-10 Pile burning in visible foreground areas shall occur as soon as weather and fuel conditions allow and shall be a priority over burning slash in other less visible areas.

SE-11 To the maximum extent practicable[1], locate fireline/handline outside of areas visible from priority travel routes. Fireline/handline should, through construction or reclamation, not develop unnatural, continuous linear features (>300 feet) on the landscape.

2.4.7.11 Special Uses

SU-1 Notify the Special Use Permit administrator of Project activities and timing of implementation, including timber harvest, prescribed fire, noncommercial thinning, and road activities. Inform permittee(s) of scheduled project activities to minimize the potential for conflicts between authorized special use activities and allow for short-term modification of special use activities, where necessary.

2.4.7.12 Timber Harvest (TH)

TH-1. Locations of all landings and skid trails shall be approved by the Timber Sale Administrator prior to their construction and use.

TH-2. Limit the grade of constructed skid trails to a maximum of 30 percent.

TH-3. Prohibit log hauling from 6:00 pm Friday through midnight on Sunday; all major holidays (Memorial Day, Independence Day, Labor Day, Thanksgiving and the day after); and the opening day of general deer and elk seasons.

TH-4. Temporary roads and skid trails used to facilitate proposed mechanical treatments are either identified as new locations or align with existing unauthorized roads. The time between the construction and decommissioning of each temporary road and skid trail would be minimized to the maximum extent practicable. Both activities (construction and decommissioning) would generally occur during the same field season. However, additional mitigation (e.g., water bars/cross ditches, slash filter windrows, silt fencing, straw bales/wattles) would be applied to temporary roads and skid trails that remain operational/open over winter to minimize soil erosion and sediment delivery during spring snowmelt and runoff (National BMP Rd5).

TH-5. When skid trails used to implement Project activities are no longer needed, carry out the following restoration activities:

a. Recontour access points the first 100 feet or sight distance, whichever is less. If needed, place barriers, such as rock, earthen berms, or large coarse woody debris, to deter unauthorized use

b. When access point is located off an open road or trail, sign the reclaimed trail as closed to motorized use

c. Remove all culverts and restore streambanks to mimic natural channel shape

d. On primary skid trails, scarify the trail tread to address soil compaction and initiate soil restoration

e. Remove lateral berm and construct waterbars or cross-ditches to provide adequate drainage and install erosion control measures to minimize sediment delivery

f. Place logs or slash against the ground surface and perpendicular to the slope fall-line over the scarified/ripped surface to achieve at least over 30 percent of the disturbed area

g. Apply certified weed-free grass seed to reclaimed skid trails to expedite vegetative recovery and further reduce potential sediment delivery. Any material used for revegetation activities will meet requirements of Design Features IS-4 and IS-5.

2.4.7.13 Transportation System (TS)

TS-1 Perform road maintenance on NFS roads to reduce resource impacts during implementation and improve watershed conditions. Road maintenance activities would include, but are not limited to, road prism blading, spot aggregate placement, drainage improvements, roadway clearing, and roadway ditch/culvert cleaning.

TS-2 Install closure devices or structures on all NFS roads and trails designated as seasonally open. Closure devices would include gates or other similar devices to control seasonal access of those routes.

TS-3 Install closure devices or other access modifications to Maintenance Level 1 NFS roads.

TS-4 Road management activities shall utilize proven best management practices (BMPs) (as identified in USDA Forest Service 2012[22]) to avoid, minimize, or mitigate adverse effects to soil, water quality, and instream riparian resources. All 11 BMPs identified for road management activities described in the technical guide may be applicable to the proposed activities and would be utilized during Project implementation.

TS-5 Prohibit magnesium chloride ($MgCl_2$) within 6.1 meters of designated critical bull trout habitat and within 3.0 meters of road/live water stream crossings within the project area.

TS-6 For all National Forest System (NFS) and unauthorized road segments to be decommissioned, risks to soil, water quality, and riparian resources would be evaluated on the ground by the hydrologist or watershed specialist and the most practicable, cost-effective treatments to achieve long-term desired

[22] USDA Forest Service. 2012. National best management practices for water quality management on National Forest System lands. Volume 1: Core BMP technical guide. Washington, DC: USDA Forest Service.

conditions and water quality management goals and objectives would be implemented.

a. The preferred method of road decommissioning would be to fully recontour the road prism to match adjacent hillslopes and re-establish the stream channel at stream crossings with the goal of promoting ecosystem recovery (Lloyd et al, 2013) and reducing risks to soil, water quality, riparian, and aquatic resources (Luce et al , 2001). Based on road segment treatment analysis, other decommissioning methods may be used such as: blockage of access, partial recountour, de-compaction the road surface, out sloping the road surface, construction of waterbars, removal of drainage structures, and/or no treatment. No treatment and treatments other than full recountour of the road prism would be utilized where temporary ground and vegetation disturbance associated with decommissioning or the cost of full recountour are determined to outweigh the benefits provided by the full recountour treatment.
b. Following the removal of drainage structures, channels and streambanks would be reshaped at crossing sites to maintain channel dimensions and longitudinal profile through the site. Road segment treatment analysis may determine that specific culverts may be left when risks and consequences are weighed against the amount of disturbance and/or costs of culvert removal (Cite RO letter).
c. Areas that are disturbed during road decommissioning operations would be revegetated by applying an appropriate seed mix as prescribed by the Botanist and mulched to reduce the risk of soil erosion as prescribed by the hydrologist or watershed specialist.
d. All decommissioned NFS roads would no longer be part of the NFS road system and would be removed from the NFS road inventory and Motor Vehicle Use Maps.

TS-7 All temporary road prisms would be fully recontoured to match adjacent hillslopes and re-establish the stream channel at stream crossings following their use to facilitate forest product removal. Clearing slash generated during the construction of temporary roads would be placed back on top of the decommissioned road prism and boulders or berms may be constructed to deter unauthorized motorized use. Areas that are disturbed during temporary road decommissioning operations would be revegetated by applying an appropriate seed mix (design feature IS-04) and mulched to reduce the risk of soil erosion as prescribed by the hydrologist or watershed specialist.

2.4.7.14 Vegetation Management (VM)

VM-1 Ensure appropriate precautions and contract provisions are used to reduce the potential buildup and spread of pine engraver (*Ips pini*) in stands where 20% or more of the thinned trees are ponderosa pine larger than 3 inches dbh.

a. Noncommercial thinning of ponderosa pine less than 8 inches d.b.h. shall not occur between December 1 and June 30.

b. Thinning of commercial size ponderosa pine 8 inches D.B.H. and larger should not occur between December 1 and June 30 unless the merchantable logs are removed from the contract area within 3 weeks of felling, or "green chaining" procedures are followed.

c. Timber Sale contracts must include "green chaining" provisions.

VM-2 Areas where artificial regeneration is necessary would be planted with species and density appropriate to the area's potential vegetation group (PVG) and in spatial arrangement (e.g., Groups, clumps) consistent with the area's fire regime.

VM-3 Retain forest stands that meet the definition of a large tree size class (USDA Forest Service 2010a, Appendix A, page A-6) until forest-wide inventories demonstrate the desired quantity of large tree size class acres within the affected PVG exist across the Forest (USDA Forest Service 2010a, Appendix A, Table A-4). Management actions are permitted in such stands as long as they would continue to meet the definition of a large tree size class (Forest Plan Standard VEST03, USDA Forest Service 2010a, p. III-32).[23]

FVS modeling indicated that the stands identified in the table below would not be maintained in the large tree size class following treatment. In order to comply with the design feature and Forest Plan Standard, these stands would retain all trees greater than or equal to the diameter at breast height displayed in the table below. If field verification of these stand conditions show that the increased diameter limit are not warranted, the District Silviculturist and Wildlife Biologist would document the stand conditions and modifications of the upper cut limit by stand for the record.

Stand ID	Alternatives	Stratum	Existing Large Tree CC%	Upper diameter limit (less than, inches)		
				Douglas-fir	Lodgepole pine	Subalpine fir
35020540	B,C,F	B	11	24.0	No limit	No limit
35020548	B,C,F	B	12	24.0	No limit	No limit
30520553	B,C,F	A	12	24.0	20.0	No limit
35020578B	B,C,F	D	11	24.0	No limit	22.0
35020609A	B,C,F	A	13	24.0	20.0	No limit
35030506	B,C,F	A	11	24.0	No limit	No limit
35040509	B,C,D,F	B	11	24.0	No limit	No limit
35040513B	B,C,F	A	10	24.0	20.0	No limit

[23] This standard shall not apply to management activities that an authorized officer determines are needed for the protection of life and property during an emergency event, to reasonably address other human health and safety concerns, to meet hazardous fuel reduction objectives within WUIs, or to allow reserved or outstanding rights, tribal rights or statutes to be reasonably exercised or complied with. This standard does not apply to PVG 10.

VM-4 Live and dead vegetative components should be managed in spatial patch sizes and patterns representative of the appropriate fire regime insofar as current conditions allow. Refer to Appendix A for assistance in addressing this guideline[24] (Forest Plan Guideline VEGU07, USDA Forest Service 2010a, p. III-33).

VM-5 Designate for retention during sale preparation, all ponderosa pine trees meeting the definition of a legacy tree consistent with the Forest's Legacy Tree Guide (Forest Plan Guideline VEGU09, USDA Forest Service 2010a). In addition, designate for retention, Douglas-fir trees that exhibit legacy-like characteristics (Van Pelt 2008).

VM-6 Management activities proposed to maintain or restore vegetative desired conditions should emphasize the following:

a. Retention of snags away from roads or other areas open to public access to reduce the potential for removal.

b. Retention of large snags of seral species (e.g. ponderosa pine and western larch), consistent with species composition desired conditions, to increase longevity of standing snags.

VM-7 Where mastication of vegetation in conjunction with noncommercial thinning actions is implemented, the following design features would be implemented:

a. Minimum stump/stubble height is 8 inches above the ground or above an obstacle such as a rock or log

b. Maximum allowable depth of masticated material (chips or mulch) is 2 inches averaged over the treatment unit. Up to 10% of the treatment unit may have depths of masticated material up to but nor more than 4 inches

[24] This guideline shall not apply to management activities that an authorized officer determines are needed for the protection of life and property during an emergency event, to reasonably address other human health and safety concerns, to meet hazardous fuel reduction objectives within WUIs, or to allow reserved or outstanding rights, tribal rights or statutes to be reasonably exercised or complied with.

2.4.7.15 Wildlife Resources (WR)

WR-1 Include in all contracts, appropriate provisions to provide protective measures for known Threatened, Endangered, Proposed, and Candidate and Region 4 Sensitive (TEPC/S) species and habitats during Project implementation. In new species, denning, nesting, and roosting sites are discovered during implementation, contact the Wildlife Biologist for mitigation measures. The Wildlife Biologist, contract representative, and other appropriate resource representatives (e.g., silviculture, fuels, and timber) would coordinate any needed modifications to prescribed treatments or activities to maintain key features of nesting/denning habitat or to avoid disrupting nesting/denning activities. Design Features WR-3 through WR-8 would be implemented with the identification or discovery of above-referenced species or habitats.

WR-2 Live trees with evidence of cavities and large stick nests would be retained. The Wildlife Biologist would be notified if any large stick nests are discovered during layout and implementation. Site-specific assessment of any protective measures required would be determined by the Wildlife Biologist and would depend upon species and occupancy status. Protective measures may include timing restrictions, no-treatment buffers, or modifications to implemented prescriptions. This design feature applies to mechanical thinning and activity fuels/broadcast burning activities as appropriate. Beyond TEPC/S species previously identified, other species that this design feature would apply to include osprey, red-tailed hawk, Cooker’s hawk, sharp-shinned hawk, great horned owl, long eared owl, or other similar raptor species.

WR-3 Specific TEPC/S nesting/denning sites discovered through the implementation of this project would be monitored on an annual basis (during the lifespan of the Project) by the wildlife biologist or other qualified personnel to determine whether the sites are occupied and which protection measures are applicable (WIST03). The following table identifies by species anticipated mitigations including timing restrictions, habitat protection or modification, and other appropriate actions. The use of these mitigations would be determined on a site-specific basis. (WIST02 and WIST03).

TEPC/S	Protective Measure	Activities that Protective Measures Apply To:
Gray Wolf	Restrict activities between April 1 and June 30 within 1 mile of newly discovered den and rendezvous sites (TEGU06)	Commercial and Noncommercial Thinning, Road Construction and Maintenance
Northern Goshawk*	Restrict activities between April 1 and August 30 up to 1,500 feet from nest site (WIST03). Exact distance for which restrictions apply would be determined by wildlife biologist based upon topography and vegetation screening on a site-specific basis	Commercial and Noncommercial Thinning, Road Construction and Maintenance, Prescribed Fire/Fuels Reduction Treatments, could apply for road construction
	In goshawk territories with active nest stands, identify 30-acre nest stand around active nests, as well as an additional replacement nest stand (Forest Plan Standard WIST05, USDA Forest Service 2010a, p. III-27). Consider modification of harvest prescriptions to maintain suitable nesting habitat if impacted by commercial or noncommercial harvest.	Commercial and Noncommercial Thinning
Great Gray Owl*	Restrict activities between April 1 and August 30 occurring up to 1,500 from nest site (WIST03). Exact distance for which restrictions apply would be determined by wildlife biologist based upon topography and vegetation screening on a site-specific basis.	Commercial and Noncommercial Thinning, Road Construction and Maintenance, Application Prescribed Fire/Fuels Reduction Treatments
	Maintain a 150-foot no-treatment buffer around identified active nests to maintain site-level microhabitat conditions (WIGU06)	Commercial and Noncommercial Thinning

Note: At the time of analysis, no nest sites for great gray owl or northern goshawk are documented in the project area.

WR-4 Restrict vegetation treatment within a 650-foot radius of an active goshawk nest tree to retain vegetative structure around the nest site. In addition, no commercial harvest, noncommercial thinning, or roadwork activities would occur within a 1,500-foot buffer (Jones 1979) around active goshawk nest tree(s) from April 1 to August 15 to avoid disrupting nesting activities. Exact distance for which restrictions apply would be determined by a Wildlife Biologist based upon topography and vegetative screening on a site-specific basis. Timing restrictions would only be required for active nest sites. Timing restrictions would not restrict planned road use patterns, public access or log hauling. Because goshawks commonly move to alternate nest sites within a territory, the nest site location would be re-identified annually. (WIGU07)

WR-5 In flammulated owl source habitat stands documented or suspected of occupancy of reproducing pairs, the Wildlife Biologist would identify 3-5 suitable nest snags per stand with the features described below and provide for an 83-foot no-treatment buffer to maintain suitable nesting and roosting habitat associated with each snag. This silvicultural prescription would retain the structural diverse vegetative condition that currently exists around the nest snag. Wildlife Biologist would coordinate with the Silviculturist and Timber Planner. (WIST02)

a. Snag species preference: 1st – ponderosa pine; 2nd – Douglas fir;

b. Decay Class: Mix of decay class 2-4;

c. Diameter at breast-height: Minimum 15” d.b.h., select for the 3-5 largest snags available;

d. Height: Minimum 15’ height;

e. Source habitat present: Multi strata structure of sapling/pole, small, medium, and large tree size class; site canopy closure of at least 40%.

WR-6 Implement the following timing restrictions for vegetation management treatments to address risk of disturbance effects to flammulated owls: no commercial harvest, noncommercial thinning, or roadwork activities would occur within a 500-foot buffer around suspected active flammulated owl nest snags from May 1 to August 15 to avoid disrupting nesting activities. (WIST02 and WIST03)

WR-7 Fuels planner would coordinate with Wildlife Biologist to identify the flammulated owl source habitat mitigations (i.e. snag buffer protections) described in WR-(5) to design implementation plans that minimize or otherwise mitigate the risk to nest snags and source habitat surrounding those snags (WIST02 and WIST03).

WR-8 For newly discovered active northern goshawk territories, restrict vegetation treatment within a 650-foot radius of any active goshawk nest trees discovered to retain vegetative structure around the nest site. In addition, since goshawks commonly move to alternate nest sites within a territory, the nest site location would be reidentified annually. (WIST03 and WIST05)

WR-9 Retain all ponderosa pine and Douglas fir snags ≥10 inches d.b.h. and >15 feet tall to meet the desired range as identified in Appendix A of the Forest Plan (Forest Service 2010a, p. A-9) unless they pose safety hazards and have to be felled. Where snags have been determined to be a safety hazard (timber sale OSHA requirements, roadside hazard trees) and must be felled, live trees of sufficient diameter shall be left to provide for snag replacement as needed to achieve desired conditions. (WIST08 and WIST09)

Desired Range of Snags per Acre for PVGs (USDA Forest Service 2010a)

PVG	Snags/Acre (10-20 inches d.b.h.)	Snags/Acre (>20 inches d.b.h.)	Total
1	0.4-0.5	0.4-2.3	0.8-2.8
2	1.8-2.7	0.4-3.0	2.2-5.7
3	1.8-4.1	0.2-2.8	2.0-6.9
4	1.8-2.7	0.2-2.1	2.0-4.8
7	1.8-5.5	0.2-3.5	2.0-9.0
8	1.8-7.5	0.2-3.0	2.0-10.5

Note: This table applies only to activity areas

WR-10 Sign up to 3 large snags (≥20 inches d.b.h.) per acre as wildlife habitat within the 600-foot corridor (i.e., 300 feet on each side) of the relocated segment of NFS road 393 to conserve large snags. (WIST08 and WIST09)

WR-11 Existing vegetation would be maintained within one site potential tree height (120 feet) of elk wallows and natural licks (WIGU13). The Wildlife Biologist would be notified as soon as possible if a wallow is discovered by layout and marking personnel. The wildlife biologist or representative would review the site on the ground and determine whether the above the silvicultural prescription adequately protects the site and provides cover for wildlife use. Prescriptions may be modified to provide adequate cover if needed. This design feature applies to commercial and non-commercial vegetation harvest actions. Exceptions include the location of wallows on established road prisms (authorized or otherwise) required for harvest implementation. (WIGU13)

WR-12 Fuels planner and Wildlife Biologist would coordinate the implementation of burn blocks and broadcast burns within the portion of the project area east of Highway 21 and north of Beaver Creek Cabins such that no more than 1,000 acres per year between May 1 and June 15 are implemented in any given year to mitigate the impact of burn-associated disturbances on calving elk. (WIGU12)

WR-13 Limit mechanical vegetation treatments and use of seasonally and year-round closed NFS roads for project implementation from May 1 through June 15 in the area east of State Highway 21 and north of Beaver Creek Cabins to reduce the risk of disturbance to calving elk (WIGU12). Coordinate with the Wildlife Biologist to assess spatial placement of activity and administrative and contract use of closed roads to address concerns of disturbance to calving elk.

WR-14 To the maximum extent practicable[1], minimize contractor use on ML 1 and seasonally closed roads from September 15 through June 15, within and adjacent to the project area. Access behind closed gates would only be allowed for contract implementation and not for hunting, transporting hunters, or retrieving game.

WR-15 Restrict public motorized use on temporary roads and closed NFS roads (ML 1) that are reopened during activity implementation to minimize impacts to wildlife and habitat. These roads would not be put on the MVUM and shall be signed on the ground as “Road Closed”. When activities are completed, temporary roads shall be decommissioned, as described in design feature TS-7, and closed roads shall be put in a state of storage and effectively closed to prevent motorized travel (DF–X) and/or decommissioned (TS-6), depending on their final disposition under the proposed action. (WIGU08)

WR-16 When feasible, restrict all road maintenance and activities associated with open NFS roads on opening day of general deer and elk hunting seasons. See IDFG regulations for unit boundaries and dates.

WR-17 A minimum average canopy cover of at least 40 percent, comprised of multiple tree size classes and overlapping crowns, would be maintained in

the northwest third of stand 0035050514, in order to maintain occupied flammulated owl habitat.

WR-18 The maximum size of Douglas-fir trees to be thinned in stand 0035020541 shall be less than 24 inch d.b.h.. This design feature insures that WIST09 is met as it pertains to management actions contributing to or not precluding restoration of old forest habitat. Maintaining Douglas-fir greater than or equal to 24" would ensure at least 30% canopy closure of Large Tree Size Class in the long-term.

2.4.8 Monitoring Elements for the Becker Integrated Restoration Project

2.4.8.1 Pikes Fork Trailhead Monitoring

The Forest will use the best management practices (BMP) monitoring evaluation for dispersed recreation uses (Rec B) from the National Core BMPs Program (USDA Forest Service 2012) to document site conditions for pre- and post-construction, as well as effectiveness of rehabilitation activities over time. These monitoring evaluations will be conducted every year for 3 years post-construction and then repeated once every 3 years. If monitoring results demonstrate degrading conditions over time, additional site management planning will be conducted to address impacts to aquatic/riparian resources. Detailed description of the monitoring plan is available in Appendix H.

The initial BMP monitoring evaluation conducted May 2015 is included in Attachment A of Appendix H of this document.

2.4.8.2 Invasive Species (Plants)

Effectiveness monitoring of weed treatment would be conducted by the Weed Specialist or Botanist annually for 3 years following completion of Project-associated activities to the maximum extent practicable[25], with treatment of noxious weeds continuing throughout this period using integrated weed management tools. Monitoring would include re-inspection of areas of project-associated ground disturbance infected with weeds prior to project implementation, as well identifying and mapping any new infestations that have become established as a result of project implementation. The Weed Specialist would recommend and oversee treatment

2.4.8.3 Rare Plants

Surveys for rare plants would occur prior to the use of the proposed landing located in a dry meadow adjacent to NFS road 362G9. Surveys will be conducted for the indicator species, aspen and false hellebores, to identify suitable habitat of small phacelia and moonworts which are often associated with aspen and meadow habitat. To minimize risks to these species, additional mitigations (Design Feature RP-1) would be needed if this area were to be used as either a tractor or helicopter landing, i.e. Fall (Sept - Dec) season of use; no excavation or levelling, log deck locations limited to 35' from edge of road on the east side and all mechanized equipment would remain on the road surface. To avoid

[25] Maximum Extent Practicable or Practicable – Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (40 CFR 230.10(a)(2)).

suppression of growth in meadow species activity slash and disposal would only occur on the west side of the road.

2.4.8.4 Terrestrial Wildlife

Flammulated Owl – Occupancy Monitoring

Implement surveys annually for flammulated owl utilizing the Northern Region Landbird Monitoring Program – Flammulated Owl Protocol (Cilimburg 2007) in the Analysis Area during project implementation and 2-years post-implementation. Utilized established routes along open NFS roads. Implemented surveys between May 15 and June 30 annually. Coordinate annually prior to May 1 with Fuels, Silviculture, and Timber Specialist to identify priority routes for survey based upon anticipated implementation schedules for fuels and vegetation management actions. Focus survey efforts along routes adjacent to areas of anticipated implementation activity. Purpose of monitoring is to: a) survey for occupancy as it relates to Design Features WR-5, 6, and 7; and b) monitor effects of vegetation and fuels treatments in occupied habitat upon continued occupancy and effectiveness of Design Features WR-5, 6, and 7.

Northern Goshawk – Detection and Occupancy Monitoring

Implement surveys annually for up to 5 years following decision, or until active nesting pair of northern goshawks is detected. Use the Northern Goshawk Inventory and Monitoring Technical Guide (Woodbridge and Hargis 2006). Focus surveys in source habitat areas associated with the Lamar, Whoop ‘um Up, and Edna Creek Drainages, as well as the China Fork of Beaver Creek. Survey source habitat patches within and adjacent to vegetation and fuels activities proposed with the selected alternative. Coordinate annually with Fuels, Silviculture, and Timber Specialists to identify priority areas for survey based upon anticipated implemenatation schedules for actions. Purpose of monitoring is to survey for active territories and nest stands as it relates to Design Features WR-1, 2, 3, 4, and 8.

If detection of active nesting territory occurs, implement Design Features WR 3, 4, and 8. In following years, focus annual survey efforts on nest site occupancy survey, and nearby protocol survey if pair is found to have moved to an alternative nest site/stand. Continue to implement Design Features WR 3, 4, and 8 so long as occupancy is detected.

2.4.9 Other Federal, State, or Local Approvals Potentially Applicable to All Action Alternatives

Table 2-23 lists the other federal, State, and local permits and/or approval that may be necessary prior to or during implementation of the ROD.

Table 2-23.Summary of other permits and approvals that may be necessary

Approval Type	Status/Comment
Clean Water Act (CWA) Section 404 Permit from the U.S. Army Corps of Engineers	Obtain permit prior to undertaking activities that may result in discharge of dredge and fill material into waters of the United States
Stream Alteration Permit from the Idaho Department of Water Resources	Obtain a Stream Alteration Permit prior to undertaking activities that may impact perennial streams and prior to crossing perennial streams
Water Quality Standards Short-term Activity Exemption from the Idaho Department of Environmental Quality	Obtain a short-term exemption before the installation/removal of the culverts used for the roads at the stream crossings
CWA National Pollutant Discharge Elimination System (NPDES) Permits for the EPA	Obtain NPDES permits prior to undertaking applicable activities.
CWA Section 401 Certification from IDEQ	Obtain as needed from the State per Section 404 or NPDES permit requirements
Conditional use permit and road maintenance agreement from affected county	Obtain as needed before activities subject to these permits are implemented
Other permits from Idaho Transportation Department and/or other entities	Obtain as required by Idaho Transportation Department and/or other entities

2.5 COMPARISON OF ALTERNATIVES

Table 2-24 and Table 2-25 summarize the proposed activities by alternative.

Table 2-24. Comparison of Alternatives by Issue

Indicator	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
ISSUE 1— Tractor-jammer logging destroys ground cover, exposes mineral soil to erosion, and compacts soils for reduced adsorption and increased runoff. Logging systems that result in the lightest ecological effects on the forest should be used (e.g., helicopter and cable or skyline systems).						
LOGGING SYSTEMS for Commercial Vegetation Treatments						
Tractor/Jammer (acres)	0	3736	3736	3919	2570	3359
Light Cable(acres)	0	612	612	612	612	612
Helicopter Logging (acres)	0	0	0	0	1166	377
TOTALS (acres)	0	4348	4348	4531	4348	4348
ISSUE 2— Opening roads/trails used by mountain bikers, hikers, and equestrians and staff access for log hauling and forest thinning could change the road/trail surface and remove existing vegetation within the road prisms, potentially changing their overall character. These changes could affect the quality of the recreational experience for the users of these trails.						
Ground-based logging systems adjacent to non-motorized trails (acres)	0	4348	4348	4531	3182	3971
Helicopter logging systems adjacent to non-motorized trails (acres)	0	0	0	0	1166	377
ISSUE 3— Construction of new roads, including temporary roads, may not be appropriate in already heavily roaded or degraded ecosystems.						
Temporary road construction (miles)	0	5.8	5.8	6.5	1.5	4.3
ISSUE 4—Removing trees greater than 18 inches dbh, unless there are site-specific exceptions, may affect the retention and/or requirement of old forest habitat components such as snags, down trees, and understory vegetation.						
Application of an 18-inch diameter limit to all commercial treatment acres	N/A	No	No	No	Yes	No

Indicator	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
ISSUE 5— If the public access roads to the Skyline (NFS Road 362F) and Stargaze (NFS Road 394B) yurt summer parking spots are closed and the public has to walk in 1.5 to 2.0 miles from Highway 21, summer use could drop dramatically. A seasonal closure to the Skyline yurt should be removed on NFS Road 366F to allow motor vehicle access to the yurt in the spring, summer, and fall.						
Status of public motorized access to the Skyline and Stargazer Yurts managed by Idaho Department of Parks and Recreation (Idaho Department of Parks and Recreation would have administrative access to the yurts for all alternatives)	Maintains NFS Rd 394B as a ML 2 open road.and the seasonal closure on NFS Road 362F	NFS roads 362F and 394 B would be changed to ML2 Admin Use Only	Maintains seasonal closure on NFS Road 362F, and establishes seasonal closure on NFS Road 394B	Removes the seasonal closure on NFS road 362F, but maintains NFS Road 394B as a ML 2 open road.	NFS roads 362F and 394 B would be changed to ML2 Admin Use Only. In addition, mechanized equipment closure from 5/1-6/15	Maintains seasonal closure on NFS Road 362F, and establishes seasonal closure on NFS Road 394B
ISSUE 6—Imposing a 50-inch width limit on proposed ATV trails does not consider the increased popularity of UTV vehicles. UTVs are not limited to utilitarian duties any longer. Most manufacturers produce popular sport versions. Most ATV users are migrating to UTV usage. The vast majority of UTVs produced have a 55- to 61-inch width. Failing to plan for UTVs is failing to plan for future usage.						
Designate a motorized trail system for vehicles <60 inches width within the project area to enhance designated motorized trail opportunities currently not available in the project area (miles)	0	0	0	22.0	0	18.8
ISSUE 7—New trails in RCAs could affect riparian function and process, particularly given the existing high road densities in the project area.						
New trail construction within RCAs	0	0.7	0.4	0.4	0	0.3
ISSUE 8—Designation of a motorized trail that overlaps portions of the non-motorized trails to be authorized could result in user conflicts and reduce the quality of experience for the non-motorized users.						
Miles of shared use traffic where nonmotorized and motorized (motor vehicles 50 inches or less in width) recreational traffic share motor vehicle trails	0	1.9	1.6	1.6	0	1.6

Indicator		Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
ISSUE 9—Designation of the proposed motorized trail would not be consistent with wildlife and aquatic resource objectives.							
The concern of this issue is the transportation system and vulnerability to hunting mortality/disturbance based on the correlation between open road density and hunting mortality, consistent with research/science. The commenter's greatest concern was associated with the calving/fawning season (May 1-June 30) and hunting seasons (Sept 1-Nov 30).							
WILDLIFE RESOURCES							
Elk Calving Success Disturbance Risk Analysis	May 1-June 15	H* – 91% M* – 9% L* – 0% N* – 0%	H – 99% M – 1% L – 0% N – 0%	H – 97% M – 3% L – 0% N – 0%	H – 97% M – 3% L – 0% N – 0%	H – 44% M – 30% L – 18% N – 9%	H – 97% M – 3% L – 0% N – 0%
	June 16-July 1	H – 95% M – 5% L – 0% N – 0%	H – 100% M – 0% L – 0% N – 0%	H – 100% M – 0% L – 0% N – 0%	H – 100% M – 0% L – 0% N – 0%	H – 91% M – 9% L – 0% N – 0%	H – 99% M – 1% L – 3% N – 0%
Elk Vulnerability to Hunting Mortality (Sept 15 – Nov 30)	Vulnerability Analysis	79%	71%	71%	73%	71%**	71%
	Route Density – NFS Roads and Motorized Trails	1.99 mi/mi^2	1.60 mi/mi^2	1.60 mi/mi^2	1.75 mi/mi^2	1.60 mi/mi^2	1.60 mi/mi^2
*H= High risk of disturbance M= Moderate risk of disturbance L= Low risk of disturbance N= No risk of disturbance							
AQUATIC RESOURCES							
Water Quality							
Temperature—Bull Trout	FUR[1]	M:N[2]	M:-*/-*/+*[3]	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*
	FR	M:N	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*
Sediment/Turbidity—Bull Trout	FUR	M:N	M:-/-/+	M:-/-/+	M:-/-/+	M:-/+/+	M:-/-/+
	FUR	M:N	M:-/+/+	M:-/+/+	M:-/+/+	M:-/+/+	M:-/+/+
Chemical Contamination/Excess	FA	M:N	M:-*/-*/N	M: -*/-*/N	M: -*/-*/N	M: -*/-*/N	M: -*/-*/N

Indicator		Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
	FR	M:N	M: -*/-*/N	M: -*/-*/N	M: -*/-*/N	M: -*/-*/N	M: -*/-*/N
Streamflow/Hydrology							
Change in Peak/Base Flows	FR	M:-*	M:N/N/+*	M:N/N/+*	M:N/N/+*	M:N/N/+*	M:N/N/+*
	FR	M:N	M:N	M:N	M:N	M:N	M:N
Change in Drainage Network	FUR	M:N	M:N/+*/+*	M:N/+*/+*	M:N/+*/+*	M:N/+*/+*	M:N/+*/+*
	FUR	M:N	M:N/+*/+*	M:N/+*/+*	M:N/+*/+*	M:N/+*/+*	M:N/+*/+*
Watershed Conditions							
Road Density and Location	FUR	M:N	M:N/+/+	M:N/+/+	M:N/+/+	M:N/+/+	M:N/+/+
	FUR	M:N	M:N/+/+	M:N/+/+	M:N/+/+	M:N/+/+	M:N/+/+
Disturbance History	FR	M:-*	M:-*/+*/+*	M:-*/+*/+*	M:-*/+*/+*	M:-*/+*/+*	M:-*/+*/+*
	FR	M:N	M:N	M:N	M:N	M:N	M:N
Riparian Conservation Areas (RCAs)	FR	M:-*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*
	FR	M:-*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*
Disturbance Regime	FR	M:-*	M:-*/+*/+*	M:-*/+*/+*	M:-*/+*/+*	M:-*/+*/+*	M:-*/+*/+*
	FR	M:N	M:N	M:N	M:N	M:N	M:N
Fisheries							
Local Population Size Growth and Survival Life History Diversity and Isolation Persistence and Genetic Integrity		M:-*/-*/-*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*

Footnotes:
[1]Functionality for baseline conditions: FA = Functioning Acceptably, FR = Functioning at Risk, FUR = Functioning at Unacceptable Risk.
[2]Effects to Functionality Class: M = Maintain (within functionality class), D=Degrade (change functionality class), NI = No Influence, I = Improve (change functionality class).
[3]Trend effects: N = No trend, - = Negative trend, + = Positive trend, +/- = Uncertain trend (may be positive or negative), * indicates negligible impact.

Alternative E does not include the motorized trail and trailhead construction. Alternative B includes 6.6 miles of motorized trail construction within the RCA. Of this mileage, 6.2 miles would occur on existing road prisms and 0.4 miles would be new construction. For Alternatives C, D, and F, only 0.1 miles of new trail construction would occur within the RCA. No trail construction (either new or on existing road prisms) is located near USFWS bull trout designated critical habitat. As a result of very little trail construction occurring inside RCAs near bull trout habitat, effects are expected to be localized and negligible.

Indicator		Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
ISSUE 10— Use of the non-motorized trail system during the spring could result in big game disturbance during critical periods (e.g., calving).							
Elk Calving Success Disturbance Risk Analysis	May 1-June 15	H* – 91% M* – 9% L* – 0% N* – 0%	H – 99% M – 1% L – 0% N – 0%	H – 97% M – 3% L – 0% N – 0%	H – 97% M – 3% L – 0% N – 0%	H – 44% M – 30% L – 18% N – 9%	H – 97% M – 3% L – 0% N – 0%
	June 16-July 1	H – 95% M – 5% L – 0% N – 0%	H – 100% M – 0% L – 0% N – 0%	H – 100% M – 0% L – 0% N – 0%	H – 100% M – 0% L – 0% N – 0%	H – 91% M – 9% L – 0% N – 0%	H – 99% M – 1% L – 3% N – 0%
ISSUE 11— Winter travel restrictions should not be a part of this project. No evidence is shown that a need to designate nonmotorized areas exists.							
Nonmotorized area designations (acres)		0	0	3309*	0	0	3309*
Groomed route, nonmotorized trail (miles)		0	29.2	29.2	29.2	29.2	29.2
Ungroomed route, nonmotorized trail		0	31.0	31.0	31.0	31.0	31.00
*Alternatives C and F add approximately 3,309 acres of winter oversnow vehicle (OSV) restriction to the south and west of Highway 21. Action Alternatives B, D, and E do not add this winter travel restriction area.							

Table 2-25. Comparison of alternatives by purpose and need

Indicator	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
PURPOSE 1—VEGETATION RESTORATION						
Contribute to the restoration of low- to mid-elevation forests in the project area; forests that fall within the non-lethal and mixed1 fire regime. **Modifying forest densities, tree size classes, and species composition and breaking-up the horizontal and vertical wildland fuel continuity will reduce the risk of uncharacteristic stand-replacement wildfire and improve forest resiliency.** **Shifting conditions toward those more representative of the desired condition for the fire regimes in the project area will benefit wildlife habitat restoration, as well as provide greater assurance that forested overstory cover in this landscape, which attracts recreational users to the area, is sustained over time.**						
Non-Lethal Fire Regime Stands						
Outside plantations: Promote medium to large ponderosa pine & Douglas fir; improve health and vigor and reduce ladder fuels, therefore, reducing risk of undesirable outcomes from natural disturbance; promote large tree development, and transition stand composition and structure to desired condition (acres)	0	3691	3691	3713	3691 +18” diameter limit	3691
Within plantations: Reduce overall stocking levels, remove undesirable species, reduce dwarf mistletoe infected trees (acres)	0	1781	1781	1781	1781	1781
Throughout project area: Reduce surface fuel loading and continuity, increase canopy base height, and decrease ladder fuel densities to increase stand resiliency and reduce the risk of undesirable overstory mortality; maintain old forest and wildlife source habitat	No	Yes	Yes	Yes	Yes	Yes
In and around higher use recreational areas (e.g. yurts, trails, campgrounds, and Highway 21): Promote vegetation conditions for providing quality recreational experience consistent with proposed VQO amendments	No	Yes	Yes	Yes	Yes	Yes

Indicator	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
Mixed 1 Fire Regime Stands						
Outside of plantations: Reduce stand densities and restore structure and species composition to desired conditions; reduce lodgepole pine/subalpine fir and retain ponderosa pine, Douglas-fir, and Engelmann spruce; increase forest resilience, reduce risk of undesirable outcomes from natural disturbance, promote large tree development, and transition stand composition and structure towards desired condition (acres)	0	2315	2315	2475	2315 +18" diameter limit	2315
Within plantations: Reduce stand densities to improve tree vigor and growth and reduce lodgepole and subalpine fir while retaining ponderosa pine and Douglas fir; reduce dwarf mistletoe-infected trees (acres)	0	567	567	567	567	567
Throughout project area: Reduce surface fuel loading and continuity, increase canopy base height and decrease ladder fuel densities to increase stand resiliency and reduce risk of undesirable overstory mortality	No	Yes	Yes	Yes	Yes	Yes
In and around higher use recreational areas (e.g. yurts, trails, campgrounds, and Highway 21): Promote vegetation conditions for providing quality recreational experience consistent with proposed VQO amendments	No	Yes	Yes	Yes	Yes	Yes
Non-Lethal and Mixed 1 Fire Regime Stands						
Within RCAs: Develop structure and function that facilitate terrestrial and riparian/aquatic processes and establish conditions that promote a gradual, diverse transition zone with greater integrity and resiliency when subjected to physical events and natural disturbance processes	No	Yes	Yes	Yes	Yes	Yes

Indicator	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
PURPOSE 2—WATERSHED RESTORATION						
Improve watershed conditions by reducing motorized route-related impacts to water resources and fish, soil, and wildlife and associated habitats while providing for a safe and efficient transportation system necessary to meet long-term management needs.						
Decommission authorized and unauthorized routes to reduce sediment to streams, improve wildlife habitat, and decrease noxious weed spread, reduce effects on soil productivity, reduce road/route-related effects on water quality and aquatic, riparian and terrestrial species and their habitats within RCAs, thereby improving watershed, aquatic, and terrestrial resource conditions (miles)	0	30.9	30.9	30.9	32.9	31.7
Close NFS roads to reduce effects such as sediment delivery to streams, removal of snags and down logs important to wildlife, and spread and/or introduction of noxious weeds (miles)	0	28.1	23.8	23.8	27.7	23.4
Reconstruct and relocate roads to reduce undesirable impacts to stream systems, aquatic habitat, and wildlife habitat (miles)	0	6.0	6.0	6.0	6.0	6.0
Replace existing culvert structures that do not provide AOP with structures that do provide AOP or, alternatively, modify habitat below these culverts to provide AOP (number)	0	23	23	23	23	23
Maintain access to two active mining claims	Yes	Yes	Yes	Yes	Yes	Yes
PURPOSE 3—RECREATION ENHANCEMENTS AND IMPROVEMENTS						
Improve and enhance the quality and diversity of recreational opportunities in the Middle Crooked River and Pikes Fork subwatersheds by reducing risk of loss of forested overstory cover, providing for a variety of recreation experiences, and reducing the potential for conflicts between motorized and nonmotorized recreational users.						
Reduce risks of uncharacteristic or undesirable disturbance events that would reduce forested overstory cover important to the quality of the recreational experience in the project area (acres)	0	13428		13610	13428	

Indicator	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
Modify the transportation system to improve the quality and diversity of the recreational experience in the project area through the following activities: *Convert roads determined to be unnecessary through the TAP for long-term management to motorized or non-motorized trails to meet recreation opportunity objectives and reduce the potential for conflict between full-sized vehicles and recreationists*	0	7.2	7.2	7.2	8.0	9.3
Maintain public access to the Yurts managed by Idaho Department of Parks and Recreation in the summer season. (Idaho Department of Parks and Recreation would have administrative access to the yurts).	Yes **Motorized Access:** Stargazer Banner Ridge Skyline (Seasonal Open 6/16-9/14) Whispering Pine **Non-Motorized Access:** Elk Horn	Yes **Motorized Access:** Banner Ridge Whispering Pine **Non-Motorized Access:** Elk Horn Stargazer Skyline	Yes **Motorized Access:** Banner Ridge Whispering Pine Stargazer (Seasonal Open 6/16-9/14) Skyline (Seasonal Open 6/16-9/14) **Non-Motorized Access:** Elk Horn	Yes **Motorized Access:** Stargazer Banner Ridge Skyline Whispering Pine **Non-Motorized Access:** Elk Horn	Yes **Motorized Access:** Banner Ridge Whispering Pine **Non-Motorized Access:** Elk Horn (Mechanized Equipment Closure 5/1-6/15) Stargazer Skyline (Mechanized Equipment Closure 5/1-6/15)	Yes **Motorized Access:** Banner Ridge Whispering Pine Stargazer (Seasonal Open 6/16-9/14) Skyline (Seasonal Open 6/16-9/14) **Non-Motorized Access:** Elk Horn

Indicator	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
Authorize summer nonmotorized trails in the project area to improve opportunities for hiking, mountain biking, and/or horseback riding during the snow-free season. The proposed summer trail system would provide a variety of nonmotorized recreational opportunities from the yurts located in the project area.	0	41.3	37.9	37.9	46.1 Alternative E will include a seasonal closure of all mechanized equipment east of Highway 21 and north of Beaver Creek	40.8
Authorize a system of over-snow or winter nonmotorized trails in the project area to provide a mix of groomed and ungroomed routes on nonmotorized trails that would provide separation between motorized and nonmotorized winter uses, thus reducing the potential for conflict between motorized and nonmotorized recreationists (miles)	0	60.2	60.2 (+includes a new winter 3,309 acre motorized restriction area)	60.2	60.2 (+includes a new winter 3,309 acre motorized restriction area)	60.2 (+includes a new winter 3,309 acre motorized restriction area)
Designate a motorized loop trail system for vehicles 50 inches or less in width within the project area to enhance designated motorized trail opportunities currently not available in the project area (miles)	0	23.3	22.0	22.0 (would allow vehicles <60 inches)	0	18.8 (would allow vehicles <60 inches)
Construct and authorize trailhead facilities at the junction of NFS Roads 312 and 385 to support the motorized trail system and provide a safe parking location off NFS roads systems open to public motorized use (number). Authorize/relocate Beaver Creek Park and Ski Trailhead to a better location.	0	2	2	2	1	2
Establish VQOs for all new summer and winter non-motorized and motorized trails (see proposed Forest Plan amendments below) important to the recreational experience desired by users of these trails	No	Yes	Yes	Yes	Yes	Yes

Indicator	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
PURPOSE 4—LOCAL AND REGIONAL ECONOMIES SUPPORT						
Support the local and regional economies by providing enhanced recreational opportunities, by utilizing wood products from the suited timber base, and by implementing forest restoration activities.						
Maintain and improve recreational opportunities in the project area to support the local economy	Maintain only	Improve	Improve	Improve	Improve	Improve
Provide wood products from vegetation restoration activities to local and regional economies:						
Commercial sawtimber (MMBF)	0	5.5	5.5	5.5	3.3	5.5
*Miscellaneous wood products (MMBF)**	0	2.9	2.9	3.2	2.9	2.9
Provide additional economic opportunities to local and regional economies through other forest restoration activities (e.g., non-commercial vegetation, transportation and aquatic resource restoration activities)	No	Yes	Yes	Yes	Yes	Yes

2.6 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

The preferred alternative is Alternative C.

The Responsible Official's selected alternative for implementation could be this alternative or another alternative considered in detail. The final decision will be documented in the Record of Decision (ROD).

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CHAPTER 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

3.1.1 Purpose and Content

Chapter 3 describes the physical and biological resources and socio-economic environment that may be affected by the alternatives presented in Chapter 2, and the effects the alternatives may have on them. The sections covering "Affected Environment" and "Environmental Consequences," are combined in this chapter to provide a concise depiction of the potentially affected resources and predicted effects under the different alternatives. The environmental effects analysis forms the scientific and analytic basis for the comparison of alternatives.

Chapter 3 is organized by resource. It describes the affected environment and environmental consequences for resources that could be affected by any of the four alternatives analyzed in detail. The following resource areas are included:

3.1. Forested Vegetation
3.2. Fire and Fuels
3.3. Air Quality
3.4. Wildlife
3.5. Transportation System
3.6. Recreation
3.7. Hydrology Resources
3.8. Fisheries Resources
3.9. Soil Resources
3.10. Botanical Resources
3.11. Noxious Weeds
3.12. Climate Change
3.13. Mineral Resources
3.14. Scenic Environment
3.15. Social/Econ
3.16. Cultural Resources
3.17. Resource Commitments

The chapter concludes with several required effects disclosures regarding potential resource commitments.

3.1.2 Analysis Calculations

In the modeling and analysis included throughout Chapter 3, road miles, acres of treatment, and others are all best estimates based on the latest available information. The modeling and analysis conducted for this DEIS are intended and designed to indicate relative differences

between the alternatives rather than to predict absolute amounts of activities, outputs, or effects.

3.1.3 Incomplete or Unavailable Information

The CEQ regulations for implementing procedural provisions of the NEPA (40 CFR 1502.22) require federal agencies to identify relevant information that may be incomplete or unavailable for evaluating reasonably foreseeable significant adverse effects in an EIS. If the information is essential to a reasoned choice between alternatives and the cost of gathering it is not excessive, it must be included or addressed in the EIS.

The ecology, inventory, and management of ecosystems are complex and developing disciplines. However, central ecological relationships are well established, and a substantial amount of credible information about ecosystems' biological and physical resources and social/economic interests within the Project area are known. The alternatives were evaluated using the best available information.

The data collection and evaluation effort for this analysis can generally be categorized into six basic groups:

- Field data was collected, compiled and analyzed to support effects disclosures (e.g., Vegetative Stand Exams, cultural surveys)
- Resource databases were used to compile and summarize information
- Geographic information system (GIS) spatial analyses were used to link database information to geographic locations
- Expert science reviews of methodology and assumptions, such as those used in the development of the Forest Plan Wildlife Conservation Strategy (USDA Forest Service 2010d), including using the six conservation principles to assess wildlife habitat families and associated species sustainability, were used and form the foundation for site-specific assessments such as those completed for this project
- Information and analysis documented in Forest Plan and project resource specialist reports were prepared by Forest Service resource experts in the fields pertaining to each resource assessed in detail identified under section 3.1.1.
- Current scientific literature reviews were conducted

Following review of the above information with the IDT, the Responsible Official determined that relevant information was sufficiently complete and available for evaluating reasonably foreseeable significant adverse effects in this EIS important to making a reasoned choice between alternatives. Additional detail about the data used by IDT members to support their analyses and the limitations of these data are summarized in each resource section and discussed in greater detail in project record resource specialist reports.

3.1.4 Resources Not Evaluated in this Chapter

Four resource areas were determined by the IDT to not measurably affected the action alternatives developed to address project Purpose and Need (section 1.4) and/or issues (section 1.11) because they do not exist within any of the analysis areas described in the resource sections in this chapter or the activities proposed would not affect them. Therefore, the analyses of effects of proposed alternatives on the following resources are not discussed:

- Wilderness and recommended Wilderness
- Wild and Scenic Rivers
- Inventoried Roadless Areas
- Range Resources

3.2 FORESTED VEGETATION

3.2.1 Analysis Scale, Data Sources and Methodology

3.2.2 Scale of Analysis

3.2.2.1 Direct and Indirect Effects Analysis Area

The Analysis Area is the area proposed for direct treatment of forested vegetation by any and all alternatives. Since Alternative D proposes the largest area for mechanical and prescribed fire treatment (12,791 acres), this area was used as the analysis area for vegetation treatments[26]. The additional stands proposed for treatment under Alternative D (183 acres) were analyzed with a "no treatment prescription" under the other action alternatives (Alternatives B, C, E and F). For indicators related to mechanical treatment of vegetation, the analysis area includes all stands proposed for mechanical treatment under any alternative, 8,536 acres total. For indicators related to burn only treatments, the analysis area includes only stands that would be treated with a broadcast burn, 4,255 acres total. The Analysis Area differs from the project area for two reasons: 1) large portions of the project area do not contain any proposed vegetation treatments and 2) much of this area also lacks site-specific forest inventory data. Therefore, quantitative analysis of direct effects to vegetation is limited to proposed area of treatment. A qualitative analysis of indirect effects on adjacent, untreated forests is also included.

3.2.2.2 Activity Area

The Activity Area is defined as the smallest logical land area where an effect being analyzed is expected to occur (USDA Forest Service 2010a, Glossary). For the assessment of snags and coarse woody debris (CWD), the Activity Area(s) are the acres with direct application of management activities (mechanical and prescribed fire). The Activity Area for Alternatives B, C, E and F is 12,608 acres and the Activity Area for Alternative D is 12,791 acres.

3.2.2.3 Cumulative Effects Analysis Area

The cumulative effects analysis area was determined by the 6th level HUC within and adjoining the project area. This area includes the Crooked River Watershed plus portions of Rock Creek and Kirkum 6th HUCs on the South Fork Payette; and the Big Owl–Wren 6th HUC in the North Fork of the Boise River. The total area of the cumulative analysis area is 100,857 acres. This analysis area was also used for assessing the affects to landscape patch and pattern since it was assumed to be large enough to capture the range of patch sizes that would have occurred under the historical fire regime (USDA Forest Service 2010a, Appendix A, Table A-1, p. A-3).

[26] This does not include 936 acres proposed for "indirect application of fire" in Table 2, Chapter 2 of the DEIS.

3.2.2.4 Temporal Scale of Analysis

Time frames as defined in the Forest Plan were used for analysis of effects: temporary (0–3 years), short-term (3–15 years) and long-term (15 or more years) (USDA Forest Service 2010a, Glossary). Forest Vegetation Simulator (FVS) (Dixon 2002) was used to simulate forested vegetation growth and treatments. Since FVS uses 10-year cycles in which the user enters the first and last years for analysis period, the following years were used for each of the time frames:

- Treatment Year: 2014
- Temporary effects: 2014, post-treatment
- Short-term effects: 2024
- Long-term effects: 2044

In addition, assessing old forest habitat conditions may take several decades to develop, especially in the young plantations within the project area; therefore, a time period of 80 years (2094) was used to analyze trends toward large tree development.

3.2.3 Data Sources and Methodology

3.2.3.1 Stand Exam Data

Forest inventory (stand exam) data was collected from 1992 to 2006 using nationally consistent Common Stand Examination (CSE) protocols for acquiring terrestrial vegetation information. CSE protocols provide the procedures for describing vegetation composition, structure, and productivity within an ecological framework (USDA Forest Service 2014d). The data are stored in the field sampled vegetation (FSVeg) database (formerly called Common Stand Exam). Most of the data for the treated stands[27] were collected in 2003 and 2006. Eight stands (468 acres) that did not have stand exam data were added to the Proposed Action late in the process. Data from similar stands was copied and used for these “no data” stands. This approach is often called “nearest neighbor” data. The nearest neighbor stands were located at similar elevations, aspect, and slope with the same forest cover type, PVG, stand size class, and density as determined by comparing geographical and remote sensing data with onsite reconnaissance.

Stand data was collected based on a stratified, random plot sampling method and averaged to represent stand conditions as a whole. For analysis purposes, stands were tracked as the smallest analysis unit. Most harvest unit boundaries coincide with the FSVeg stand boundaries with some exceptions. The exceptions include stands that are only partially treated or were split between two different proposed treatments and RCA buffers.

The FSVeg stand data for the project area does not have geospatial locations for the inventory points; thus, for split stands, the data for all the plots in the stand were averaged and allocated according to the acres of each portion of the stand to arrive at total values.

[27] In the FSVeg database, stands were renamed as polygons. These terms may be used interchangeably throughout this document to refer to a “stand” of trees.

Potential Vegetation Groups

Forested vegetation refers to land that contains at least 10% canopy cover by forest trees of any size, or land that formerly had tree cover and is currently at an earlier seral stage. Forested vegetation is described by habitat types (Steele et al. 1981), which uses potential climax vegetation as an indicator of environmental conditions. At the Forest Plan level, forested habitat types have been further grouped into potential vegetation groups (PVGs) that share similar environmental characteristics, site productivity, and disturbance regimes (Table 3-1). These groupings simplify the description of vegetative conditions for use at the broad scale. PVGs 1, 2, 3, 4, 7, 8, 9 and 10 are found in the project area. PVG 2 is most common, comprising 33% of the project area.

Table 3-1. Forested Potential Vegetation Groups (PVGs)with fire regimes for the Boise National Forest

Fire Regimes	Potential Vegetation Group
Nonlethal	PVG 1—Dry Ponderosa Pine (*Pinus ponderosa*)/Xeric Douglas-fir (*Pseudotsuga menziesii*)
	PVG 2—Warm Dry Douglas-fir/Moist Ponderosa Pine
Nonlethal-Mixed1	PVG 5—Dry Grand Fir (*Abies grandis*)
Mixed1-Mixed2	PVG 3—Cool Moist Douglas-fir
	PVG 4—Cool Dry Douglas-fir
	PVG 6—Cool Moist Grand Fir
Mixed2	PVG 7—Warm Dry Subalpine Fir (*Abies lasiocarpa*)
	PVG 11—High Elevation Subalpine Fir
Mixed2-Lethal	PVG 10—Persistent Lodgepole Pine (*Pinus contorta*)
Lethal	PVG 8—Warm Moist Subalpine Fir
	PVG 9—Hydric Subalpine Fir

Determination of Stand Level Potential Vegetation Group and Fire Regime

When collecting stand exam data, field crews determined the habitat type at each plot using the key in *Forest Habitat Types of Central Idaho* (Steele et al. 1981), and then they determined the predominant habitat type for the stand. During the field reconnaissance, it was determined that the mid-scale fire regime classes described in the Forest Plan (USDA Forest Service 2010a, Appendix A) did not correspond well to the PVG assignments for the project area. Mid-elevation topography and landform patterns make for a highly complex intermix of PVGs and historical fire regimes within the project area. This complex intermix is represented where species that generally occur in mutually exclusive habitat types are growing together, often side-by-side. Specifically, ponderosa pine of all sizes, including large legacy trees, are growing within subalpine fir habitat types in PVG 7, and subalpine fir and lodgepole pine are present within drier ponderosa pine and Douglas-fir habitat types in PVGs 2, 3, and 4. Some of this intermix is represented by slope position where the wetter subalpine fir types occur on the lower slopes in the drainages and the drier types occur on the upper portions of the slope. This distinction was not visible on the aerial photos and remote imagery used to delineate stand boundaries and, therefore, many of the stands include multiple habitat types. In other cases, the presence of ponderosa pine with subalpine fir and

lodgepole indicate an historical fire-maintained ponderosa pine/Douglas-fir cover type with a fire regime continuum from nonlethal to mixed1.

IDT members classified the PVGs for many of the project area stands based on field observation and an assessment of field data. The tree and understory plant species inventoried at each plot were used to identify the “best” fit habitat type for individual plots and the combined majority of habitat types for a stand were used to determine the “best” fit PVG assignment for the stand. In some cases, the habitat types indicated two distinct PVGs; rather than simplify to a single PVG, some stands were assigned a combined PVG such as 2/4, 2/7, 3/4 or 3/7. Where plant species indicated a majority of the stand fell within habitat types represented by one PVG, the stand was assigned a single PVG.

After the individual stands were assigned a PVG, the tree species mix and various habitat types present in the stand were used to assign a fire regime if the mid-scale fire regime cross-walk for the PVG in Appendix A of the Forest Plan (USDA Forest Service 2010a) was determined to not be representative. This approach resulted in several stands that were predominately PVG 2 but contained indicators of other PVGs (e.g., PVG 4 or PVG 7) being classified as a mixed1 fire regime. Additionally, several stands classified as PVG 7 but containing ponderosa pine, which indicates a historically fire-maintained early seral species stage, were classified as mixed1 rather than mixed2, the mid-scale fire regime assignment for PVG 7. Figure 3-1 displays the geographical distribution of the stand-level fire regime classification within the landscape level fire regime patches (see the vegetation technical report [project record] for acreage of each PVG).

The stand level fire regime occurs within the larger fire regime patches as displayed in Figure 3-1. The majority of stands and acres (7,881 acres or 41% of the project area) are classified in the nonlethal fire regime. At the stand level, 28% of the project area is classified as mixed1 fire regime; 14% of the project area is classified as the nonlethal/mixed1 fire regime. These three fire regimes combined (nonlethal, nonlethal/mixed1 and mixed1) comprise 83% of the analysis area. The pattern of the stand scale fire regimes occur within the larger landscape scale fire regime patches.

Site-specific data for RCAs was not collected during the stand exam, nor is identifying specific plots inside of RCAs possible due to a lack of geospatial location information for the stand exam plots. Upland vegetation located within the RCAs is assumed to be similar to the upland vegetation located outside of the RCAs.

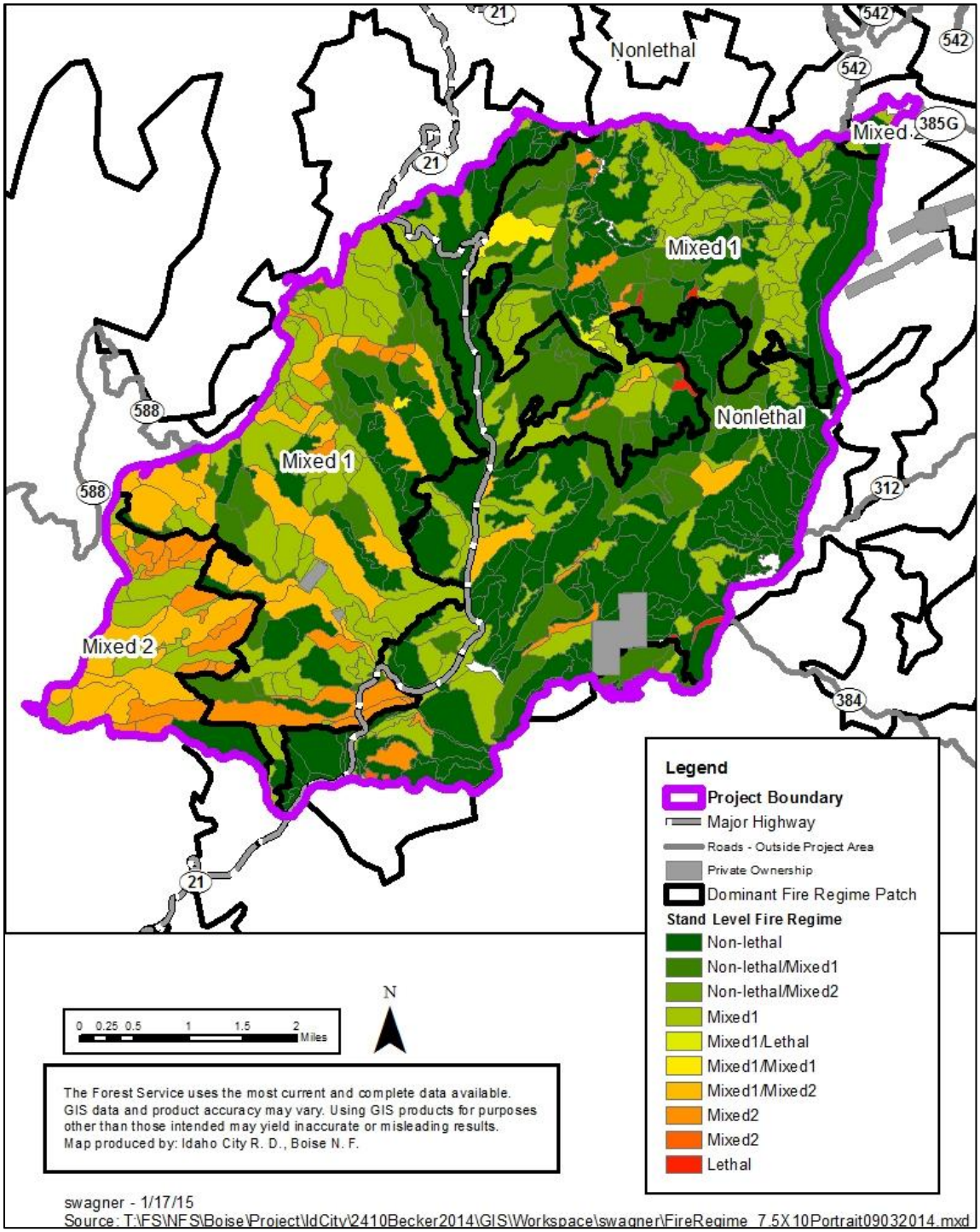


Figure 3-1. Dominant Fire Regime Patches in the project area

3.2.3.2 Relationship of Strata to Fire Regime

Due to the complexity of forest types, stands, and PVGs in the project area, stands were grouped into five strata labeled A through E to represent similar site and stand conditions. Stratification was determined based on the dominant fire regime, PVG, and existing forest cover type for each stand (Table 3-2). Figure 3-2 displays the distribution of the strata for all stands with proposed vegetation management activities. Table 3-3 summarizes the acres of proposed vegetation treatments (mechanical and prescribed fire) by alternative. Stratum A was further subdivided based on dominant cover type, relative species composition, and proposed treatment for development of prescriptions in FVS. Vegetative conditions were modeled by stand and displayed using the strata. However, though the strata were developed to reduce the variability of conditions across the fire regimes, the results represent an average of the range of conditions that occur within and between stands. Similar to the strata summaries, overall metrics for the fire regimes were developed based on stand averages. The nonlethal fire regime is represented by Stratum A and the Mixed1 fire regime is represented by strata B, C, D and E.

Table 3-2. Characteristics of strata used to model and analyze mechanical treatments of vegetation for the Becker project

Stratum	Fire Regime	PVG(s)	Cover Type(s)	Description
A	Nonlethal	1,1/2, 2	PP, DF, LPa	Predominately PVG 1 and PVG 2, nonlethal fire regime. Presence of ponderosa pine primary indicator. Many stands dominated by DF or LP due to fire exclusion and past activities
	Nonlethal/ Mixed1	1/2, 1/3, 2, 2/3, 2/4, 2/7, 4		
	Mixed1	2		
B	Mixed1	2/3, 3	DF, PP, LP	Predominately PVG 3 or wetter/cooler range of PVG 2. PP occurs but not dominant. Higher percentage of less fire-tolerant, more shade-tolerant species.
C	Mixed1	4	DF, LP	All PVG 4 stands. DF is primary species but some stands are dominated by LP. PP is more common than in other PVG 4 stands on the Boise forest.
D	Mixed1	2/7, 3, 3/7, 4/7, 7	DF, LP, PP	Predominately PVG 7 or wetter/cooler extremes of PVG 2, PVG 3, PVG 4. DF presence throughout. Subalpine fir and LP common, PP rare except on warmer drier microsites.
	Mixed1/ Mixed2	2/7, 3/7, 4/7, 7	DF, LP	
	Mixed2	7	DF, LP, SF	
E	Mixed2	10	LP	PVG 10. Mostly found in cold valley bottoms in the project area.

[a] PP = ponderosa pine. DF = Douglas-fir. LP = lodgepole pine. AF = subalpine fir. SF = Englemann spruce and subalpine fir.

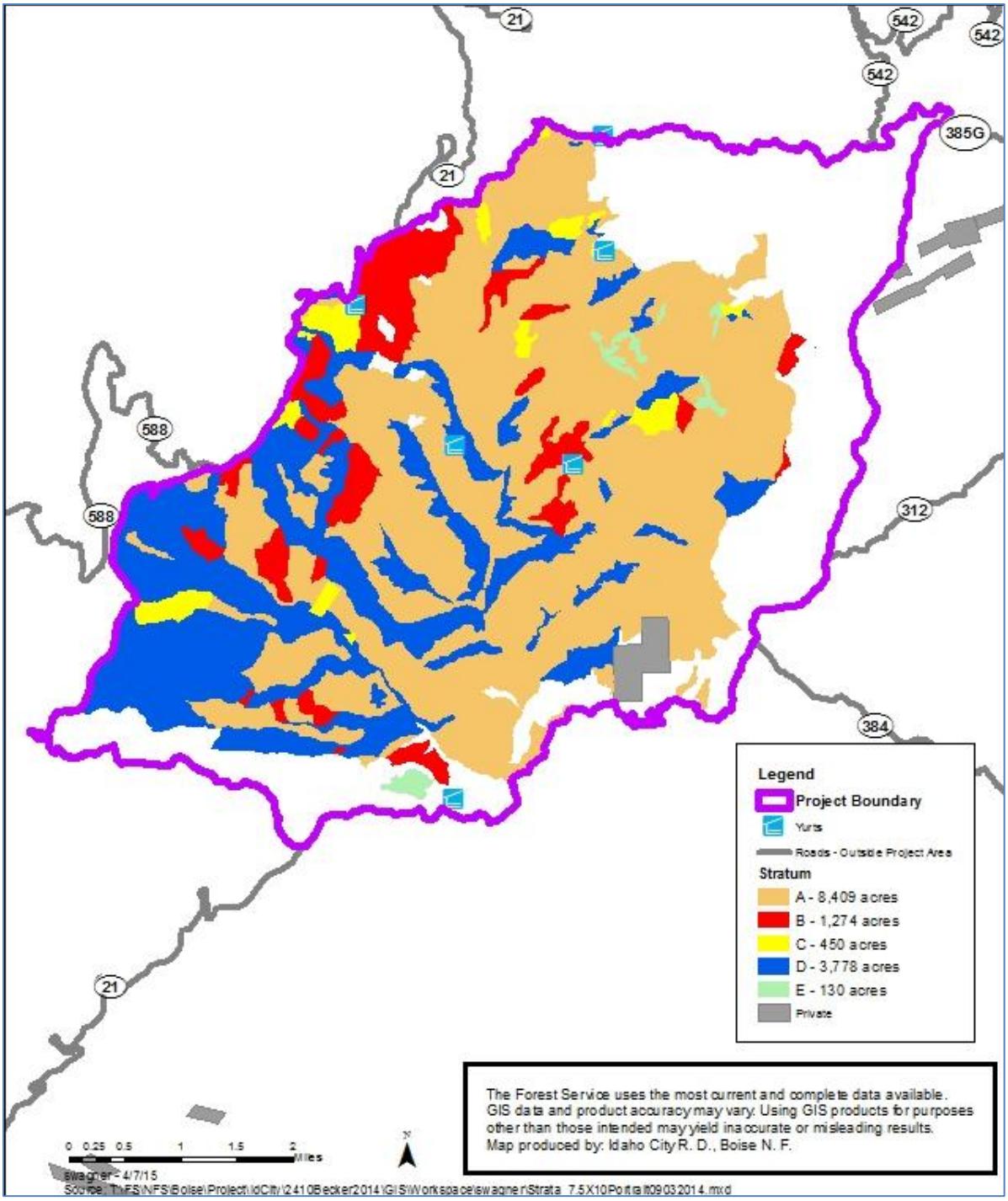


Figure 3-2. Map showing the distribution of stands proposed for mechanical and prescribed fire (underburn) treatments of vegetation by strata in the project area

Table 3-3. Summary of acres proposed for mechanical and underburn treatments by strata and alternative

Stratum	Type of Treatment	Alternatives B, C, E and F	Alternative D
A	Thinning and Activity Fuels Underburn	4,790	4,790
	Thinning Only	681	703
	Natural Fuels Underburn Only	2,731	2,731
	Subtotal	**8,202**	**8,224**
B	Thinning and Activity Fuels Underburn	643	643
	Thinning Only	421	487
	Natural Fuels Underburn Only	103	103
	Subtotal	**1,137**	**1,233**
C	Thinning and Activity Fuels Underburn	145	145
	Thinning Only	12	12
	Natural Fuels Underburn Only	286	286
	Subtotal	**443**	**443**
D	Thinning and Activity Fuels Underburn	1,389	1,389
	Thinning Only	272	321
	Natural Fuels Underburn Only	1,050	1,050
	Subtotal	**2,711**	**2,759**
E	Thinning Only	0	46
	Natural Fuels Underburn Only	73	73
	Subtotal	**73**	**119**
N	Natural Fuels Underburn Only	12	12
	Subtotal	**12**	**12**
Subtotal Thinning and Activity Fuels Underburn		6,967	6,967
Subtotal Thinning Only		1,386	1,569
Subtotal Natural Fuels Underburn Only		4,255	4,255
TOTAL TREATMENT ACRES (Activity Area)		**12,608**	**12,791**
Total Mechanical Treatment (thinning) Acres		**8,353**	**8,536**
TOTAL Activity/Natural Fuels Underburn Acres		**11,222**	**11,222**

3.2.3.3 Landscape Patch and Pattern Data

Historical fire regimes were used to represent patch and pattern for the project area and surrounding landscape. Forest-wide fire regimes were used to represent fire regimes at the mid-scale, and site-specific information was used to represent fire regimes at the stand-scale. Specialists delineated “patches” for the landscape within and surrounding the project area based on the spatial pattern of fire regimes and knowledge of the ecological context of the landscape. The predominant fire regime patches within the project area are nonlethal and mixed1 with a small amount of mixed2 to the southwest.

3.2.4 Analysis Process/Indicators

The indicators identified below will be used to compare the alternatives, ascertain achievement of treatment objectives, and determine compliance with design features and 2010 Forest Plan standards and guidelines (USDA Forest Service 2010a).

Purpose #1 in Chapter 1 describes a common restoration need for both the nonlethal and mixed1 fire regimes to achieve functioning vegetation and terrestrial habitat conditions associated with departed forest stand and landscape patch dynamics of upland vegetation communities that fall within the RCAs. Specific analysis of effects in RCAs will be addressed in section 0 below.

For the analysis, Stratum A includes all the stands classified as nonlethal or nonlethal/mixed1 fire regimes while Strata B, C, D and E include stands assigned to the mixed1 and mixed1/mixed2 fire regimes.

3.2.4.1 Mechanical/Underburn Treatments in the Nonlethal[28] Fire Regime Stands, outside of Plantations

- *Indicator 1:* Canopy cover of large tree size class for measuring the development of medium-to-large size trees
- *Indicator 2:* Trees per acre (TPA) by tree species in the medium and large size classes as measures of species composition and stand structure toward the desired condition
- *Indicator 3:* Dwarf mistletoe infection rates of Douglas-fir and lodgepole pine as an indicator of stand health and vigor
- *Indicator 4:* Bark beetle risk rating as an indicator of forest health, vigor and resistance to disturbance
- *Indicator 5:* Average Basal Area (BA) as a measure of stand density to indicate development of desired conditions and resilience to natural disturbance.

3.2.4.2 Mechanical/Underburn Treatments in the Nonlethal[29] Fire Regime Stands, within Plantations

- *Indicator 1:* Combined BA and TPA by tree species to measure stocking levels to indicate development of desired conditions
- *Indicator 2*: Dwarf mistletoe infection rates of Douglas-fir and lodgepole pine as an indicator of forest health and vigor
- *Indicator 3:* Qualitative discussion on benefits of variable spacing to achieve aggregated tree distribution.

[28]Stratum A was used to represent results for the nonlethal fire regime
[29] Stratum A was used to represent results for the nonlethal fire regime

3.2.4.3 Burn Only Treatments in the Nonlethal[30] Fire Regime Stands

- *Indicator 1:* TPA in the small size class by species as a measure of species composition and stand structure toward the desired condition

3.2.4.4 Mechanical Treatments in the Mixed1[31] Fire Regime Stands outside of Plantations

- *Indicator 1:* Canopy Cover by tree size class for measuring the promotion of medium-to-large size trees
- *Indicator 2:* TPA by tree species and tree size class for measures of species composition and stand structure toward the desired condition
- *Indicator 3:* Dwarf mistletoe infection rates on Douglas-fir and lodgepole pine as an indicator of stand health and vigor
- *Indicator 4:* Bark beetle risk rating as an indicator of forest health, vigor and resistance to disturbance
- *Indicator 5:* Average BA as a measure of stand density to indicate development of desired conditions and resilience to natural disturbance

3.2.4.5 Mechanical Treatments in the Mixed1[32] Fire Regime Stands within Plantations

- *Indicator 1:* Combined BA and TPA by tree species to measure stocking levels to indicate development of desired conditions
- *Indicator 2*: Dwarf mistletoe infection rates of Douglas-fir and lodgepole pine as an indicator of forest health and vigor
- *Indicator 3:* Qualitative discussion on benefits of variable spacing to achieve aggregated tree distribution

3.2.4.6 Burn Only Treatments in the Mixed1[33] Fire Regime

- *Indicator 1:* TPA in the small size class by species as a measure of species composition and stand structure toward the desired condition

3.2.4.7 Mechanical and Underburn Treatments for Needs 1–3

While addressing needs 1 through 3, old forest[34] and wildlife source habitat components characteristic of the fire regime should be maintained where present; where not present, restoration should be promoted.

- *Indicator 1:* Number of stands meeting old forest characteristics as defined in Appendix E of the Forest Plan (USDA Forest Service 2010a, Table E-2)

[30] Stratum A was used to represent results for the nonlethal fire regime
[31] Strata B, C, D, and E were used to represent the mixed1 fire regime.
[32] Strata B, C, D, and E were used to represent the mixed1 fire regime.
[33] Strata B, C, D, and E were used to represent the mixed1 fire regime.
[34] Old forest habitat components are described in Appendix E of the Forest Plan (USDA Forest Service 2010a, p. E-25) and include tree size class, canopy cover, species composition, snags, and coarse woody debris desired conditions by Potential Vegetation Group (PVG). Other stand structural components are also important (USDA Forest Service 2010b, pp. E-24 through E-28) but are not easily derived from data, including within-stand patchiness, canopy gaps, and decadence.

3.2.5 Affected Environment

Treatments would occur on the same acres under Alternatives B, C, E and F and will be referred to collectively as "Alternatives B/C/E/F" for purposes of identifying spatial location and size of treatments. The proposed mechanical treatments under Alternative E would occur on the same stands and acres but differ from Alternatives B, C and F due to an 18-inch upper diameter limit. Therefore, the effects of treatments will be analyzed separately for Alternative E.

3.2.5.1 Mechanical Treatments

Alternatives B/C/E/F would include mechanical vegetation treatments on 8,353 acres in 201 stands (Table 3-4). Alternative D includes all the stands and acres under Alternatives B, C, E and F plus an additional 8 stands covering 183 acres. Of the 8 additional stands under Alternative D, 2 are in Stratum A (22 acres), three in Stratum B (66 acres), two in Stratum D (48 acres), and 1 in Stratum E (46 acres). Of the 8,353 acres proposed for treatment in Alternatives B, C, E and F, 6,967 would have a follow-up underburn to remove activity and natural fuels (Table 3-3) and 1,386 acres would have mechanical treatment with piling and burning of slash concentrations but no underburn. Under Alternative D, the same stands and acres as the other action alternatives would receive an understory burn (6,967) while the additional 183 acres would be mechanically treated with piling of slash but no underburn (1,569 acres total).

The acres in Table 3-4 do not reflect within-stand prescription modifications for RCA-specific design features, such as FH-2. For example, in stands proposed for *Thinning with Product Removal*, the acres are for the entire stand. The stand acres were not adjusted for the RCA "no treatment buffer" and the "noncommercial thin" in the first site-potential tree height (refer to Chapter 2 for a description of the design features for mechanical treatments within RCAs).

Table 3-4. Acres and number of stands of mechanical vegetation treatments by strata, type of treatment and alternative

Stratum	Mechanical Treatment	Alternatives B/C/E/F		Alternative D	
		Acres	# of Stands	Acres	# of Stands
A	Thinning with No Product Removal	2,239	65	2,239	65
	Thinning (Optional Mastication) No Product Removal	625	17	625	17
	Thinning with Optional Misc. Wood Product Removal	1,146	25	1,146	25
	Thinning with Product Removal	1,350	27	1,372	29
	Mixed Treatment with Product Removal	111	3	111	3
Subtotal Stratum A		**5,471**	**137**	**5,493**	**139**
B	Thinning with No Product Removal	581	12	581	12
	Thinning (Optional Mastication) No Product Removal	58	2	58	2
	Thinning with Product Removal	425	11	442	13
	Mixed Treatment with Product Removal	0	0	49	1
Subtotal Stratum B		**1,065**	**25**	**1,132**	**28**
C	Thinning with No Product Removal	29	2	29	2
	Thinning with Product Removal	42	2	42	2
	Mixed treatment with Product Removal	86	2	86	2
Subtotal Stratum C		**157**	**6**	**157**	**6**
D	Thinning with No Product Removal	396	10	396	10
	Thinning with Optional Misc. Wood Product Removal	118	2	118	2
	Thinning with Product Removal	414	10	463	12
	Mixed Treatment with Product Removal	733	11	733	11
Subtotal Stratum D		**1,661**	**33**	**1,710**	**35**
E	Mixed Treatment with Product Removal	0	0	46	1
Subtotal Stratum E		**0**	**0**	**46**	**1**
GRAND TOTAL		**8,353**	**201**	**8,536**	**209**

3.2.5.2 Thinning with No Product Removal

Thinning with no product removal (noncommercial thinning) is proposed on 3,192 acres under all alternatives (Table 3-5). This treatment would include thinning from below of trees less than 12.0 inches dbh. Thinning from below means smaller trees would be cut, leaving the larger trees of the desired species composition. The objectives would be the same as commercial thinning—reduce stand densities, promote individual tree growth and development of large size class trees, promote desired species composition, reduce dwarf-mistletoe–infected trees, and begin to develop the desired stand structure in terms of age/size class distribution and horizontal aggregation.[35] Much of the noncommercial thinning would occur in plantations or in stands with limited access and/or volume to support a commercial thin.

[35] Aggregation refers to grouping or clumping, openings and uniformity of tree distribution.

Table 3-5. Acres and number of stands with mechanical treatments proposed under all alternatives

Mechanical Treatment	Alternatives B/D/E/F		Alternative D	
	Acres	# of Stands	Acres	# of Stands
Thinning with No Product Removal	3,245	89	3,245	89
Thinning (Optional Mastication) No Product Removal	683	19	683	19
Thinning with Optional Misc. Wood Product Removal	1,264	27	1,264	27
Thinning with Product Removal	2,231	50	2,319	56
Mixed Treatment with Product Removal	930	16	1,025	18
TOTAL	8,353	201	8,536	209

3.2.5.3 Thinning (Optional Mastication) No Product Removal

Within this treatment group, 19 stands covering 683 acres would have the option to be thinned with mastication equipment, which would provide options for thinning and treating slash in stands with slopes less than 35% and access for the equipment. The objectives and desired conditions for the mastication treatment would be the same as Thinning with No Product Removal with the exception of the follow-up slash treatment (slash treatments will be discussed at the end of this section).

3.2.5.4 Thinning with Optional Miscellaneous Wood Products Removal

Thinning with optional miscellaneous wood products removal (noncommercial thinning/misc. product) is proposed on 1,264 acres under all alternatives (Table 3-5). This treatment would include thinning from below of trees less than 12.0 inches dbh (14.0 dbh for lodgepole pine). Emphasis would be on harvesting miscellaneous wood products where practicable. The objectives would be the same as commercial thinning but with the upper diameter limits. These stands were selected for noncommercial thinning due to insufficient volume and/or inadequate access to support commercial harvesting. The upper diameter limits were set to avoid high levels of activity-generated fuels following the treatment.

3.2.5.5 Thinning with Product Removal

Thinning with product removal (commercial thinning) is proposed on 2,231 acres under Alternatives B/C/E/F and 2,319 acres under Alternative D (Table 3-5). This treatment would include commercial and noncommercial thinning, which may be implemented concurrently or sequentially. The objective would be to reduce overall stand densities, promote desired species composition, reduce relative numbers of dwarf mistletoe–infected trees, and promote tree growth for the development of large size class trees. Small canopy gaps up to 2.0 acres in size would be enhanced or created during thinning to develop the desired structural diversity for the PVG and to promote the development of uneven-aged stands over the long term. All merchantable logs would be harvested. Noncommercial thinning would generally involve trees less than 8.0 inches dbh. Miscellaneous wood products (e.g., firewood, posts, poles, or biomass) would be harvested during noncommercial thinning where access, volume, and markets allow.

3.2.5.6 Mixed Treatment with Product Removal

Mixed treatment with product removal (Mixed Treatment or MT) is proposed on 930 acres under Alternatives B/C/E/F and 1,025 acres under Alternative D (Table 3-5). This treatment would be a commercial thin interspersed with created gaps from 0.25 to 4.9 acres. The created gaps would be located where opportunities exist to remove dwarf mistletoe–infected trees, within patches of undesired species, and or to promote aspen or lodgepole pine regeneration. "Desired" tree species would depend on stratum and PVG of the stand and, to some extent, the specific tree species in any given area. In general, ponderosa pine would be preferred over Douglas-fir, which would be preferred over lodgepole pine and subalpine fir. The created gaps would also serve to provide for future natural regeneration. All merchantable logs would be harvested during commercial thinning. Commercial thinning would be followed by, or be concurrent with, noncommercial thinning. Noncommercial thinning would generally involve trees less than 8.0 inches dbh. Miscellaneous wood products would be harvested during the noncommercial thinning where access, volume, and markets allow.

3.2.5.7 Treatment Descriptions

This section describes the existing condition, desired condition and prescribed treatments for all of the action alternatives. Table 3-6 displays the desired post-treatment stand densities and the long-term desired species composition by strata and predominant PVG. The desired density is measured in basal area (ft^2 per acre) and trees per acre (TPA). In general, the BA would apply for stands with quad mean diameter (QMD) of 8.0 inches and greater while the average TPA would apply for stands with a QMD less than 8.0 inches. The desired conditions in Table 3-6 were developed with the long-term goal of development of large tree size class of the desired species for the PVG, and the development of old forest habitat.

Table 3-6. Desired ranges of stand densities and species composition following treatment by stratum and predominant Potential Vegetation Group (PVG)

Stratum	Fire Regime	PVG	Basal Area (ft2/acre)	Trees Per Acre	Ponderosa Pine (%)	Douglas-fir (%)	Lodgepole Pine (%)	Subalpine Fir (%)
A	Nonlethal	1	50–70	105–220	96+	0–4	Trace	0
A	Nonlethal	2	55–75	105–220	78–85	12–22	Trace	0
B	Mixed1	3	55–80	140–320	26–41	48–72	1–2	0
C	Mixed1	4	60–80	110–260	5–15	60–80	0–5	Trace
D	Mixed1	7	55–85	210–380	5–10	30–50	22–38	12–21
E	Mixed1	10	0–70	600–800	Trace	Trace	90–98	Trace

Treatments Common to all Strata

Silvicultural Prescription Items

- Ponderosa pine trees 20.0 inches dbh and greater will not be cut except where necessary for OSHA safety requirements or if needed for ROW clearance or landings.
- All ponderosa pine and Douglas-fir trees with legacy or legacy-like characteristics will not be cut, regardless of size (USDA Forest Service 2009b)
- In the stands proposed to be thinned with *No Product Removal* or with M*iscellaneous Product Removal* the maximum dbh for cutting of ponderosa pine, Douglas-fir and subalpine fir trees is 11.9 inches. Maximum dbh for lodgepole but trees is 13.9 inches
- All conifer trees less than 20.0 inches dbh (18.0 inches in Alternative E) will be cut within one average aspen tree height of live aspen clones with at least 20 viable stems and evidence of sprouting. Trees 20.0 inches dbh and over (except in Alternative E) may be removed if consistent with the prescribed treatment for the stand. The objective is to promote aspen sprout response by reducing shade to the soil and roots and to reduce competition to promote health and growth of aspen clones.
- Engelmann spruce and whitebark pine will not be cut and will be protected from accidental damage and/or cutting where possible.
- No ponderosa pine or Douglas-fir snags greater than 10.0 inches DBH and at least 30 feet tall will be cut unless necessary for OSHA safety standards or for public safety near developed recreation sites.

Silvicultural Treatments within Riparian Conservation Areas

The prescription for thinning within RCAs is the same as outside of RCAs for each stratum with the exception of an upper diameter limit of 8.0 inches dbh within the first site-potential tree height buffer in order to prevent removing trees that may be providing shade to the stream. Trees would be felled away from the stream or riparian area. Table 3-7 summarizes the acres of proposed mechanical vegetation treatments in RCAs by stratum and alternative. The acres listed under Alternative B are the same for Alternatives C, E and F. The acres listed under Alternative D are only for the additional stands proposed for treatment under Alternative D.

Table 3-7. Summary of total acres by strata type of treatment of mechanical treatment in Riparian Conservation Areas for Alternative B and additional stands under Alternative D

Stratum	Mechanical Treatment	Alt B Acres	Alt D Added Acres
Treatments within First Site Potential Height Buffer			
A	Thinning with No Product Removal	914	1
B	Thinning with No Product Removal	17	3
C	Thinning with No Product Removal	19	0
D	Thinning with No Product Removal	293	3
E	Thinning with No Product Removal	0	4
First Site Potential Tree Height Total		1402	11
Treatments within Second Site-Potential Tree Height Buffer			
A	Mixed Treatment with Product Removal	15	
	Thinning (Optional Mastication) No Product Removal	55	
	Thinning with No Product Removal	242	1
	Thinning with Optional Misc. Wood Product Removal	106	
	Thinning with Product Removal	153	
A Total		570	1
B	Thinning (Optional Mastication) No Product Removal	6	
	Thinning with No Product Removal	80	
	Thinning with Product Removal	42	3
B Total		128	3
C	Mixed Treatment with Product Removal	6	
	Thinning with No Product Removal	1	
C Total		7	0
D	Mixed Treatment with Product Removal	90	
	Thinning with No Product Removal	60	
	Thinning with Optional Misc. Wood Product Removal	16	
	Thinning with Product Removal	53	7
D Total		220	7
E	Mixed Treatment with Product Removal	0	1
E Total		0	1
Second Site Potential Tree Height Buffer Total		925	11
Grand Total		2,327	21

Silvicultural Prescriptions in Developed Recreation Sites

Thirteen developed recreation sites occur in the project area (existing and proposed) (see recreation section). Mechanical and prescribed fire vegetation treatments are proposed adjacent to or within the following developed recreation sites and facilities in all action alternatives:

- Stargazer Yurt
- Elkhorn Yurt
- Skyline Yurt
- Beaver Creek Summit Trailhead Parking (proposed new locationBanner
- Ridge Trailhead Gold Fork Trailhead
- Beaver Creek Campground
- Edna Creek Campground
- Whoop-Em-Up Campground and Ski

To the extent practicable, Vegetation Management Plans will be prepared for all developed recreation facilities Priority would be given to preparing plans for sites with proposed mechanical vegetation treatments. These plans will be prepared by a certified silviculturist with assistance from the South Zone Botanist, District Recreation Program Manager and/or forest health specialists.

The vegetation management area associated with the developed recreation sites includes the site and an area approximately 30 to 50 feet from the outer edge of all constructed facilities or designated parking/camping sites. The actual distance will be determined at the site based on terrain and vegetation conditions.

The primary objective of the mechanical treatments within and immediately adjacent to the developed recreation sites is to promote forest health, reduce hazards and provide for scenic quality. The treatments would promote long-lived, fire tolerant seral species (ponderosa pine and Douglas-fir) while reducing lodgepole pine and subalpine fir. Dwarf mistletoe–infected trees would be removed if possible while complying with all applicable design features. The thinning would be more uniform than in areas away from developed recreation facilities and large canopy gaps would not be created except to provide limited scenic views.

Many of the developed recreation sites are located within RCAs. Treatments would comply with the applicable RCA design features as much as possible while providing for safety and scenic quality.

Hazard trees of any size (including snags) may be cut if deemed a hazard to constructed facilities or the public. Much of the slash generated from vegetation treatments would either be piled and burned or removed. Some larger pieces may be left to provide for coarse woody debris and scenic diversity. Residual smaller size material would be dispersed.

Stratum A

This stratum includes stands that are predominately PVG 1 (dry ponderosa pine/xeric Douglas-fir) and PVG 2 (warm-dry Douglas-fir/moist ponderosa pine) with included pockets of PVG 3 (cool, moist Douglas-fir), PVG 4 (cool, dry Douglas-fir), and PVG 7 (warm, dry

subalpine fir) (Table 3-2). Stratum A represents stands in the nonlethal fire regime. Stratum A has the most acres of proposed treatments in the project area. A total of 5,471 acres in 137 stands are proposed for mechanical treatment under Alternatives B/C/E/F; Alternative D includes an additional 22 acres in 2 additional stands (Table 3-4).

Mechanical treatment methods in Stratum A include the following (Table 3-4):

- Thinning with No Product Removal (2,239 acres, 65 stands)
- Thinning (Optional Mastication), No Product Removal (625 acres, 17 stands)
- Thinning with Optional Misc. Wood Product Removal (1,146 acres, 25 stands)
- Thinning with Product Removal (1,350 acres, 27 stands). Alternative D would treat 1,372 acres in 29 stands.
- Mixed Treatment with Product Removal (111 acres, 3 stands)

Stands in Stratum A occur throughout the project area. Elevations range from 5,100 to 6,600 feet on predominately southeast, south, southwest, and west aspects. Thirty-five percent of the stands and acres in this stratum are plantations (47 stands on 1,780 acres). All of the stands have had some type of past management activity, including commercial timber harvest, noncommercial thinning, and planting. About 480 acres in 27 stands were burned in the Lowman Complex wildfire in 1989. Most of the burned stands were planted following the fire.

Figure 3-3 compares species composition inside and outside of plantations as a percentage of trees per acre for all stands proposed for treatment in Stratum A. Outside of plantations, Douglas-fir is the most abundant species, comprising about 35% of the TPA, followed by lodgepole pine at 23%, and then ponderosa pine at 22% (Figure 3-3). Within plantations ponderosa pine is the most abundant species. Engelmann spruce is very rare in Stratum A, as would be expected. Aspen comprises about 11 to 16% of the TPA but it is generally small trees concentrated in dense clones on wet microsites.

Figure 3-4 compares species composition based on basal area (BA) inside and outside of plantations for all treatment stands in Stratum A. BA is only calculated for trees that are at least 4.5 feet tall and, by definition, is weighted by tree size. Aspen and Engelmann spruce are excluded from the chart because they comprise a very small percent of BA. Outside of plantations, Douglas-fir comprises 46% of the BA and ponderosa pine comprises 27%, followed by lodgepole at 23% (Figure 3-4). Within plantations, ponderosa pine comprises the most BA at 51% (Figure 3-4).

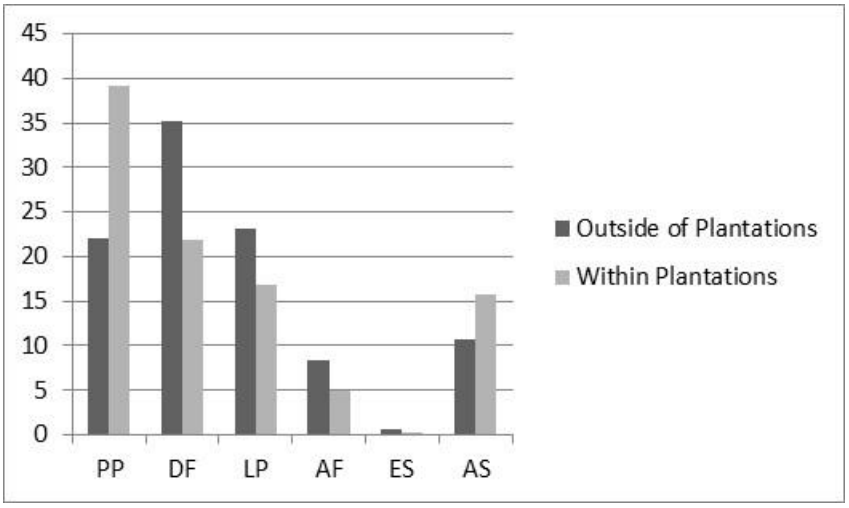


Figure 3-3. Percent of total trees per acre by species for all stands proposed for mechanical and prescribed fire vegetation treatments in Stratum A

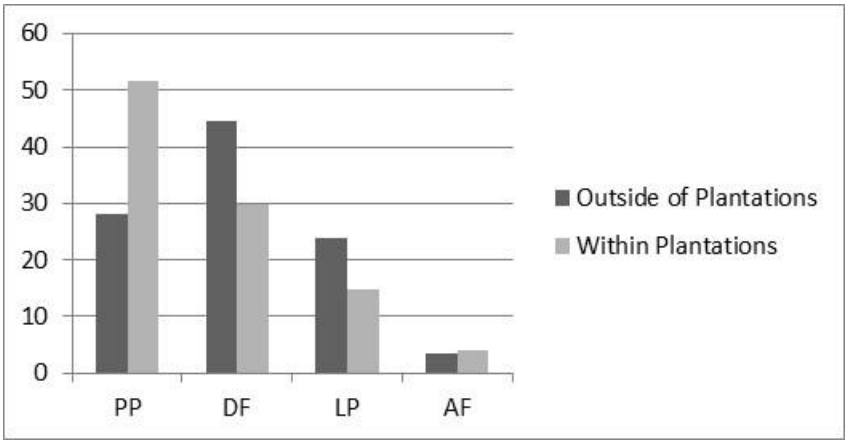


Figure 3-4. Percent of total basal area by species for all stands proposed for mechanical treatments in Stratum A

The desired species composition for stands in Stratum A is for ponderosa pine to comprise 78%–96% with 4%–22% Douglas-fir (Table 3-6). Aspen would occur in small clones on seeps and depressions. Lodgepole pine would be restricted to the lower slopes and benches adjacent to streams. Subalpine fir would be absent. Ponderosa pine would be distributed in groups interspersed with small canopy gaps and widely spaced individual trees. Older groups would generally have fewer, widely spaced trees while younger groups would have more, closely spaced trees. Gaps would range in size from 0.25 to 2.0 acres and would occupy about one-third of the total area in each stand. On average there would be about 2 medium and 1 large-size snags per acre which may be widely dispersed individuals or in groups of 2 to 5 snags. Surface fuels would be light and average crown base heights would be relatively high, depending on tree size.

Stands in Stratum A are departed from the desired condition in terms of species composition: percentages of ponderosa pine TPA and BA are below desired conditions, both inside and outside of plantations, and Douglas-fir, lodgepole pine, and subalpine fir percentages are higher than desired (Figure 3-3, Figure 3-4, Table 3-6). The larger relative percent of

ponderosa pine BA compared to TPA indicates more ponderosa pine in the overstory and more of the other species in the understory.

The prescription for stands proposed for *Commercial Thinning* in Strata A, is to reduce average stand basal area to 50–70 ft^2/acre With one exception, commercial thinning would occur in non-plantation stands. Species retention priority would be ponderosa pine, Douglas-fir, lodgepole pine, and subalpine fir. No legacy ponderosa pine or "legacy-like" Douglas-fir trees would be cut. No ponderosa pine over 20.0 inches dbh would be cut. Douglas-fir over 20.0 inches dbh with moderate-to-severe dwarf mistletoe infection (Dwarf Mistletoe Rating [DMR] of 3 or more) would be cut (see the vegetation technical report [project record] for a description of the DMR codes). In stands where retaining large size class trees is necessary to meet Forest Plan standards for maintenance of large tree size class stands, no Douglas-fir over 24.0 inches would be cut.

In general, Douglas-fir, lodgepole pine, and subalpine fir, within and adjacent to ponderosa pine clumps or individual trees, would be removed. Within patches where no ponderosa pine trees are present, all lodgepole pine and subalpine fir within or near retained Douglas-fir would be cut. Within patches with no ponderosa pine or Douglas-fir, emphasis would be on removing subalpine fir and insect or dwarf mistletoe-infected lodgepole pine. These sites would also be appropriate for created gaps.

Within ponderosa pine patches, a non-uniform tree thinning would be utilized to reduce the patch density to within the desired range and to establish groups, clumps, and canopy gaps. Three stand structural conditions are related to tree distribution (aggregation) in ponderosa pine and dry mixed conifer forests: 1) clumps or aggregated groups of trees with interlocking or nearly touching crowns; 2) canopy gaps occupied by shrubs, grass, forbs or seedling size trees; 3) widely spaced individual trees (Larson and Churchill 2012). Canopy gaps would range in size from 0.25 to 2.0 acres.

This spatial pattern in fire-frequent forests is important because canopy gaps with exposed mineral soils provide opportunities for germinating ponderosa pine seedlings. These canopy gaps have low surface fuel loads and tend to not burn, or burn at low intensity, allowing most of the seedlings and saplings to survive the next fire event before they are large enough to survive a hotter fire. As fuels accumulate at the base of trees, fires burn hotter and begin to thin some of the trees from the clump. Inter-tree competition within groups leads to diversity of tree sizes as the group ages. Many wildlife species depend on the groups for trees for habitat needs.

The distribution of the groups, canopy gaps, and widely spaced individuals will vary from stand to stand but roughly one-third of the treated area would be in each type following mechanical treatment. Groups containing medium-to-large size trees would not be thinned of ponderosa pine but where possible, other species would be removed from the group. Smaller trees and less desired species around the groups would be removed. Existing canopy gaps would be maintained by removing trees encroaching from the perimeter, especially if they are less fire-resistant species such as subalpine fir, Douglas-fir, or lodgepole pine. New canopy gaps from 0.25 to 2 acres would be created. These canopy gaps would be located in patches of less fire-resistant species, patches of Douglas-fir infected with dwarf mistletoe, and/or patches of small-to-medium size trees. Desired retention species (ponderosa pine or

Douglas-fir) larger than the upper diameter constraint for the particular stand would be retained as “reserves” in the canopy gaps.

In stands proposed for *Thinning with No Product Removal or w/ Misc. Product Removal* (noncommercial thin) the thinning would set up the stand for future development of the desired spatial pattern. This treatment is proposed both in and outside of plantations. Ponderosa pine, Douglas-fir, and subalpine up to 12.0 inches dbh would be cut while lodgepole pine up to 14.0 inches would be cut. The thinning would expand on the existing non-uniform spacing patterns, when present. Ponderosa pine groups up to 0.25 acres would be identified as future groups. The area between the groups would be thinned much heavier, and small canopy gaps would be created where few trees are present or in lodgepole pine patches. Priorities for tree removal would be the same as in the noncommercial treatment stands. Additionally, smaller trees would be cut from directly beneath and adjacent to larger retained ponderosa pine and Douglas-fir to reduce competition and ladder fuels. Miscellaneous wood products would be removed where access and terrain allow.

Stratum B

Stratum B includes PVG 3 stands (cool, moist Douglas-fir) with pockets of PVG 2 (Table 3-2). All stands in the stratum have a mixed1 fire regime. This stratum has 1,064 acres in 25 stands proposed for mechanical treatment under Alternatives B/C/E/F with an additional 66 acres in 3 stands under Alternative D (Table 3-4). Of the total, 507 acres (9 stands) are plantations.

Mechanical treatment methods in Stratum B include the following (Table 3-4):

- Thinning with No Product Removal (581 acres, 12 stands)
- Thinning (Optional Mastication), No Product Removal (58 acres, 2 stands)
- Thinning with Product Removal (425 acres, 11 stands, Alternative D would treat 442 acres in 13 stands).
- Mixed Treatment with Product Removal (Alternative D only: 49 acres, 1 stand)

Stands in Stratum B tend to be concentrated more on the west side of the project area. Elevations range from 5,300 to 6,320 feet on a variety of aspects. At the lower elevations, stands are on northerly aspects; stands tend to be on more southerly aspects on the higher elevations. Thirty-six percent of the stands and just under half of the acres are plantations. All of the stands have had some type of management activity in the past, including commercial timber harvest, noncommercial thinning, and planting. About 413 acres in 11 stands were burned in the Lowman Complex wildfire in 1989. Nine stands were planted following the fire.

Outside of plantations, Douglas-fir is the most abundant species, comprising 48% of total TPA, followed by subalpine fir at 21% and ponderosa pine at about 12% (Figure 3-5). Within plantations, ponderosa pine is most abundant comprising 33% of the TPA followed by Douglas-fir at 28% (Figure 3-5).

Outside of plantations, Douglas-fir comprises 67% of the BA while ponderosa pine comprises 17% and subalpine comprises 8% (Figure 3-6). Within plantations, ponderosa pine occupies the most BA followed by Douglas-fir (Figure 3-6).

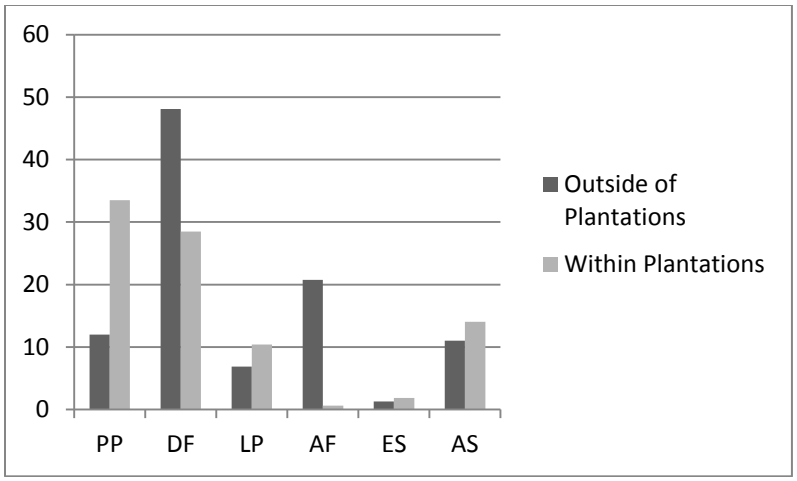


Figure 3-5. Percent of average trees per acre by species for all stands in Stratum B proposed for mechanical or prescribed fire treatments

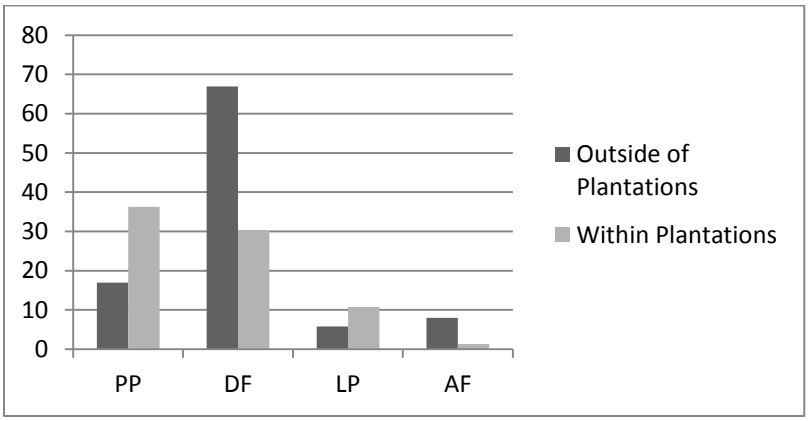


Figure 3-6. Percent of stand average basal area by species for all stands in Stratum B proposed for mechanical or prescribed fire treatments

The desired condition for stands in Stratum B is for species composition to be predominately Douglas-fir (48%–72 %) and ponderosa pine (26%–41%) (Table 3-6). Aspen would occur in small-to-medium size clones, and lodgepole pine would be present in trace amounts. Subalpine fir would be absent. Tree species would occur in three types of patches: ponderosa pine dominated, Douglas-fir dominated and mixed species. Ponderosa pine patches would have similar horizontal distribution of clumps and canopy gaps as in Stratum A. Mixed species patches would be less aggregated, and Douglas-fir patches would have the least pronounced horizontal aggregation. Canopy gaps would range from 0.25 to 5.0 acres and would occupy about one-quarter of the total area in each stand. On average, about 4 to 6 snags greater than 10.0 inches dbh and 30 feet tall would be present per acre. Snags might be widely dispersed individuals or in groups of 2 to 5. Surface fuels would be variable, depending on time since last fire and species-dominated patch. Within the ponderosa pine patches, crown base heights would be higher than in the Douglas-fir and mixed species patches.

The post-treatment average stand basal areas in Stratum B would range from 60 to 80 ft^2/acre for stands with QMD ≥8.0 inches and 240 to 320 average TPA for stands with QMD <8.0.

In the *Thinning with Product Removal* stands (e.g., commercial/noncommercial thin), thinning would focus on removing nearly all subalpine fir and lodgepole pine using thinning from below in ponderosa pine and Douglas-fir patches. No legacy ponderosa pine or "legacy-like" Douglas-fir trees would be cut. No ponderosa pine >20.0 inches dbh would be cut. No Douglas-fir >20.0 inches dbh would be cut except for trees with moderate-to-severe dwarf mistletoe infections (DMR 3.0 or greater) in stands where maintenance of large tree size class is not a concern. Within the ponderosa pine patches, non-uniform thinning from below would be implemented to promote clumps of 2 to 20 trees each and widely spaced individuals trees. Within Douglas-fir dominated patches, all trees except for healthy Douglas-fir >20.0 inches dbh would be removed from within 30 feet of the outer crown of any ponderosa pine >8 inches dbh. All subalpine fir and lodgepole pine would be removed from within 70 feet of the outer crown of any retained ponderosa pine or Douglas-fir >8.0 inches dbh. Canopy gaps from 0.25 to 1.25 acres would be created in patches of lodgepole pine, subalpine fir, or dwarf mistletoe–infected Douglas-fir. Total area occupied by canopy gaps would be less than 15% of the stand.

In the one stand proposed for *Mixed Treatment* under Alternative D, the treatment would primarily focus on removing all subalpine fir and disease- or insect-infected lodgepole pine trees while promoting ponderosa pine and Douglas-fir. Canopy gaps up to 5.0 acres would be created in lodgepole pine patches to reduce dwarf mistletoe and/or promote regeneration of lodgepole pine, ponderosa pine, and Douglas-fir.

In the *Thinning with No Product Removal or with Miscellaneous Product Removal* (noncommercial thin) treatments, ponderosa pine, Douglas-fir and subalpine fir up to 12.0 inches dbh would be cut while lodgepole up to 14.0 inches dbh would be cut. The noncommercial thinning would focus on promoting larger trees of the desired species and reducing lodgepole and subalpine fir from ponderosa pine or Douglas-fir dominated patches. Douglas-fir trees with any dwarf mistletoe infection would also be cut. Trees <12.0 inches dbh directly beneath or adjacent to larger ponderosa pine or Douglas-fir would be cut to reduce competition and ladder fuels. Existing canopy gaps and tree aggregation would be utilized to promote clumps and expand or create small canopy gaps. Miscellaneous wood products would be harvested where access and terrain allow.

Stratum C

Stratum C includes only PVG 4 stands (cool, dry Douglas-fir) with a mixed1 fire regime (Table 3-2). This Stratum has 157 acres in 6 stands proposed for mechanical vegetation treatment in all action alternatives (Table 3-4).

Mechanical treatment methods in Stratum C include the following (Table 3-4):

- Thinning with No Product Removal (29 acres, 2 stands)
- Thinning with Product Removal (42 acres, 2 stands).
- Mixed Treatment with Product Removal (86 acres, 2 stands)

Stands in Stratum C are located on southerly aspects on higher elevations, ranging from 5,900 to 6,400 feet, in the project area. The cover type for the majority of the mechanical treatment stands is Douglas-fir; one stand is ponderosa pine. All of the stands have had some type of management activity in the past, including commercial timber harvest, noncommercial thinning, and planting. Portions of two stands (totaling 15 acres) were burned

in the Lowman Complex wildfire in 1989 and one stand was planted following the fire. The PVG 4 stands in the project area are different than other PVG 4 stands on the Forest in that they have a ponderosa pine component, likely because of the mix of PVGs 2 and 3 in the project area.

Douglas-fir is the most common species both inside and outside of plantations (Figure 3-7 and Figure 3-8). More ponderosa pine and less Douglas-fir occur within the plantations (Figure 3-7 and Figure 3-8). Lodgepole pine does not appear in the inventory data in Stratum C, though it is present in a few of the stands. Subalpine fir comprises a small percent of the trees.

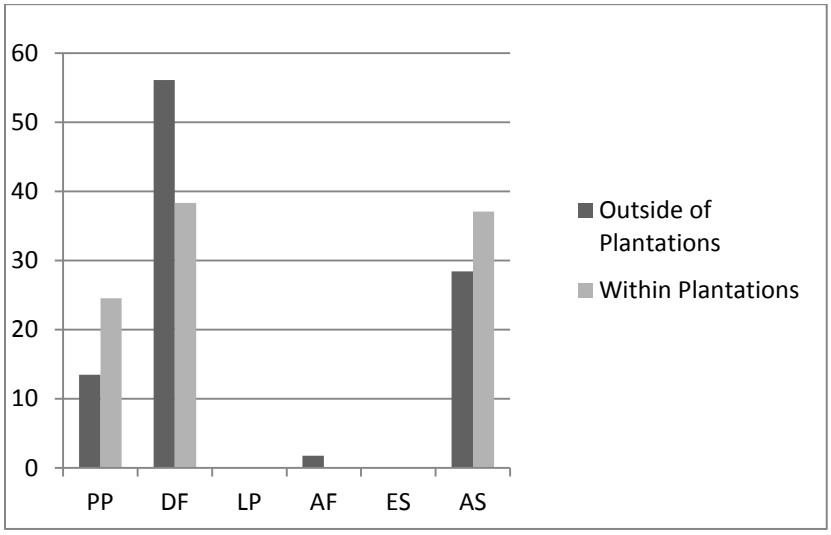


Figure 3-7. Relative percent of trees per acre by species for all stands proposed for mechanical and prescribed fire treatment in Stratum C

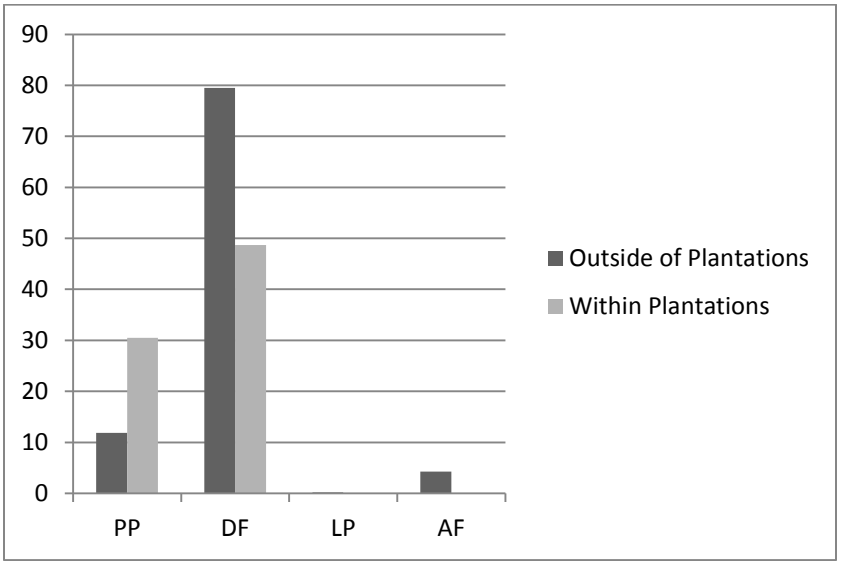


Figure 3-8. Percent of Total basal area by species for all stands proposed for mechanical and prescribed fire treatment in Stratum C

Outside of plantations, the QMD is 12.3 with 209 TPA and a BA of 103. Within plantations, the QMD is 5.9 with 897 TPA and a BA of 77.

The desired condition for stands in Stratum C is for species composition to be 60%–80% Douglas-fir and 5%–15% ponderosa pine (Table 3-6). Aspen would be found only in widely dispersed small clones. Lodgepole pine may comprise up to 5%, subalpine fir in trace amounts (Table 3-6). The stands would be uneven-aged with trees distributed in relatively even-aged patches (cohorts). Following treatment, two distinct patches would remain. Patches of ponderosa pine may occupy up to 25% of the stand area and, with the exception of healthy, large Douglas-fir, would not contain any other tree species. Douglas-fir dominated patches would occupy from 60%–75% of the stand area and may include scattered lodgepole pine or occasional individual or small clumps of ponderosa pine. Horizontal tree distribution would be somewhat aggregated, but less so than in Strata A and B. Canopy gaps would range in size from 0.25 to 4.9 acres and would occupy about <20% of the total area in each stand. Created canopy gaps would be located where opportunities exist for removing undesired species and/or dwarf mistletoe–infected trees. Large Douglas-fir without severe dwarf mistletoe and large ponderosa pine would be retained throughout, even in created canopy gaps. On average, about 4 to 6 snags >10.0 inches dbh and 30 feet tall would be present per acre. Snags might be widely dispersed individuals or in groups of 2 to 5. Surface fuels would be variable, depending on time since last fire and species-dominated patch. Within the ponderosa pine patches, crown base heights would be higher than in the Douglas-fir/mixed species patches.

The proposed treatments in all action alternatives in Stratum C include *Thinning with No Product Removal* on 29 acres (2 stands), *Thinning with Product Removal* on 42 acres (2 stands), and *Mixed Treatment with Product Removal* on 87 acres (2 stands).

The post-treatment average stand basal areas in Stratum C would range from 60 to 80 for stands with QMD ≥8.0 inches and 110 to 260 average TPA for stands with QMD <8.0 inches.

In the stands with proposed for *Thinning with Product Removal and Mixed Treatment*, the focus would be to promote larger/healthier ponderosa pine and Douglas-fir. All lodgepole pine and subalpine fir would be cut unless doing so would create canopy gaps greater than 2 acres in stands proposed for *Thinning with Product Removal* and 5 acres in stands proposed for *Mixed Treatment*. Within the patches of ponderosa pine or Douglas-fir, thinning from below would be implemented to promote the desired species composition and horizontal diversity for each patch.

Stratum D

Stratum D stands are predominately PVG 7 (warm, dry subalpine fir) with pockets of PVGs 2, 3 and 4 (Table 3-2). The fire regime is mixed1 or mixed1/mixed2. A total of 1,661 acres in 33 stands are proposed for mechanical vegetation treatment under Alternatives B/C/E/F and an additional 48 acres in 2 stands under Alternative D (Table 3-4).

The proposed treatments in all action alternatives in Stratum D include the following (Table 3-4):

- Thinning with No Product Removal (396 acres, 10 stands)
- Thinning w/ Optional Misc. Wood Product Removal (118 acres, 2 stands)
- Thinning with Product Removal (414acres, 10 stands, 463 acres, 12 stands in Alternative D)
- Mixed Treatment with Product Removal (733 acres, 11 stands)

Stands in Stratum D tend to be more concentrated on the west side of the project area at elevations ranging from 5,000 to 7,000 feet. Nearly all the stands are on northerly aspects. Most of the stands proposed for mechanical vegetation treatment have had some type of management activity in the past. Approximately 16 acres in portions of 5 stands were burned in the Lowman Complex wildfire in 1989 and one stand was planted following the fire.

Outside of plantations, subalpine fir is the most abundant species, followed by Douglas-fir and lodgepole pine (Figure 3-9). Within plantations, aspen is the most abundant in terms of TPA, followed by subalpine fir and lodgepole pine (Figure 3-9). Douglas-fir comprises the largest percent of BA outside of plantations while subalpine fir has the most BA within plantations (Figure 3-10). As expected, ponderosa pine is a small component of this stratum comprising about 1% of TPA and 5% of BA.

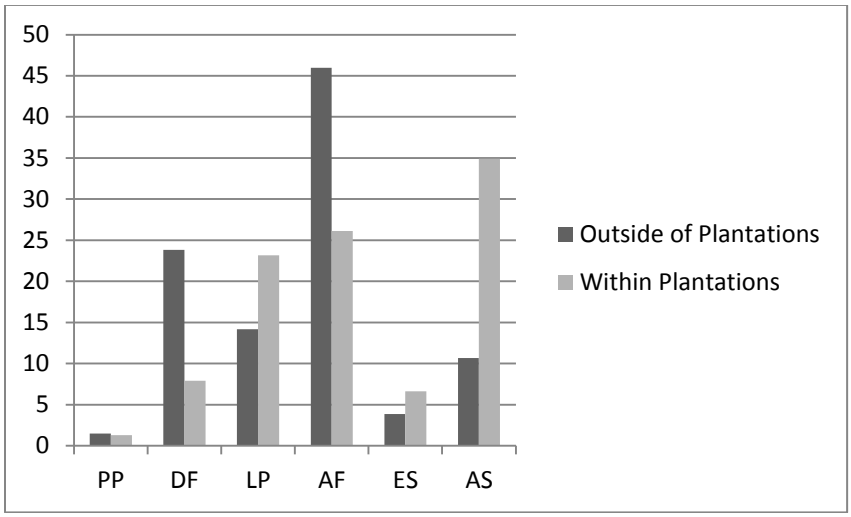


Figure 3-9. Relative percent of trees per acre by species for all stands proposed for mechanical and prescribed fire treatment in Stratum D

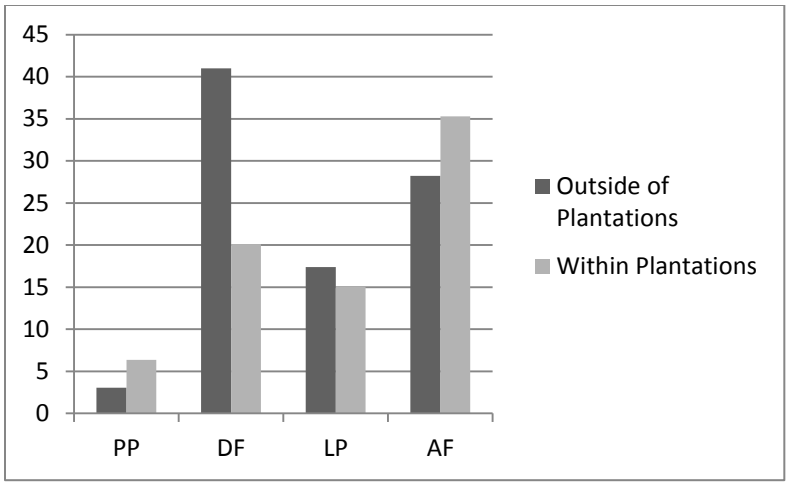


Figure 3-10. Relative percent of basal area by species for all stands proposed for mechanical and prescribed fire treatment in Stratum D

The desired condition for stands in Stratum D is for species composition to be 30%–50% Douglas-fir and 5%–10% ponderosa pine (Table 3-6). Aspen would be found only in widely dispersed small clones. Lodgepole pine may comprise 22%–38%; subalpine fir may comprise 12%–21%. The trees would be dispersed in mixed species patches dominated by Douglas-fir with scattered patches dominated by ponderosa pine on the drier microsites. Horizontal tree distribution would be somewhat aggregated, but less so than in Strata A and B. Canopy gaps would range in size from 0.25 to 4.9 acres and would occupy about 20% or less of the total area in each stand. On average about 4 to 6 snags greater than 10.0 inches dbh and 30 feet tall would be present per acre. Snags may be widely dispersed individuals or in groups of 2 to 5. Surface fuels would be variable, depending on time since last fire and species dominated patch. Within the ponderosa pine patches, crown base heights would be higher than in the Douglas-fir/mixed species patches.

The post-treatment average stand basal areas in Stratum B would range from 60 to 85 ft^2/acre for stands with QMD ≥8.0 inches and 210 to 380 average TPA for stands with QMD <8.0 inches.

Stratum E

One stand is proposed for mechanical treatment in Stratum E for a total of 46 acres under Alternative D only (Table 3-4). This stratum includes PVG 10 stands, which is persistent lodgepole pine. The stand is located in the Whoop-Em-Up drainage on rolling terrain in the bottom of the valley and is subject to frequent inversions and frosts throughout the growing season.

In terms of number of trees, subalpine fir is most common (Figure 3-11). In terms of basal area, a relatively equal distribution between Douglas-fir, lodgepole pine, and subalpine fir exists (Figure 3-12). However, the entire stand is not proposed for treatment under Alternative D, and the portion to be treated is predominately lodgepole pine with small subalpine fir and Douglas-fir.

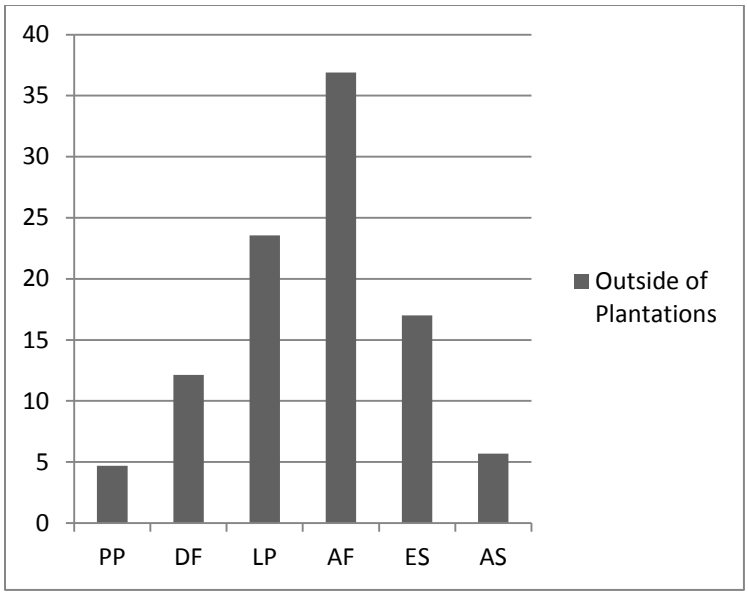


Figure 3-11. Percent of trees per acre by species in Stratum E

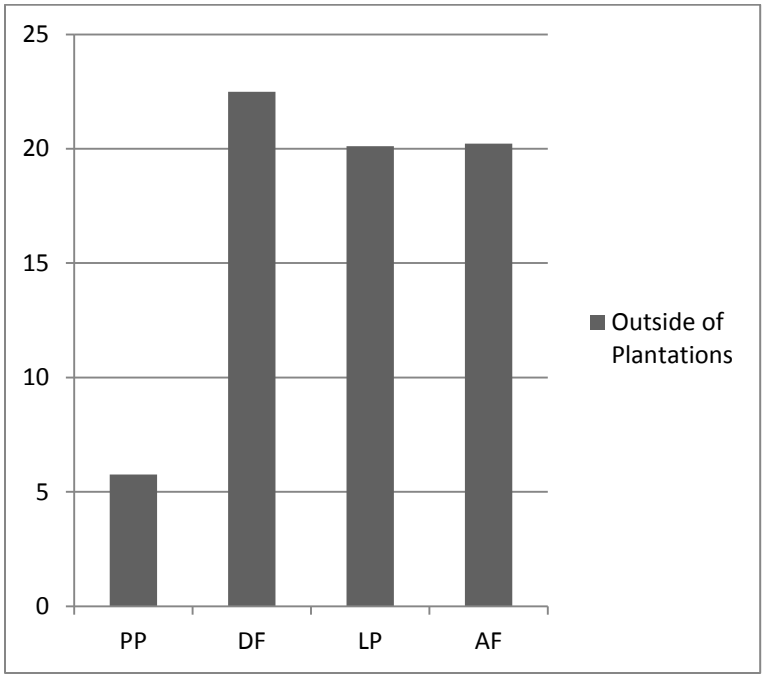


Figure 3-12. Percent of basal area by species in Stratum E

The proposed treatment in Stratum E would be small patch cuts up to 5.0 acres located in areas of declining lodgepole pine with moderate-to-severe dwarf mistletoe or active bark beetles. The canopy gaps would occupy about 30% of the total stand area. In the matrix between the canopy gaps, a thinning would be conducted to remove all subalpine fir and the majority of lodgepole pine with moderate-to-severe dwarf mistletoe. Wind firmness of residual lodgepole pine should be considered when selecting trees for removal. Approximately 20% of the lodgepole pine in the matrix would be removed in the thinning.

3.2.5.8 Fuels Treatments

Slash Treatments

In areas commercially thinned with ground-based equipment, whole trees would be transported to landings where the slash would be piled and burned. For noncommercial thinning and areas or stands with helicopter logging, four options for treatment of activity fuels are proposed: 1) lop and scatter; 2) pile and burn all slash; 3) pile and burn slash concentrations; 4) remove as biomass. A lop and scatter treatment involves cutting and disbursing all slash to less than 24 inches above the ground and would be implemented in stands or portions of stands with low levels of slash, such as in young plantations or in open areas where few trees would be cut. Piling and burning would occur in areas with higher levels of slash or areas of higher concern for visual quality, and/or protection of improvements from wildfire. Piling of slash concentrations would occur in variable density stands where areas of high slash concentration would be piled and burned. Otherwise, it would be lopped and scattered. Removing slash as biomass would involve some type of biomass processing into chips or bundles either at the stump or landing. Currently, a local market for biomass does not exist, so this option is less likely to occur. (For a more complete description of slash treatments refer to the fire and fuels section.)

Within RCAs, some modification would be made to slash treatments. From 0 to 50 feet of the edge of the streambank, all activity generated slash would be lopped and scattered. Beyond 50 feet of the streambank, slash would be lopped and scattered or piled and burned.

Natural and Activity Fuels Understory Burn

Of the total 201 stands proposed for mechanical treatment under Alternatives B/C/E/F (209 under Alternative D), 167 stands in all alternatives would be burned with a low-intensity, understory burn following the mechanical treatment. Stands not proposed for burning were burned in the Gold Fork Fire in 1989 and either the forested vegetation has not been reestablished or insufficient fuels exist to support an underburn. The underburn would occur in the spring or fall when conditions are conducive to achieving the desired burn conditions. The objectives of the underburn are to reduce natural and activity-generated surface fuels, reduce ladder fuels, raise crown base height, and reduce small size fire-intolerant tree species while promoting fire tolerant species. For more information regarding the understory burn refer to the fire and fuels section.

Natural Fuels Understory Burn: An understory burn of natural fuels is planned for 4,289 acres under all alternatives. These are referred to as “burn only” in this report. The “burn only” treatment units are islands of areas where no mechanical treatment is proposed for various reasons.

A total of 11,222 acres were analyzed for for burning. The understory burn would occur in spring or fall under low-to-moderate fire conditions to minimize scorch and mortality to medium and large size trees. The objectives of the burn would be to consume natural and activity generated surface fuels, raise crown base heights, kill small trees of less fire tolerant species, and recycle nutrients.

The burn would be implemented under conditions that would limit mortality of large size class ponderosa pine and Douglas-fir trees to less than 2%. Allowable mortality in medium

size class pine and Douglas-fir trees would be 5% in plantations and 10% outside of plantations.

3.2.5.9 Design Features

The following list of design feature**s from Chapter2** effect mechanical treatment of vegetation.

- **RM-4**: Thinning treatments would be designed to provide shade for snow retention and visual quality objectives adjacent to designated Nordic ski trails. Specifically, no trees would be cut within a variable 15- to 30-foot-wide buffer on the southeast-to-west sides of the trails. No more than 30% of the canopy cover would be removed from a variable 15- to 30-foot wide buffer on the northwest to east sides of Nordic ski trails. On all other designated NFS trails, a variable 15- to 30-foot-wide reduced-cut buffer would be maintained in which no more than 30% of the trees would be cut.

GIS analysis showed that RM-4 would affect a small portion of the activity area due to the size of the buffer and that many of the ski trails are in the no-cut buffers of RCAs. Therefore this design feature was not incorporated in the FVS modeling. It will be implemented during treatment unit layout and in the marking/cutting guides.

- **SE-5** Within 100 feet of constructed features in campgrounds and within 100 feet of Park-and-Ski trailheads, retain approximately 70% of trees less than 12 inches DBH (except for hazard trees).

SE-5 would affect 4.4 acres of proposed mechanical treatment in Alternative D, 1.2 of which are in the first site-potential tree height as defined by FH-2. Because of the small number of acres affected, this Design Feature is not addressed in the analysis. It will be implemented using marking/cutting guides.

- **VM-3** Retain forest stands that meet the definition of a large tree size class (USDA Forest Service 2010a, Appendix A, page A-6) until forest-wide inventories demonstrate the desired quantity of large tree size class acres within the affected PVG exist across the Forest (USDA Forest Service 2010a, Appendix A, Table A-4). Management actions are permitted in such stands as long as they would continue to meet the definition of a large tree size class (Forest Plan Standard VEST03, [USDA Forest Service 2010a, p. III-32]).[36]

Analysis of VM-3 is addressed in Silvicultural Prescriptions and Proposed Treatments. It will be implemented using marking/cutting guides.

- **VM-4** Live and dead vegetative components should be managed in spatial patch sizes and patterns representative of the appropriate fire regime insofar as current conditions allow.

VM-3 will be implemented through the silvicultural prescriptions.

[36] This standard shall not apply to management activities that an authorized officer determines are needed for the protection of life and property during an emergency event, to reasonably address other human health and safety concerns, to meet hazardous fuel reduction objectives within WUIs, or to allow reserved or outstanding rights, tribal rights or statutes to be reasonably exercised or complied with. This standard does not apply to PVG 10.

- **VM-5** Designate for retention during sale preparation, all ponderosa pine trees meeting the definition of a legacy tree consistent with the Forest's Legacy Tree Guide (Forest Plan Guideline VEGU09, USDA Forest Service 2010a). In addition, designate for retention, Douglas-fir trees that exhibit legacy-like characteristics (Van Pelt 2008).

Analysis of VM-5 was modeled in FVS with a 20" diameter limit for ponderosa pine and 24 to 28" diameter limits for Douglas-fir. VM-3 would be implemented through silvicultural prescriptions and marking/cutting guides.

- **VM-6** Management activities proposed to maintain or restore vegetative desired conditions should emphasize the following:
    a. Retention of snags away from roads or other areas open to public access to reduce the potential for removal.
    b. Retention of large snags of seral species (e.g. ponderosa pine and western larch), consistent with species composition desired conditions, to increase longevity of standing snags.

VM-6 will be implemented using marking/cutting guides.

- **WR-5** In flammulated owl source habitat stands documented or suspected of occupancy of reproducing pairs, the Wildlife Biologist would identify 3–5 suitable nest snags per stand with the features described below and provide for an 83-foot no-treatment buffer to maintain suitable nesting and roosting habitat associated with each snag. This silvicultural prescription would retain the structural diverse vegetative condition that currently exists around the nest snag. Wildlife Biologist would coordinate with the Silviculturist and Timber Planner. (WIST02)
    a. Snag species preference: 1st—ponderosa pine; 2nd—Douglas fir;
    b. Decay Class: Mix of decay class 2-4;
    c. Diameter at breast-height: Minimum 15" dbh, select for the 3–5 largest snags available;
    d. Height: Minimum 15' height;
    e. Source habitat present: Multi-strata structure of sapling/pole, small, medium, and large tree size class; site canopy closure of at least 40%.

WR-5 is addressed in Silvicultural Prescriptions and Proposed Treatments. It wukk be implemented using marking/cutting guides

- **WR-9** Retain all ponderosa pine and Douglas fir snags ≥10 inches d.b.h. and >15 feet tall to meet the desired range as identified in Appendix A of the Forest Plan (USDA Forest Service 2010a, p. A-9) unless they pose safety hazards and have to be felled. Where snags have been determined to be a safety hazard (timber sale OSHA requirements, roadside hazard trees) and must be felled, live trees of sufficient diameter shall be left to provide for snag replacement as needed to achieve desired conditions (WIST08 and WIST09).

  The desired ranges of snags (USDA Forest Service 2010a) are displayed in the table below:

PVG	Snags/Acre (10-20 inches d.b.h.)	Snags/Acre (>20 inches d.b.h.)	Total
1	0.4–0.5	0.4–2.3	0.8–2.8
2	1.8–2.7	0.4–3.0	2.2–5.7
3	1.8–4.1	0.2–2.8	2.0–6.9
4	1.8–2.7	0.2–2.1	2.0–4.8
7	1.8–5.5	0.2–3.5	2.0–9.0
8	1.8–7.5	0.2–3.0	2.0–10.5

Note: This table applies only to activity areas.

WR-9 will be implemented in project layout and marking/cutting guides.

- **WR-17** A minimum average canopy cover of at least 40%, comprised of multiple tree size classes and overlapping crowns, will be maintained in the northwest third of stand 0035050514 in order to maintain occupied flammulated owl habitat.

  WR-9 will be implemented in silvicultural prescriptions and marking/cutting guides

- **WR-18** The maximum size of Douglas-fir trees to be thinned in stand 35020541 shall be less than 24 inches DBH. This is necessary in order to comply with Forest Plan Standard WIST09.

  WR-18 will be implemented in silvicultural prescriptions and marking/cutting guides

3.2.5.10 Landscape Patch and Pattern

The arrangement of vegetative attributes within fire regimes constitutes the landscape patch and pattern. “Patch” is defined as a relatively homogeneous area that differs from its surroundings. Patches have a spatial arrangement (pattern) across the landscape as well as a within patch configuration that can be described by macrovegetation (e.g., combinations of tree size class, canopy cover class, and tree species composition). Pattern also occurs within macrovegetation due to, for example, the arrangement of trees. As applied here, patches are the basic landscape unit that change and fluctuate over time through a process called “patch dynamics,” which are largely driven by disturbance and succession.

Within landscape patches of macrovegetation, specific conditions exist that provide habitat for plant and animal species. The Forest Plan emphasizes restoration and maintenance of old forest habitat, which occurs within the large tree size class and is defined by canopy cover, tree species composition, and snags and large CWD occurring in combination (USDA Forest Service 2010a, Appendix E, Table E-2).

The project area is somewhat unique within the larger landscape. Patches within the project area are smaller and more intermixed than surrounding patches which tend to be larger and therefore more continuous (Figure 3-13). The patches within the project area are predominately nonlethal on the south-to-southeast and mixed1 on the west-to-north. A smaller amount of mixed2 fire regime occurs within the project boundary: one portion that is part of a larger patch that extends north-to-south on the Forest and another portion that is part of a larger patch connected to the Sawtooth Mountains. The nonlethal and mixed1 patches in

the project area serve as bridges connecting the nonlethal/mixed1 patches in Mores Creek and the Boise Basin area to the nonlethal/mixed1 patches in the Payette Valley to the north.

The smaller and more intermixed patches are largely due to the highly dissected topography that occurs within the project area. This topography leads to both smaller patches as well as subtle transitions between fire regimes within patches. An example is the intermix of ponderosa pine and lodgepole pine in numerous stands within the project area. Ponderosa pine is considered predominately a nonlethal-to-mixed1 fire regime species while lodgepole pine is considered a mixed2 fire regime species. In the Crooked River watershed, lodgepole pine historically occurred in valley bottoms and low benches within the cold air inversion zones. Due to the limited size of the lodgepole pine stands and proximity to adjacent nonlethal/mixed1 forest types, the historical fire regime of the lodgepole pine is better represented by a mixed1 fire regime. Frequent fires on warmer/drier slopes (historically nonlethal-to-mixed1 fire regimes) killed small lodgepole pine trees and restricted its distribution to the valley bottoms. In these cold-site lodgepole pine areas, fuel buildup was slow and fire occurred less frequently. As the stands aged, surface fuels accumulated and eventually burned with higher intensity and reset the successional stage. Outside the project area, mixed2 fire regime patches are more typical in that they are larger and more contiguous. The key characteristics of the lodgepole pine areas in the Crooked River watershed are more frequent fire intervals.

Recognizing the temporal and spatial nature of landscape patterns, disturbance agents, and successional drivers responsible for their creation is crucial to resource planning. It has been suggested that if existing landscape patches and disturbance regimes emulate historic conditions, then biodiversity, long-term site productivity, and habitat for wildlife species would be conserved. Landscape patches and patterns, as discussed here, reflect the pattern of live and dead wood components within a given fire regime. Landscape patch and pattern is important, in part because of the relationship of these patches to habitat for terrestrial wildlife species, as well as the ability for ecological disturbance processes to operate in a desired manner, which is the concept of ecological resilience (Millar et al. 2007, Peterson et al. 2011).

The underlying philosophy of the Forest Plan is that restoration of desired vegetative conditions that would allow natural disturbance processes to operate characteristically would contribute to wildlife species conservation (USDA Forest Service 2010a, Haufler et al. 1996, Hunter et al. 1988, McComb and Duncan 2007, Noss 1987, Raphael et al. 2000, Wisdom et al. 2000). An understanding of landscape patches and patterns is key to implementing the conservation principles presented in the Forest Plan (USDA Forest Service 2010a, Appendix E, p. E-7 through E-13) and were developed under the following assumptions:

- Contiguous patches of habitat are better than fragmented habitat.
- Large patches of habitat are better than small patches.
- Patches of habitat close together are better than patches far apart.
- Interconnected patches are better than isolated patches.

Historically, patches in the nonlethal fire regime were primarily large tree size class dominated by ponderosa pine with generally small (<1.0 acre) groups of smaller tree size classes (USDA Forest Service 2010a, Appendix A, Table A-1, p. A-3). Frequent low-intensity fire kept these forests relatively open, Douglas-fir composition low, and fuel build

up low and limited the spread of insects and diseases. Moderate-to-high intensity fires occurred in some areas of heavier fuels or denser tree groups, and moister areas where lodgepole pine, Douglas-fir, and subalpine fir were more prevalent. These types of fires were generally limited to small patches or areas, such as steep northerly slopes within the project area (USDA Forest Service 2004a, Arno et al. 1995*)*.

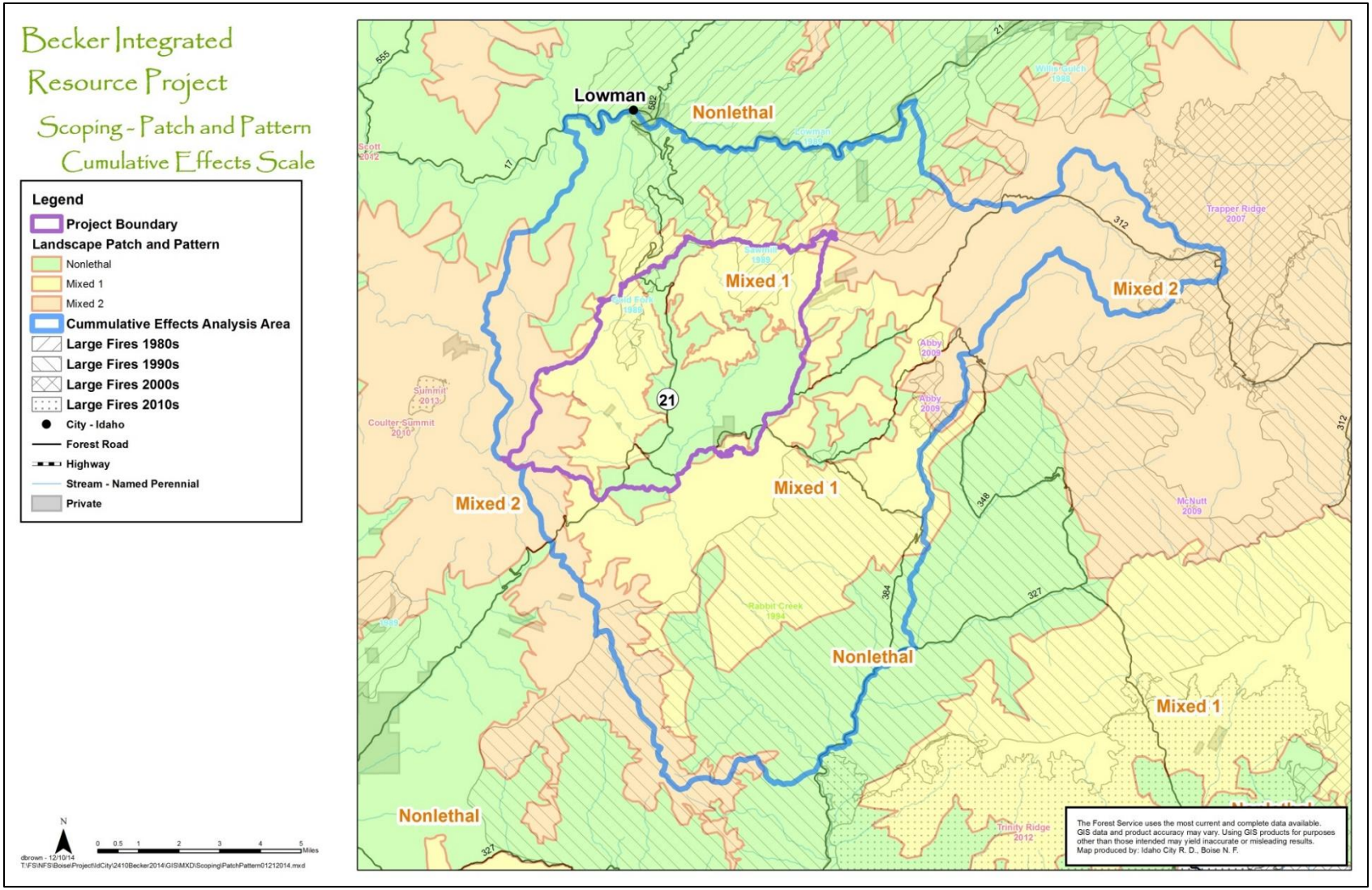


Figure 3-13. Fire regime patch and pattern for the landscape surrounding the project area

In the nonlethal fire regime, historical stand structure would have been comprised of multiple cohorts (age classes) of ponderosa pine with three primary spatial patterns: clumps, widely spaced individuals, and openings (Larson and Churchill 2012). In general, the clumps would have been comprised of the trees of the same cohort, but some clumps would have trees of mixed ages. The widely spaced individuals would have been the largest trees in the stand. Douglas-fir trees would be present but at much lower levels than ponderosa pine (Arno et al. 1995). Within the mixed1 patches, similar to the nonlethal patches, large tree size class comprised of ponderosa pine and Douglas-fir trees would have been relatively extensive, though generally less so than within nonlethal patches. A diversity of different sized overstory and understory groups would have been present within or surrounding the large tree areas. Within the nonlethal and mixed1 patches, in combination with the continuum of moisture regimes, the extent and intensity of various disturbance processes would alter within-patch arrangement of vegetative conditions over time and space.

Changes in patch dynamics have altered patch conditions. Fire frequency and intensity and endemic insect cycles are different now within the project area than occurred historically. Within-patch dynamics have been affected by past timber harvesting, grazing, fuelwood collection, fire exclusion, and other activities.

Current vegetative conditions within the project area reflect past management activities, including mining activities, timber harvesting fire suppression, and recent high-severity wildfires. Mining activities began in the late 19th and early 20th century in the Crooked River. Most timber harvesting occurred in the 1960s through the 1990s. Many of these stands were planted following the harvest. Most plantations were established by planting ponderosa pine seedlings though some natural regeneration occurred in stands that were harvested 40 to 50 years ago. Small amounts of post-timber sale tree planting also took place into the 1990s. Most of the more recent plantings occurred between 1990 and 1994 within the Goldfork and Sawmill wildfire areas. In addition, extensive plantations occur outside the project area in the 44,150-acre Lowman Complex Fire (1989) area to the north in the South Fork Payette River watershed, and the 149,958-acre Rabbit Creek Fire (1994) area to the east in the Crooked River and North Fork Boise River watersheds. Both fires burned at high intensity across large portions of their perimeters. Another large fire that occurred in the area was the 2007 Trapper Ridge Wildland Fire that burned approximately 20,160 acres with mixed intensities.

Many of these plantations, including those in the project area, are at high densities with numerous ladder fuels. Some plantations, as well as natural stands, were thinned in the 1980s and 1990s, resulting in some areas of uniform tree distribution and a reduction of natural grouping or clumping. In 2007, the Trapper Flat Fire burned 18,341 acres in the Crooked River and Ten Mile Creek watersheds. Though areas within this fire's perimeter were not planted, it did create some fairly extensive patches of early seral stage forests and shrublands.

Past commercial tree harvesting has reduced large size class and legacy ponderosa pine trees. Many large Douglas-fir trees were also removed, though in some areas, large dwarf-mistletoe–infected trees, which are undesirable as a commercial product, were left. Fire exclusion has increased surface fuel loads and the vertical and horizontal continuity of fuels primarily as a result of increased stand densities and incursion of less fire-resilient, more shade-tolerant species (e.g., subalpine fir and Douglas-fir) in nonlethal fire regimes that were historically predominantly ponderosa pine. In the mixed1 fire regime, fire exclusion and past

timber harvest activities have increased shade-tolerant subalpine fir and reduced fire-resistant lodgepole pine.

Relative to desired conditions, ponderosa pine is the most under-represented species in the project area. Under historical fire regimes, fire tolerant species such as ponderosa pine would have been more prevalent on the warmer ridges and slopes while less fire-tolerant lodgepole pine would have been restricted to the valley bottoms where cold inversions can occur any time of the year. The relative abundance of Douglas-fir and subalpine fir trees has increased in the nonlethal and mixed1 fire regimes compared to historical conditions. Much of the older lodgepole pine trees in the project area are reaching their lifecycle, have high rates of mistletoe infection, and are at moderate-to-high risk of mountain pine beetle attack.

The prominent insect and disease tree mortality and damaging agents in the project area include western pine beetle, mountain pine beetle, Douglas-fir beetle, western spruce budworm, and Douglas-fir/lodgepole pine dwarf-mistletoes. Endemic populations of western pine beetle have increased to sporadic epidemic outbreaks in stands dominated or co-dominated by ponderosa pine. The remaining legacy ponderosa pine trees are particularly at risk to mortality due to age-related and competitive stress in high-density patches. Though these types of trees are important as snags, only a few live legacy trees are left within the project area. Mountain pine beetle has been actively killing lodgepole pines throughout the project area, contributing to an increase in surface fuel loadings of dead wood, particularly in areas where lodgepole pine was historically less common. Historically short-cyclic, endemic Douglas-fir bark beetle populations have increased to fairly long-term epidemic outbreaks, attacking and killing the larger and older Douglas-fir trees, many of which are already stressed from dwarf-mistletoe infections.

Extent and relative abundance of Douglas-fir and lodgepole pine trees in the project area have increased considerably over historical conditions and dwarf-mistletoe infection rates have been increasing in recent years in stands dominated by Douglas-fir and lodgepole pine. Dwarf-mistletoe stressed trees result in declining vigor and growth, increasing susceptibility to bark beetle attack and eventually may kill the host tree.

The long-term (30–50 years) goal for landscape patches and within-patch pattern for the project area is to move towards developing source habitat for Family 1 species, such as white-headed woodpecker, in the nonlethal fire regime, and for Family 2 species associated with ponderosa pine, such as flammulated owls, in the mixed1 fire regime. These wildlife species use a variety of source habitat conditions, including old forest habitat attributes typical of the types of patch dynamics that historically occurred. The long-term objective for the treated area is to develop large tree size class stands with a preponderance of early seral species. In the nonlethal fire regime patches, the emphasis would be on retaining and promoting large ponderosa pine. In the mixed1 fire regime the emphasis would be on large ponderosa pine and large Douglas-fir trees with lower levels of dwarf mistletoe than are found currently.

In the nonlethal fire regime, the objective of the treatments would be to develop interconnected stands dominated by medium-to-large sized ponderosa pine. Within-patch areas (generally from 0.25 to 5 acres) would consist of relatively even-aged ponderosa pine distributed in clumps or groups interspersed by small canopy gaps that mimic historical reference conditions. In non-plantation stands, existing canopy gaps would be maintained or

enlarged and new canopy gaps would be created. The majority of the canopy gaps would be less than 0.5 acres, with a few up to 2 acres, and would occupy no more than one-third of the total area of any one stand while on average, canopy gaps would occupy about one-fifth of the area across a nonlethal patch. In plantations, the objective of the treatments would be to begin to establish the desired tree aggregation patterns by promoting the development of future clumps of large size class trees and enhancing and/or maintaining existing canopy gaps. In the plantations, the majority of the canopy gaps would be less than 0.25 acres with a few up to 0.5 acres.

Within the mixed1 fire regimes, the objective would be to develop more heterogeneity than in the nonlethal fire regime. Within the mixed1 patches, macro-vegetation would be dominated by ponderosa pine and/or Douglas-fir but with more species diversity. Pattern within the patches would include uniform areas comprised of medium-to-large size ponderosa pine and/or Douglas-fir; mixed species areas of Douglas-fir, ponderosa pine, subalpine fir and lodgepole pine; and areas of aspen and even-aged lodgepole pine. Outside of plantations, canopy gaps up to 5 acres would be maintained or enlarged and new canopy gaps created. The average size of created canopy gaps would be somewhat larger than in the nonlethal fire regime. In the mixed1 fire regime, two canopy gap conditions would be created. The first is within and around patches dominated by ponderosa pine where small canopy gaps up to 2 acres (similar to the nonlethal fire regime) would be created. The second condition would be in patches of lodgepole pine or medium-size Douglas-fir with moderate-to-severe dwarf mistletoe where canopy gaps up to 5 acres would be created.

Prescribed fire would be used to treat natural and activity generated fuels. Small wildfires will likely occur throughout the area. However, due to the risks of stand-replacing effects associated with wildfires, large wildfires would be undesirable until more acres of large tree and old forest habitat develop across the forest. The conditions created would help develop landscapes that would be less susceptible to large-scale, stand-replacing wildfire. Insect and disease cycles would continue within and adjacent to treated stands. Restoration treatments and the smaller-scale wildfire and insect disturbances likely to occur across the project area contribute to clumping, grouping, and patch dynamics that help create landscape heterogeneity and retention of early seral species. Untreated areas and areas not affected by wildfire would continue to develop multi-storied conditions with a greater preponderance of later seral to climax species.

3.2.6 Environmental Effects

3.2.6.1 Direct and Indirect Effects

All Action Alternatives

With the exception of the harvest system under Alternative F, the proposed vegetation treatments and acres for Alternatives B, C, and F are the same. Therefore, throughout this section, Alternatives B, C and F are lumped together. If any differences in the effects between these alternatives occur, they are specifically described. Alternative D is identical to Alternative B with the exception of 182 additional acres of treatment under Alternative D. Alternative E would treat the same acres as Alternatives B, C, and F but is different than all other action alternatives due to the 18.0-inch dbh upper diameter limit and utilization of tree bunching equipment and helicopter yarding methods.

Variable Spacing to Achieve Aggregated Tree Distribution

Non-Uniform Spacing

One of the objectives of Purpose 1 within plantations in nonlethal and mixed1 fire regimes is the establishment of non-uniform tree spacing for future large tree clump development. Non-uniform tree spacing will be utilized during implementation regardless of the selected alternative (except for No Action) within PVGs 1 and 2 and around ponderosa pine patches in other PVGs. As discussed in the description of silvicultural prescriptions, three structural components of forest exist in the nonlethal and mixed1 fire regimes: 1) clumps or aggregated groups of trees with interlocking or nearly touching crowns; 2) canopy gaps occupied by shrubs, grass, forbs or seedling size trees; 3) widely spaced individual trees. There are three types of clumps: dense patches of seedlings and saplings; overstory trees of relative similar age and size with 2 to 44 trees per clump; and mixed-age clumps consisting of larger overstory trees intermixed with younger/smaller trees.

Within plantations where the trees are generally all the same age and size and more uniformly distributed, noncommercial thinning would begin to setup the stand for future development of the desired spatial pattern. The created canopy gaps in the plantations would be smaller than in natural stands as it is expected that additional trees would be killed by prescribed fire and insects enlarging the size of the canopy gaps in the future.

Aggregated tree distribution is important for wildlife habitat, fire behavior and natural regeneration within the nonlethal fire regime. The large gaps between the tree groups have a greater effect of breaking up crown fuel connectivity and interrupting crown fires compared with uniformly distributed trees. Groups of medium to large size trees create habitat characteristics of high forest, closed canopy conditions necessary for many wildlife species while canopy gaps (openings) are suitable sites for establishment of understory vegetation and for natural regeneration of ponderosa pine.

Mechanical/underburn Treatments in the Nonlethal Fire Regime Stands, outside of Plantations

The nonlethal fire regime is represented by stands in Stratum A. Table 3-8 displays the number of stands and acres proposed for thinning treatments by predominant PVG in Stratum A. The only difference between Alternatives B/C/E/F and Alternative D is an additional 2 stands on 22 acres of *Thinning with Product Removal* in PVG 2, outside of plantations.

Table 3-8. Number of stands and acres proposed for thinning treatments in predominant Potential Vegetation Group (PVG) 1 and PVG 2 stands outside and within plantations in Stratum A (nonlethal fire regime) for all action alternatives

GROUP	Alternative B/C/E/F		Alt. D (total)		Alt. D (added)	
PVG 1 (includes PVGs 1 and 1/2)	**Stands**	**Acres**	**Stands**	**Acres**	**Stands**	**Acres**
OUTSIDE OF PLANTATIONS						
Thinning with No Product Removal	3	135	3	135	0	0
Thinning with Optional Misc. Wood Product Removal	1	8	1	8	0	0
Thinning with Product Removal	2	34	2	34	0	0
SUBTOTAL	**6**	**177**	**6**	**177**	**0**	**0**
WITHIN PLANTATIONS						
Thinning (Optional Mastication) No Product Removal	2	55	2	55	0	0
Thinning with No Product Removal	2	72	2	72	0	0
SUBTOTAL	**4**	**127**	**4**	**127**	**0**	**0**
TOTAL PVG 1 STANDS	**10**	**304**	**10**	**304**	**0**	**0**
PVG 2 (includes PVGs 1/3, 2, 2, 2/3, 2/4, 2/7)	**Stands**	**Acres**	**Stands**	**Acres**	**Stands**	**Acres**
OUTSIDE OF PLANTATIONS						
Mixed Treatment with Product Removal	3	111	3	111	0	0
Thinning with No Product Removal	35	1,108	35	1,108	0	0
Thinning with Optional Misc. Wood Product Removal	21	979	21	979	0	0
Thinning with Product Removal	25	1,316	27	1,338	2	22
SUBTOTAL	**84**	**3,514**	**86**	**3,536**	**2**	**22**
WITHIN PLANTATIONS						
Thinning (Optional Mastication) No Product Removal	15	570	15	570	0	0
Thinning with No Product Removal	25	925	25	925	0	0
Thinning with Optional Misc. Wood Product Removal	3	159	3	159	0	0
SUBTOTAL	**43**	**1,654**	**43**	**1,654**	**0**	**0**
TOTAL PVG 2 STANDS	**127**	**5,168**	**129**	**5,190**	**2**	**22**
GRAND TOTAL STRATUM A	**137**	**5,471**	**139**	**5,493**	**2**	**22**

Canopy Cover of Large Tree Size Class

The FVS-calculated average canopy cover of all the trees in the large size class (≥20.0 inches dbh) was used as an indicator of development of large trees over time. The stand mean canopy cover was averaged for all stands in each stratum for each alternative as displayed in Table 3-9 below.

Canopy cover for a stand is defined as the percent of non-overlapping area of the ground covered by tree crowns. Canopy cover for each tree is calculated in FVS based on the species, size and stand density. Then, for each tree that value is “corrected” based on an assumed overlap of individual tree crowns. The overlap correction is based on distribution of trees in natural stands for each forest type. There has been a concern among foresters and wildlife biologists on the Forest that the corrected canopy cover calculated in FVS underestimates the actual canopy cover in many stands. Barry Stern, a silviculturist on the Forest (USDA Forest Service 2009a) compared field collected crown measurements with

FVS calculated values using forest monitoring plots (B-Grid) on the Forest. He found that the FVS calculated values for all trees except subalpine fir are reasonably close to field measured values and within the allowable error. He recommended using the corrected canopy cover in FVS except for where the trees are uniformly distributed such as plantations or intensively managed stands. Outside of plantations, the distribution of trees, especially of medium to large size class trees, in the project area tend to be clustered. Since the plantations are least likely to achieve old forest habitat status in the analysis period and most of the thinning that would affect large tree canopy cover is outside of the plantations, the FVS calculated corrected canopy cover was used for attributes of old forest habitat and large tree-size class stands.

Table 3-9. Average percent canopy cover of large size class trees for all stands outside of plantations in Stratum A, nonlethal fire regime

Strata	Timeframe	Canopy Cover (%)			
		Alt. A	Alt. B/C/F	Alt. D	ALT E
A	2014 (existing condition)	8.5	8.5	8.5	8.5
	2014 (post treatment)	8.5	7.9	7.9	8.5
	2024	10.3	10.1	10.1	10.8
	2044	13.8	14.7	14.7	15. 3
	Rate of Increase from post-treatment values	62%	86%	86%	80%

Alternative A—No Action

Under the No Action alternative average canopy cover of large trees would increase from 8.5% in 2014 to 13.8% in 2044 (Table 3-9). The rate of increase from 2014 to 2044 is 62%.

Alternatives B, C, F

For Alternatives B, C and F large tree canopy cover would decrease in 2014 post-treatment from 8.5% to 7.9%, but it would recover to nearly the same level as Alternative A by 2024 and would increase to 14.7% by 2044 (Table 3-9). The rate of increase from 2014 (post treatment) to 2044 is 86% compared with 62% in Alternative A. This increase would be expected because thinning favors healthy trees which would be able to grow into large tree size class quicker because of due reduced competition and improved vigor. Therefore, the increase in canopy cover under Alternatives B, C and F compared to Alternative A is due to a greater number of trees attaining large tree size class.

Alternative D

Alternative D is the same as Alternative B with the exception of 182 additional acres of mechanical treatment. Of these additional acres, 2 stands totally 22 acres would be in the nonlethal fire regime (Stratum A). These two stands were modeled with a 20.0-inch dbh limit for both ponderosa pine and Douglas-fir in order to comply with Design Feature VM-3. However, even with this consideration, the outcomes for Alternative D would be the same as Alternative B (Table 3-9).

Alternative E

No decrease in large tree canopy cover post-treatment would occur under Alternative E since no trees larger than 18.0 inches would be removed (Table 3-9). In 2044, Alternative E large tree canopy cover would increase to 15.3, the highest of all the alternatives (Table 3-9). The effects of Alternative E to existing large trees would be similar to Alternative A, while effects to smaller trees would be similar to Alternatives B, C and F. The result would be a greater number of large sized trees over time than Alternative A or the other action alternatives because all existing large sized trees would be retained following treatment, so undesirable species and trees with moderate-to-severe dwarf mistletoe would remain. However, the rate of increase of large trees canopy cover of 80% would be slightly less than Alternatives B/C/D/F.

Summary

Alternative would result in the largest average large tree canopy cover However, all existing large size class trees would be retained regardless of species or dwarf mistletoe infection levels. Though large tree canopy cover would be lower under Alternatives B, C, D and F, more of the trees would be the desired species for the PVG and there would be fewer trees with high levels of dwarf mistletoe infection.

Trees per Acre by Species in the Medium and Large Size Classes

Table 3-10 shows the relative percent of large size class trees (≥20.0 inches dbh) for ponderosa pine, Douglas-fir, lodgepole pine, and subalpine fir averaged for all stands outside plantations in Stratum A labeled by the predominant PVG. The PVG 1 group includes PVGs 1 and 1/2 while the PVG 2 group includes PVGs 1/3, 2, 2/3, 2/4 and 2/7. Within Stratum A, the desired species composition (Table 3-6) is subdivided between the predominant PVG 1 and PVG 2 stands. Table 3-11 shows the relative percent of medium size class (≥12.0 inches dbh) trees by species averaged for all stands in Stratum A, outside plantations by PVG group. The medium tree size class was used to indicate relative species composition and trends for long-term development of large size class trees.

Table 3-10. Percent of Large tree size class composition for ponderosa pine, Douglas-fir, lodgepole pine and subalpine fir averaged for all stands in the Stratum A (nonlethal fire regime), outside of plantations, by Potential Vegetation Group (PVG)

PVG	Analysis Period	No Action				Alt. B/C/F				Alt. D				ALT E			
	Species	PP	DF	LP	AF	PP	DF	LP	AF	PP	DF	LP	AF	PP	DF	LP	AF
1	2014 (existing condition)	89	8	2	0.4	89	8	2	0.4	89	8	2	0.4	89	8	2	0.4
	2014 (post treatment)					89	8	2	0.4	89	8	2	0.4	89	8	2	0.4
	2024	87	7	5	0.8	90	7	3	0.8	89	7	3	0.8	87	7	5	0.8
	2044	77	14	9	0.6	83	14	3	0.6	81	14	5	0.6	78	14	8	0.6
2	2014 (existing condition)	33	61	5	1.0	33	61	5	1.0	33	61	5	1.0	33	60	5	1.0
	2014 (post treatment)					36	59	5	0.5	36	59	4	0.5	33	61	5	1.0
	2024	31	62	5	1.3	34	60	5	0.9	34	60	4	0.9	31	62	5	1.3
	2044	33	59	6	2.1	37	57	4	1.3	37	57	4	1.3	34	58	5	1.7

Table 3-11. Percent of medium tree size class composition for ponderosa pine, Douglas-fir, lodgepole pine and subalpine fir averaged for all stands in Strata A, outside of plantations by Potential Vegetation Group (PVG)

PVG	Analysis Period	No Action				Alt. B/C/F				Alt. D				ALT E			
	Species	PP	DF	LP	AF	PP	DF	LP	AF	PP	DF	LP	AF	PP	DF	LP	AF
1	2014 (existing condition)	43	10	46	0.4	43	10	46	0.4	43	10	46	0.4	43	10	46	0.4
	2014 (post treatment)					53	13	34	0.4	53	13	34	0.4	53	13	34	0.4
	2024	40	10	51	0.0	48	13	39	0.0	48	13	39	0.0	49	13	38	0.0
	2044	38	2	60	0.0	47	4	49	0.0	47	4	49	0.0	48	4	48	0.0
2	2014 (existing condition)	22	50	25	3.4	22	50	25	3.4	22	50	25	3.4	22	50	25	3.4
	2014 (post treatment)					29	51	17	2.9	29	52	16	2.9	28	53	16	3.0
	2024	22	48	26	3.3	32	50	15	2.4	32	51	15	2.4	31	52	15	2.4
	2044	21	47	28	4.4	32	52	14	2.1	33	52	13	2.1	33	53	13	2.1

Alternative A—No Action

PVG 1, large size class trees—In the existing condition in PVG 1, 89% of the large trees are ponderosa pine while 8% are Douglas-fir, and the remaining 2% are lodgepole pine with a trace amount of subalpine fir (Table 3-10). This composition is near the desired condition for large trees (96%–99% ponderosa pine; Table 3-6). However, the species composition of large ponderosa pine would begin to decrease in 2024 while Douglas-fir and lodgepole pine would increase. By 2044, the relative percent of ponderosa pine would be 77%, while Douglas-fir and lodgepole pine would have nearly doubled to 14% and 9%, respectively (Table 3-10). This change would occur because of ingrowth of subalpine fir and lodgepole pine into the large size class and mortality of large size class ponderosa pine.

PVG 2, large size class trees—Ponderosa pine comprises 33%, Douglas-fir 61%, and lodgepole pine 5% in the existing condition in the predominant PVG 2 stands (Table 3-10). The desired condition for this group is 78%–85% for ponderosa pine and 12%–22% for Douglas-fir (Table 3-6), indicating departure from the desired condition. Ponderosa pine would decrease 2 percentage points in 2024 while Douglas-fir would decrease from 62% in 2024 to 59% in 2044 (Table 3-10) because of dwarf mistletoe mortality and a corresponding increase in the number of ponderosa pine and lodgepole pine trees.

PVG 1, medium size class trees—In 2014, the relative percent of ponderosa pine is 43%, Douglas-fir is 10%, and lodgepole pine is 46% (Table 3-11). This composition indicates a departure from the desired condition primarily due to ingrowth of lodgepole pine in these stands. By 2044, ponderosa pine would decrease to 38% while Douglas-fir would decrease to 2% with a corresponding increase in lodgepole pine to 60% (Table 3-11).

PVG 2, medium size class trees—The species composition of medium size trees in the PVG 2 stands is more departed from the desired condition than PVG 1 stands with ponderosa pine comprising 22%, Douglas-fir comprising 50%, lodgepole pine comprising 25%, and subalpine fir comprising 3% (Table 3-11). The long-term trend would be similar to the PVG 1 group with continued decreases in ponderosa pine and Douglas-fir and increases in lodgepole pine (Table 3-11). Subalpine fir would increase from 3.4% to 4.4%, indicating continued ingrowth of this shade-tolerant species in the understory.

Alternatives B, C, and F

PVG 1, large size class trees—In the PVG 1 stands, the relative percent of large size class ponderosa pine and Douglas-fir trees would not change after the proposed treatments (Table 3-10) because of the 20.0-dbh limit for ponderosa pine and because very few large Douglas-fir and lodgepole pine occur in PVG 1 stands and none are cut by the FVS modeled treatments. In the long term, though the absolute average number of large ponderosa pine trees would increase, the relative percentage would decrease from 90% in 2024 to 83% in 2044 due to a greater increase in the average number of large Douglas-fir resulting from ingrowth of approximately 2 TPA from the medium size class. These trees would be retained following the treatment in order to meet Forest Plan standards WIST09 and VEST03.

PVG 2, large size class trees—In the PVG 2 group, large size class ponderosa pine would increase from 33% to 36% with a corresponding decrease in Douglas-fir from 61% to 59% following treatment (Table 3-10). This change would be from removing approximately one large Douglas-fir tree with moderate-to-severe dwarf mistletoe per 2 acres (on average). The

relative abundance of large lodgepole pine would not change following the mechanical treatment because large lodgepole pine are rare in the project area and diameter limits of 20 inches dbh are proposed in the few stands in the PVG 2 group with large lodgepole pine, in order to comply with Design Feature VM-3. Large size class Douglas-fir would slightly increase and ponderosa pine would decrease in 2024 due to medium size class Douglas-fir growing into the large size class. By 2044, ponderosa pine would increase to 37% while Douglas-fir would decrease to 57% (Table 3-10). Lodgepole pine and subalpine fir currently comprise small portions of the large trees in the PVG 2 group. The relative abundance of large lodgepole pine would remain constant at 5% through 2024 and would decrease slightly to 4% by 2044; subalpine fir would be reduced by half following the treatment but would increase to above current levels by 2044 (Table 3-10).

PVG 1, medium size class trees—For the medium size class trees in the PVG 1 group, ponderosa pine would increase from 43% to 53% while Douglas-fir would increase from 10% to 13% and lodgepole pine would decrease from 46% to 34% following the treatment (Table 3-11). This change would reflect the objective of reducing Douglas-fir and lodgepole pine to favor ponderosa pine in the nonlethal fire regime. By 2044, ponderosa pine would increase to 47%, Douglas-fir would decrease to 4%, and lodgepole pine would increase to 49% (Table 3-11). The increase in lodgepole pine in the medium size class would be due to the need to retain some residual lodgepole pine to avoid creating large openings (>2.0 acres) as well as to meet design features for buffering along RCAs (FH-2) and trails (RM-4). Following the mechanical and burn treatments, lodgepole pine regeneration would be expected to be higher than other species, indicating future mechanical and prescribed fire treatments would be needed to maintain the stand in the desired species composition.

PVG 2, medium size class trees—Treatments in the PVG 2 group would increase the relative percentage of ponderosa pine with corresponding decreases in lodgepole pine and subalpine fir. Medium size class Douglas-fir would slightly increase following thinning (Table 3-11). The average TPA of medium size class Douglas-fir would decrease but not as much as that of lodgepole pine and subalpine fir; therefore, the relative percentage would increase. The reason Douglas-fir would not decrease more would be due to the need to retain higher levels of this species in some stands to meet design features for trails (RM-4), RCAs (FH-2), and flammulated owl source habitat (WR-5). In the short term (2024) and long term (2044), ponderosa pine and Douglas-fir would continue to increase while lodgepole pine and subalpine fir would decrease (Table 3-11). This change would primarily be due to heavy thinning of small lodgepole pine and subalpine fir, leaving fewer available to grow into the medium size class. It would also result from the understory burn in 2024, which would kill a greater number of small lodgepole pine and subalpine fir than ponderosa pine or Douglas-fir.

Alternative D

PVG 1, large and medium size class trees—The species composition in PVG 1 under Alternative D would be the same as under Alternatives B/C/F because Alternative D includes the same stands and acres (Table 3-10). No additional stands are proposed for treatment in PVG 1 under Alternative D.

PVG 2, large size class trees—The species composition for large size class trees in PVG 2 under Alternative D would be the same as Alternatives B/C/F (Table 3-10) because only two additional stands are included under Alternative D and both stands were modeled with a

20.0-inch dbh limit for Douglas-fir and lodgepole pine in order to meet Forest Plan standard VEST03. Thus, there would be no difference in the relative percentage of large size class trees following the treatment.

PVG 2, medium size class trees—The species composition for medium size class trees in the PVG 2 stands under Alternative D would be nearly identical to Alternatives B/C/F (Table 3-11) due to the fact that the 22 acres of additional treatment in PVG 2 under Alternative D would have a negligible effect on the average TPA.

Alternative E

PVG 1, large size class trees—The relative percentage of large size class trees under Alternative E post-treatment in 2014 would be the same as the other action alternatives because no large size class trees would be cut under Alternatives B/C/F, and no trees over 18.0 inches dbh would be cut under Alternative E (Table 3-10).

By 2024, a reduction in the relative amount of ponderosa pine (89% to 87%) would occur with a corresponding increase in the relative amount of lodgepole pine (2% to 5%) (Table 3-10) as a result of retaining 18.0 to 19.9 inch dbh lodgepole pine following the treatment in 2014, which would grow into the large size class by 2024. The trend would continue through 2044 as ponderosa pine would decrease to 78% and lodgepole pine would increase to 8% of the number of large size class trees. This would be a greater relative increase in large lodgepole pine and relative decrease in large ponderosa pine than what would occur in all other action alternatives.

PVG 2, large size class trees—No change from the existing condition in the relative species composition of large size class trees would occur following treatment under Alternative E because no trees over 18.0 inches dbh would be cut. In 2024, the relative percent of ponderosa pine would decrease by 2 points with a corresponding increase in Douglas-fir due to a larger number of medium size class Douglas-fir than ponderosa pine growing into the large size class between 2014 and 2024 (Table 3-10). By 2044, the relative percent of ponderosa pine would be 34%, Douglas-fir would be 58%, lodgepole pine would remain relatively unchanged at 5%, and subalpine fir would increase slightly from 1.3% in 2024 to 1.7% by 2044 (Table 3-10).

PVG 1, medium size class trees—The post-treatment species composition of the medium size class trees in the PVG 1 stands under Alternative E would be the same as the other action alternatives (Table 3-11). This similarity is because, of the 10 stands in this group, 2 are proposed for commercial thinning and 8 are proposed for noncommercial thinning. The proposed noncommercial thinning treatments are the same under all alternatives, and the commercial thinning treatments are nearly the same. The long-term species composition would show slightly more ponderosa pine and slightly less lodgepole pine under Alternative E compared to the other action alternatives, but the difference would be minor.

PVG 2, medium size class trees—The post-treatment percentage of medium size class ponderosa pine trees under Alternative E would be slightly higher and Douglas-fir would be slightly lower than Alternatives B/C/F and D. Lodgepole pine would decrease from 25% to 16% post-treatment (Table 3-11), 1 point lower than the other action alternatives as a result of removing more medium size trees to compensate for leaving all trees over 18 inches dbh. In 2024, Douglas-fir would be 1–2 points higher under Alternative E than under Alternatives

B/C/F and D because an average of one 18.0–19.9 inch dbh Douglas-fir that would be cut under the other action alternatives but would be retained under Alternative E. The relative percent of subalpine fir post-treatment would be slightly higher than the other action alternatives due to retaining approximately one 18.0–19.9 inch dbh tree per every 10 acres under Alternative E that would otherwise be cut in the other action alternatives.

The changes in percent of TPA by species in years 2024 and 2044 under Alternative E would follow the same patterns as the other action alternatives. Ponderosa pine and Douglas-fir would continue to increase while lodgepole pine and subalpine fir would decrease (Table 3-11). The decreases in lodgepole pine and subalpine fir would be due to bark beetle and fire-caused mortality in the small and medium size classes.

Summary

The species composition in PVGs 1 and 2 are departed from the desired condition. The medium size class trees are more departed than the large size class trees, which would lead to a long-term trend of increasing departure from the desired condition in the large size class under the No Action Alternative as trees grow from medium to large size class. The indirect effects of this trend would be an increasing risk of lethal fire from increased ladder fuels from less fire-tolerant species.

In 2024 and 2044, all of the action alternatives would be closer to the desired conditions than the No Action Alternative. In PVG 1 and PVG 2 stands in Stratum A, Alternatives B/C/F and D would result in higher relative amount of large ponderosa pine than under Alternative E throughout the planning period.

In PVG 1, there is a high relative amount of lodgepole pine in the medium size class. All of the action alternatives would reduce the relative abundance of lodgepole pine, but it would still be departed from the desired condition. Higher levels of lodgepole pine than desired would be retained in this PVG in order to avoid reducing overall stand densities below the desired levels and to meet design features for RCAs (FH-2) and along ski trails (RM-4). Under all action alternatives, the percentage of lodgepole pine would increase by 2044, though less than the No Action Alternative. Even though it would be lower than under the No Action Alternative, the increase by 2044 would indicate a need for additional treatment to continue to move the stands towards the desired species composition.

Little difference occurs in species composition of medium size class trees between the action alternatives, although all of the action alternatives would be closer to the desired species composition than the No Action Alternative. Alternative D is slightly better than the other alternatives because it would treat more acres toward the desired condition.

An indirect effect of reducing stand density, ladder fuels, and less-fire tolerant species is a reduction in the fire hazard in untreated stands directly adjacent to untreated stands. This effect is most pronounced for adjacent stands that are downwind and/or uphill from treated stands. There would be an indirect effect in stands adjacent to treated stands regarding natural regeneration following the treatments. There would likely be less natural regeneration of subalpine fir and lodgepole pine due to the reduction in seed source in treated stands. This effect would be most pronounced in stands that are downwind and/or downhill from treated stands and in adjacent stands that do not currently have lodgepole pine or subalpine fir seed trees. More stands would be indirectly affected by the treatments under Alternative D

because of more stands proposed for treatment and greater number of stands directly adjacent to treated stands.

Dwarf Mistletoe Rating Index

Dwarf mistletoe is a live plant that lives under the bark of trees and acquires water, energy and nutrients directly from the tree. Dwarf mistletoe affects tree health and vigor by reducing growth, causing deformation of boles and branches, and increasing susceptibility to other damaging agents such as bark beetles. Past management activities, fire exclusion, and changes in species composition have led to undesirable levels of dwarf mistletoe infection in numerous stands in the project area. One of the objectives of the proposed action is to reduce dwarf mistletoe infection rates in order to promote development and retention of stands in the large tree size class. Without some control, dwarf mistletoe will continue to spread and infect trees. Infected trees in the overstory disperse seed and infect understory trees of the same species. Seeds are also carried in the wind where they can infect neighboring trees and stands. Within the same tree, dwarf mistletoe spreads under the bark and by seed dispersal from branch to branch. Of the tree species in the project area, dwarf mistletoe infects Douglas-fir, ponderosa pine, and lodgepole pine. However, only the ratings for Douglas-fir and lodgepole pine will be used as an indicator because very little dwarf mistletoe has infected ponderosa pine in the project area. The Dwarf Mistletoe Rating (DMR), Infected TPA, and Mortality TPA will be used as indicators of Douglas-fir dwarf mistletoe infection and overall stand health. The DMR is the average dwarf mistletoe rating for all trees of the species. Infected TPA is the average number of trees infected with dwarf mistletoe of the species and Mortality TPA is the average number of trees per acre per year that have died from dwarf mistletoe infection during the previous cycle. DMR is affected by the individual tree ratings and trees per acre of the species. The FVS standard reports for dwarf mistletoe do not provide post-treatment (i.e., post-treatment 2014) figures; therefore, 2024 will be used as the indicator of post-treatment effects.

The average DMR, Infected TPA, and Mortality TPA of Douglas-fir and lodgepole pine trees for stands outside of plantations in the nonlethal fire regime is displayed in Table 3-12. Additionally, in the Infected TPA cells, the Infection Rate is presented as a percent of total Douglas-fir and lodgepole pine TPA.

Table 3-12. Average Dwarf Mistletoe Rating (DMR), Infected Trees per Acre (TPA), Infection Rate and Mortality TPA for Douglas-fir and lodgepole pine outside of plantations in the nonlethal fire regime

Year	No Action	Alt. B/C/F	Alt. D	Alt. E
Average DMR				
2014	1.2	1.2	1.2	1.2
2024	1.6	1.2	1.1	1.2
2044	2.0	1.4	1.4	1.4
Average Infected TPA / Total TPA (Infection Rate)				
2014	73 (42%)	73 (42%)	73 (42%)	73 (42%)
2024	103 (40%)	40 (33%)	28 (33%)	40 (34%)
2044	136 (56%)	42 (45%)	35 (44%)	42 (42%)
Average of Mortality TPA				
2014	4.8	4.8	4.8	4.8
2024	6.1	2.4	1.6	2.4
2044	7.9	2.3	1.8	2.2

Alternative A—No Action

Under Alternative A, a steady increase in the average DMR and Infected TPA would occur. The DMR would increase from 1.2 in 2014 to 2.0 in 2044 (Table 3-12). The Infected TPA would increase from 73 (42% infection rate) to 136 (56% infection rate) and Mortality TPA would increase from 4.8 in 2014 to 7.9 in 2044 (Table 3-12).

The infection rate and Mortality TPA would almost double over current levels. Indirectly indicating declining forest health, vigor, and resilience as the infected trees would be more susceptible to causes of death such as drought and bark beetles. The increasing rates of mortality would lead to higher surface fuel loads and likely increase the wildfire hazard and resistance to control.

Alternatives B, C, F

In Alternatives B, C and F, the DMR would not change by 2024, but the total number of Infected TPA would decrease to 40 (33% infection rate) in 2024 (Table 3-12). The DMR does not change despite tree removal preference for dwarf mistletoe-infected trees. A major portion of the stands in Strata A would be treated with either *Thinning with No Product Removal* or *Thinning with Optional Misc. Product Removal.* The upper diameter limits for Douglas-fir in these two treatments is 12.0 inches dbh and that of lodgepole pine is 12.0 to 14.0 inches dbh. Therefore, numerous dwarf mistletoe-infected trees over the size limit would not be removed, and these larger trees likely have higher dwarf mistletoe infection rates, resulting in no change in the DMR.

From 2024 to 2044, under Alternatives B/C/F, the DMR would increase to 1.4, Infected TPA would increase to 42 (45% infection rate), and Mortality TPA would decrease to 2.3 per year (Table 3-12). The average number of infected TPA under Alternatives B/C/F would be about one-third of the No Action Alternative by 2044 (Table 3-12).

Alternative D

In 2024, all of the measures for dwarf mistletoe infection would be lower under Alternative D than all other alternatives (Table 3-12). By 2044, Alternative D would result in the lowest number of Infected TPA and Mortality TPA of all the alternatives because more acres are being treated and the additional stands under Alternative D have high dwarf mistletoe infection rates.

Alternative E

In 2024, the DMR, Infected TPA, and Mortality TPA under Alternative E would be the same as Alternatives B/C/F and higher than Alternative D (Table 3-12). Over the long term, Alternative E would be very similar to Alternatives B/C/F except that the infection rate of 42% (Table 3-12) would be lower because of the higher number of trees retained. Infection rates are similar to Alternatives B/C/F because of upper diameter limits being very similar across all alternatives. Upper diameter limits on Douglas-fir and lodgepole in the commercially treated stands in Strata A restrict the ability to remove dwarf mistletoe–infected trees under Alternatives B/C/F, resulting in little difference from Alternative E. Furthermore, as mentioned above, a large portion of stands in Strata A are proposed to be treated with noncommercial thinning, which has the same prescription across all action alternatives.

Summary

Under Alternative A, a steady increase in all dwarf mistletoe indicators would occur, with increasing Mortality TPA by 2044 (Table 3-12). Increased mortality would increase standing and down fuel loads and the risk of bark beetle infestations as the higher DMR rates increase individual tree stress. All of the action alternatives would decrease (compared to the No Action Alternative) average stand DMR, Infected TPA, and Mortality TPA following treatment with slight-to-moderate increases in the long term. These increases would be the result of both intra- and inter-tree spread of dwarf mistletoe. In all action alternatives, numerous infected trees would remain following the treatment which would provide seed for future spread of the disease.

An indirect effect of reduction of dwarf mistletoe–infected trees would be reducing the spread of dwarf mistletoe to adjacent stands. This effect would be most pronounced in stands downwind and/or downhill from treated stands and in stands with little-to-no existing trees with dwarf mistletoe infection. This indirect effect would be greatest under Alternative D because more stands would be treated and more dwarf mistletoe–infected trees would be removed. This indirect effect would decrease over time.

Alternative D would result in the lowest levels of infected TPA while Alternatives B/C/F and E would have similar results.

Bark Beetle Risk Rating

Numerous studies have shown that healthy, vigorous trees are less susceptible to bark beetle attack and management practices that maintain forest stands within certain density ranges tend to create stands more resistant to bark beetle outbreaks (Fetig et al. 2006). In mixed conifer forests, maintaining multiple species within the desired conditions reduces the risk of a single species of bark beetle reaching outbreak levels. The bark beetle hazard ratings for

each species are provided on a scale of 0 to 4, with 0 indicating no bark beetle hazard. Ratings were calculated based on individual scores for stand density, tree size, and host species percent of basal area, which were multiplied to get a final score. The final scores were converted to a bark beetle hazard rating for the stand based on the following ranges:

- Low: ≤1.2
- Low-moderate: 1.2–1.99
- Moderate: 2.0–2.99
- High: 3.0–3.99
- Very high: ≥4.0

Two bark beetles are of primary concern in the project area: Douglas-fir beetle (DFB) and mountain pine beetle (MPB), which attacks both ponderosa pine (MPB-PP) and lodgepole pine (MPB-LP). In the project area, the primary concern with MPB is with lodgepole pine. Table 3-13 lists the total number of stands with moderate-to-high bark beetle hazard ratings (scores ≥2.0) for the two beetles of concern in the nonlethal fire regime, outside of plantations.

Table 3-13. Number of stands with bark beetle hazard scores 2.0 or greater for stands that are outside of plantations, in the nonlethal fire regime (Stratum A)

Year	ALT A	ALT B/C/F	ALT D	ALT E
	Douglas-fir Beetle (number of stands)			
2014	22	22	22	22
2024	29	15	15	19
2044	30	17	17	19
	Mountain Pine Beetle—Lodgepole Pine (number of stands)			
2014	25	25	25	25
2024	25	1	0	1
2044	30	3	1	2

Total Number of Stands Outside of Plantations in Strata A = 92

Alternative A

Under Alternative A, 22 out of 92 stands (24%) have moderate-to-high hazard ratings for DFB and 25 out of 92 (27%) have moderate-to-high hazard ratings for MPB-LP (Table 3-13). By 2044, the number of stands with moderate-to-high ratings would increase to 30 (33% of total) for each beetle (Table 3-13). Recently, the number of Douglas-fir and lodgepole pine trees killed by bark beetles in the project area has increased. Though drought is likely a major factor in recent outbreaks, high stand densities and high proportion of host species (Douglas-fir and lodgepole pine) predispose the stands to outbreaks during drought. Stands with moderate-to-high bark beetle hazard for DFB and MPB are predisposed to bark beetle–caused mortality. Increased tree mortality would increase fuels, which would increase potential fire intensity and resistance to control, which would increase the risk of lethal fires in the nonlethal fire regime and the risk of soil damage. Although trees killed by bark beetles would provide some snag habitat, Douglas-fir and lodgepole pine snags are not the preferred snag species in the nonlethal fire regime.

Alternative B/C/F

The number of stands with a moderate-to-high hazard rating for DBF would decrease to 15 stands in 2024 (16% of total), and the number of stands with moderate-to-high ratings for MBP-LP would decrease to one by 2024 (Table 3-13). Both of these numbers indicate that the proposed mechanical treatments would be effective for reducing DBF and MBP hazard in the treated stands. The number of stands with moderate-to-high ratings would increase by two for each beetle species from 2024 to 2044 as a result of increasing stand densities. The number of moderate-to-high rating stands for DFB would decrease less than for MPB-LP due to the retention of more medium-to-large size class Douglas-fir in the nonlethal fire regime to meet management objectives, design features, and Forest Plan standards.

Alternative D

The number of stands with moderate-to-high DFB ratings would be the same under Alternative D as Alternative B (Table 3-13). However, the number of stands with moderate-to-high MPB-LP ratings would decrease from 25 to 0 under Alternative D by 2024 and increase from 0 to 1 by 2044 (Table 3-13). The two additional stands in Stratum A have numerous lodgepole pine trees and, thus, result in fewer stands with moderate-to-high ratings by 2024 due to treatment.

Alternative E

The number of stands with moderate-to-high DFB hazard under Alternative E would decrease to 19 by 2024 (21% of total); 4 stands more than Alternatives B/C/F and D (Table 3-13). The higher number of stands would be a direct effect of retaining more medium-to-large size class Douglas-fir trees under Alternative E. The number of moderate-to-high DFB stands would remain at 19by 2024 (Table 3-13). The number of stands with moderate-to-high ratings for MPB-LP would decrease to 1 by 2024, the same as under Alternatives B/C/F, and would increase to 2 by 2044, 1 less than under Alternatives B/C/F (Table 3-13). This difference is from the removal of more lodgepole pine smaller than 18.0 inches dbh in some stands to compensate for leaving all trees greater than 18.0 inches dbh.

Summary

A total of 22 stands currently have moderate-to-high hazard ratings for DFB and 25 stands have moderate-to-high ratings for MPB-LP. The number of stands with moderate-to-high ratings for both bark beetles would increase over the short and long term and would likely result in increased bark beetle–caused tree mortality that would lead to increased wildfire hazard in these stands. In short, under the No Action Alternative, the stands in Stratum A would become less resilient to disturbance.

The number of stands with moderate-to-high ratings would decrease under all of the action alternatives because of the proposed treatments. The treatments would reduce stand densities, thus reducing individual tree stress and making them more resistant to bark beetles. Furthermore, the treatments would reduce the relative amounts of Douglas-fir and lodgepole pine trees compared to ponderosa pine. The lower hazard ratings associated with the action alternatives indicate better overall stand health and resilience to bark beetle attack. In the short term and long term, fewer trees would likely be killed by bark beetles, which would reduce the amount of dead fuel and lower the wildfire hazard.

Alternative D would result in the fewest number of stands in the moderate-to-high bark beetle hazard rating in the short term and long term for both beetles. Alternative D would result in more acres with lower hazard ratings for lodgepole pine than the other action alternatives because of the additional 2 stands that would be treated. Alternative E would result in more stands with moderate-to-high hazard for Douglas-fir beetle than the other action alternatives, but fewer stands than Alternative A. Alternative E would result in fewer stands with moderate-to-high hazard ratings for MPB-LP than Alternatives B/C/F but more than Alternative D.

A slight indirect effect of reducing bark beetle hazard in treated stands would likely occur in adjacent untreated stands. However, this indirect effect would depend on the existing condition and risk of the untreated stands. The reduced bark beetle hazard in treated stands throughout the project area would reduce the overall hazard of a landscape-scale outbreak.

Average Basal Area

Average BA is used as a measure of stand density for stands outside of plantations (i.e., naturally established stands), which generally are composed of larger trees than plantation stands. Though not a perfect measure of density, BA is often used because it is easy to measure, calculate, and convey. The desired range of BA following mechanical treatment by stratum are displayed in Table 3-6. The target basal areas were established to achieve Purpose 1: the need to develop large trees (of the appropriate species for the PVG) and old forest habitat while reducing the risk of uncharacteristic disturbance from wildfire and undesirable levels of bark beetles.

Table 3-14 displays the average stand BA in square feet per acre for all trees 0.1 inches dbh and greater, outside of plantations in the nonlethal fire regime (Stratum A). The target ranges of basal areas following the mechanical treatments for Stratum A are 50–70 in PVG 1 and 55–75 in PVG 2.

Table 3-14. Average stand basal areas (square feet per acre) for all stands outside of plantations, in the nonlethal fire regime (Stratum A), by Potential Vegetation Group (PVG)

PVG	Year	Alternative A (ft^2/acre)	Alternatives B/C/F (ft^2/acre)	Alternative D (all stands) (ft^2/acre)	Alternative E (ft^2/acre)
1	2014 (Existing Condition)	81	81	81	81
	2014 (Post Treatment)	N/A	63	63	64
	2024	93	77	77	77
	2044	113	85	85	85
2	2014 (Existing Condition)	104	104	104	104
	2014 (Post Treatment)	N/A	69	68	73
	2024	119	82	81	85
	2044	143	94	93	96

Alternative A

The existing average BA of the predominant PVG 1 stands is 81and of the predominant PVG 2 stands is 104 (Table 3-14). By 2044, the average BA would increase to 113 in PVG 1 and 143 in PVG 2 (Table 3-14).

Alternatives B, C, F

In PVG 1, the average BA would be reduced to 63 following mechanical treatment in 2014 (Table 3-14). By 2044, the average BA would increase to 85 (Table 3-14). In PVG 2 stands, the average BA would be 69 following treatment and would increase to 94 by 2044 (Table 3-14). These numbers indicate that mechanical treatments reduce the stand densities to within the target BA range. The BAs listed are averages for all stands within this group and do not reflect the variation that would occur between stands. A few stands would be outside of the desired post-treatment range. A few stands currently have low BAs but are proposed for noncommercial thinning because of the need to shift them towards the desired species composition. Other stands would have a residual BA greater than the target range in order to comply with Forest Plan standards VEST03 and WIST09.

Alternative D

Alternative D does not propose treatment in any additional PVG 1 stands; therefore, the average BA would be the same as Alternatives B/C/F (Table 3-14). Two additional PVG 2 stands are proposed for treatment, but these stands would have minimal effect on the average BA for all stands under the alternative.

Alternative E

The average post-treatment BA of PVG 1 stands under Alternative E would be slightly higher than the other action alternatives; but BA would be the same as the other alternatives by 2024 and 2044 (Table 3-14). In PVG 2 stands, the post-treatment BA would be 73 and would increase to 96 by 2044, which would be higher than the in the other action alternatives (Table 3-14).

Summary

All of the action alternatives would reduce average stand BAs to within the desired range following treatment. Over the long term, no difference would be detectible between the action alternatives in PVG 1 stands (Table 3-14). In PVG 2 stands (the largest group in the project area with 126 stands on 5,055 acres), Alternatives B/C/F or D would result in the lowest average stand BA following treatment and stands would remain at a lower average BA than under Alternatives A or E in 2044 (Table 3-14). This result indicates that Alternatives B/C/F or D would maintain lower stand densities over the long term. The difference between Alternative D and Alternatives B/C/F would be due to the additional 2 stands treated under Alternative D.

Reducing average stand densities within treated stands would directly affect resilience to disturbance (fire and bark beetle). The risk of large, stand-replacement (lethal) fires and bark beetle outbreaks would also be reduced in the project area, which would indirectly affect untreated stands within the project area and stands adjacent to the project area.

Mechanical/Underburn Treatments in the Nonlethal Fire Regime Stands, within Plantations

Basal Area and Trees per Acre by Species

BA and TPA are used to measure stand density based on the average size of the trees in the stand as measured by quadratic mean diameter (QMD). The desired conditions by stratum are displayed in Table 3-6**.** For stands with a QMD <8.0 inches, TPA is a better measure of density. The desired post-treatment density for Stratum A is 105–220 TPA or an average BA of 50–75. QMD is also an indicator of thinning treatment effectiveness towards developing larger trees. For example, thinning from below (e.g. removing smaller trees and leaving the larger trees) will result in a larger QMD. Table 3-15 displays the average QMD, BA, and TPA for stands within plantations in the nonlethal fire regime.

Table 3-15. Average quadratic mean diameter (QMD), basal area (BA) and trees per acre (TPA) for stands within plantations in the nonlethal fire regime

Stratum	Year	No Action	Alt. B/C/F	Alt. D	Alt. E
		AVERAGE QMD			
A	2014 (Existing Condition)	6.0	6.0	6.0	6.0
	2014 (Post Treatment)	N/A	7.3	7.3	7.3
	2024	5.6	6.7	6.7	6.9
	2044	5.9	7.7	7.7	7.6
AVERAGE BA (ft^2/acre)					
A	2014 (Existing Condition)	47	47	47	47
	2014 (Post Treatment)	N/A	39	39	39
	2024	63	54	54	54
	2044	99	73	75	73
AVERAGE TPA					
A	2014 (Existing Condition)	310	310	310	310
	2014 (Post Treatment)	N/A	175	175	175
	2024	394	250	250	232
	2044	526	243	243	246

Alternative A

With an average TPA of 310, plantation stands in Strata A are above the desired density of 105–220 TPA (Table 3-15). Average stand QMD is 6.0 inches and average BA is 47. By 2044, the average stand BA and TPA would both be higher than desired, and the QMD would decline to 5.9 inches (Table 3-15). These changes would result from continued establishment of natural regeneration, which would lower the average stand QMD over time.

Alternatives B/C/D/F

The average stand QMD would increase from 6.0 to 7.3 inches following thinning, indicating that thinning would remove more small trees than large trees. The QMD would increase to 7.7 by 2044 (Table 3-15). An average of 175 TPA following the treatment (Table 3-15), which indicates that thinning would reduce density to within the desired range. TPA would increase to 250 by 2024 due to natural regeneration (Table 3-15). This number represents stand density prior to the understory burn in 2024. By 2044, TPA would be 243, a decrease of 7, under Alternatives B/C/F and D, which would be the net result of fire-caused mortality in 2024 and natural regeneration in 2034 (Table 3-15). The average stand QMD, BA, and TPA would be the same under Alternative D as under Alternatives B/C/F because no plantations occur in the additional stands to be treated in Alternative D (Table 3-15).

Alternative E

For plantations in Stratum A, very little difference would be seen between Alternative E and the other action alternatives (Table 3-15). The average post-treatment QMD, BA, and TPA would be the same. The QMD under Alternative E would be 6.9 inches in 2024, which would be larger than Alternatives B/C/F, while the average TPA would be lower (Table 3-15). The variations between Alternatives B/C/F and Alternative E would result from one stand proposed to be treated with commercial thin. Under Alternative E, the 18.0-inch diameter

limit and different assumptions in the FVS simulations regarding natural regeneration result in slightly different outcomes than the other action alternatives. All other plantation stands in Stratum A would be treated with a noncommercial thin, which would result in the same effects for all action alternatives.

Summary

Stands within plantations in Stratum A have higher densities than desired in terms of TPA, and by 2044, the average BA would also be above the desired level (Table 3-15). All of the action alternatives would equally reduce TPA to within the desired range following treatment in 2014 (Table 3-15). The QMD would increase under all action alternatives following treatment, indicating that the treatments promote larger trees. By 2044, the QMD under all the action alternatives would be larger than under Alternative A (Table 3-15), indicating that the treatments would increase individual tree growth, promoting long-term development of larger trees.

The direct effects of thinning plantations to within the desired density range would be healthier stands and individual trees that would grow faster, resulting in the development of large trees sooner. Indirect effects would include reduced ladder and crown fuels and more available resources (light, water and nutrients) for understory vegetation.

Within plantations in the nonlethal fire regime, all of the action alternatives would be essentially equal in promoting the development of large trees and improving stand resilience. All action alternatives would move stands within desired conditions or be closer to desired conditions than the No Action Alternative.

Over the short term, treatments would have very little indirect effect within plantations on adjacent, untreated stands. However, over the long term and beyond, treatments would have an indirect effect to adjacent stands. One indirect effect to adjacent untreated stands would be lower risk of lethal fire behavior. This effect would be most pronounced in adjacent stands that are downwind and/or uphill from treated stands and would decline further away from the treated area. A second indirect effect to adjacent, untreated stands in the nonlethal fire regime would be a reduction of seed source of undesirable tree species, such as lodgepole pine and subalpine fir. This effect would depend on the presence of undesirable species in the untreated stand and distance from the treated area.

Dwarf Mistletoe Rating Indices

The measures used for dwarf mistletoe infection rates are DMR, Average Infected TPA, and Average Mortality TPA caused by dwarf mistletoe. See section 0 for more detail about the measures. Only the ratings for Douglas-fir and lodgepole pine were used because these are the only two species with moderate-to-high levels of dwarf mistletoe infection in the project area. Table 3-16 displays the average of dwarf mistletoe indices for Douglas-fir and lodgepole pine for proposed mechanical treatment stands within plantations in the nonlethal fire regime.

Table 3-16. Average Dwarf Mistletoe Rating (DMR), Infected Trees per Acre (TPA), and Mortality TPA for Douglas-fir and lodgepole pine within plantations in the nonlethal fire regime

Year	No Action	Alt. B/C/F	Alt. D	Alt. E
Average DMR				
2014	1.1	1.1	1.1	1.1
2024	1.1	1.2	1.2	1.2
2044	1.5	1.4	1.4	1.3
Average Infected TPA / Total TPA (Infection Rate)				
2014	48 / 162 (30%)	48 / 162 (30%)	48 / 162 (30%)	48 / 162 (30%)
2024	65 / 209 (31%)	20 / 70 (29%)	20 / 70 (29%)	20 / 66 (30%)
2044	93 / 280 (33%)	21 / 61 (34%)	21 / 61 (34%)	22 / 70 (31%)
Average Mortality TPA				
2014	2.2	2.2	2.2	2.2
2024	3.0	0.9	0.9	0.9
2044	4.6	1.0	1.0	1.0

No Action Alternative

The average DMR within plantations in the nonlethal fire regime is 1.1 with an average of 48 TPA infected (30% of total TPA) (Table 3-16). Dwarf mistletoe mortality is 2.2 TPA per year (Table 3-16). The DMR would remain the same in 2024 despite an increase in the Infected TPA to 65 (31% infection rate). The increase in Infected TPA would be offset by an equivalent increase in total TPA of these two species. However, the Mortality TPA would increase from 2.2 to 3.0 TPA per year (Table 3-16).

By 2044, DMR would increase to 1.5 as younger trees are infected and dwarf mistletoe spreads in already infected trees (Table 3-16). The number of Infected TPA would increase to 93 (33% infection rate) and the Mortality TPA would increase 4.6 (Table 3-16). This change indicates a moderately rapid rate of spread of dwarf mistletoe in the plantation stands, resulting in a decline in forest health, vigor, and resilience. Increased mortality would lead to higher levels of surface fuels over the long term.

Alternatives B/C/D/F

Noncommercial mechanical treatments in plantations in the nonlethal fire regime would reduce the number of Infected TPA from 48 to 20 (29% infection rate) and the Mortality TPA from 2.2 to 0.9 per year by 2024 (Table 3-16). The DMR would increase by 2024 (Table 3-16) despite the preference to remove dwarf mistletoe–infected trees as indicated by the reduction in Infected TPA. The DMR would increase while the Infected TPA would decrease because the noncommercial treatments would not remove any trees over 14.0 inches dbh, which tend to be the trees with higher levels of infection, but the treatments would reduce overall TPA. The DMR would continue to increase in 2044 while the number of Infected TPA would increase to 21 and the Mortality TPA would increase to 1.0 (Table 3-16).

The measures for dwarf mistletoe infection would be the same under Alternative D as under Alternatives B/C/F because no additional plantation stands are proposed for treatment under Alternative D (Table 3-16).

Alternative E

The measures for Alternative E would be near those for Alternatives B/C/F and D with some small differences (Table 3-16) because of one plantation stand proposed for commercial thinning in Stratum A. Otherwise, the effects of noncommercial thinning would be the same under Alternative E as Alternatives B/C/F. In 2044, the DMR under Alternative E would be 1.3, which is lower than the other action alternatives because of slightly higher numbers of total Douglas-fir and lodgepole pine TPA that would remain following the treatments (Table 3-16). The Infected TPA of 22 would be slightly higher by 2044 (Table 3-16).

Summary

All of the action alternatives show an equal reduction in average Infected TPA and Mortality TPA in the short term following the treatments. Alternatives B/C/F and D would result in slightly fewer Infected TPA and Mortality TPA than Alternative E in 2044, but the effect would occur because of only one stand (Table 3-16).

An indirect effect of reducing dwarf mistletoe–infected trees would be reducing the spread of dwarf mistletoe to adjacent stands. This effect would be most pronounced in stands downwind and/or downhill from treated stands and in stands with little-to-no existing trees with dwarf mistletoe infection. This indirect effect would decrease over time.

Burn Only Treatments in the Nonlethal Fire Regime Stands

Trees per Acre of Small Size Class

In frequent fire forests (nonlethal and mixed1 fire regimes), managed fire is an important tool with effects that are difficult to replicate with mechanical treatments. Some of the effects of an understory prescribed burn on conifers include killing and pruning of lower limbs and of small trees that serve as ladder fuels, thinning of the forest, killing less-fire adapted species, and recycling nutrients. A comparison of the average TPA by species in the small size class was used as an indicator of the effects of understory burning on stand structure and composition for stands proposed for Burn Only treatment in the project area. A more extensive analysis of the effects of the understory burn on vegetation and fuels is discussed in the fire and fuels technical report (project record).

The proposed Burn Only treatments are the same for all the action alternatives and are represented in this effects analysis by Alternative B. The additional acres proposed for treatment under Alternative D do not include any stands with a Burn Only treatment.

FVS uses the Fire and Fuels Extension (FFE) (Rebain 2010) to simulate the effects of fire and calculate fuel loads. FFE runs each cycle after FVS projects stand development; thus, the effects of fuels and fire treatments on the stands appear in the next 10-year cycle. In the Becker FVS analysis, the understory burn was simulated in year 2024, therefore, the effects on vegetation appear in the data in 2034.

The change in average small size class (5.0–11.9 inches dbh) TPA by species was used to analyze and compare the effects of the understory burn on conifers. This measure includes

the size of trees that would primarily be affected by the understory burn and would exclude any changes in species composition and density as a result of establishing regeneration in the FVS model. Additionally, the small size class trees generally have a higher rate of fire-caused mortality compared to other mortality agents, including bark beetle and dwarf mistletoe. Up to the burn in 2024, the TPA in the Burn Only stands would be the same under all alternatives, including Alternative A. Therefore, any difference in 2034 can be directly attributed to the understory burn. Table 3-17 displays the average stand TPA by species for the existing condition (2014), No Action Alternative, and Alternative B in 2034.

Table 3-17. Comparing Trees per Acre (TPA) by species in the small size class between Alternative A and Alternative B for stands in the nonlethal fire regime

Alternative	Year	Average TPA Small Size Class			
		PP	DF	LP	AF
Existing Condition	2014	16.0	10.5	19.7	1.6
Alternative A	2034	9.9	9.1	15.7	1.6
Alternative B	2034	6.3	6.9	8.7	0.8
Percent Difference between No Action and Alt B. (Mortality Rate)		36%	24%	45%	48%

Note: PP = ponderosa pine, DF = Douglas-fir, LP = lodgepole pine, AF = subaline fir

Alternative A—No Action

Lodgepole pine is the most abundant tree in the small size class, followed by ponderosa pine, Douglas-fir, and subalpine fir (Table 3-17). The desired condition for this fire regime is for ponderosa pine to comprise at least 80% of the trees. Under Alternative A, there would be a decline in the TPA of all species except for subalpine fir from 2014 to 2034, and the greatest decline would be in ponderosa pine, which would trend away from the desired condition (Table 3-17). The overall decline in small TPA would likely occur from trees growing into the medium size class and fewer trees entering from the sapling size class but would also be a reflection of the stands becoming denser and less favorable for early successional species like ponderosa pine.

All Action Alternatives

Comparing the average TPA by species in 2034 shows the direct effects of the understory burn on stand density and species composition. The FVS model estimates an average of 38% mortality across all species in the small size class as a result of the understory burn (Table 3-17). Most mortality would occur in lodgepole pine, which would decrease from 15.7 TPA under Alternative A to 8.7 TPA under Alternative B, a 45% reduction (Table 3-17). This reduction would be expected since lodgepole pine has very thin bark and is not very tolerant of even low-intensity fire. The same is true of subalpine fir; though not common in the nonlethal fire regime areas, nearly half of the subalpine fir trees would be killed by the understory burn. Ponderosa pine would have an average mortality rate of 36% and Douglas-fir would be 24% (Table 3-17). The difference between mortality rates would likely result from Douglas-fir generally occurring on slightly wetter sites and northerly aspects while ponderosa pine generally occurring on southerly aspects and drier sites within the nonlethal fire regime. This difference is a consequence of the complex intermix of PVGs in the project area. Within ponderosa pine, there is likely to be higher surface fuel loads with long-needle duff buildup, whereas the short-needle species like Douglas-fir tend to have shallow needle layers that don’t burn as hot or have the same rate of spread as the longer needle fuels. Even though the understory burn would be conducted under moist fuel conditions, the combined

effect of fuel loads and drier microsites would lead to more intense fire behavior in the ponderosa pine groups, killing more trees than in the Douglas-fir groups.

Direct effects of the understory burn would include thinning smaller trees, reducing ladder fuels, and consuming surface fuels. In addition, the burn would retain more of the desired species (ponderosa pine and Douglas-fir) and kill more of the undesired species (lodgepole pine and subalpine fir), moving the stands toward the desired species composition.

An indirect effect of the prescribed burn would be a higher risk of bark beetle attacks on surviving ponderosa pine and Douglas-fir trees for 2 to 3 years following the burn. However, this would be a temporary condition traded-off for reducing surface and ladder fuels and thinning smaller trees with greater retention of the desired species. The combined effect would be reduced risk of high intensity wildfires for 10 to 20 years following the understory burn.

An indirect effect of the prescribed burn would be seen in stands directly adjacent to the treated stands. This effect would be primarily to untreated stands that are directly downwind and uphill from the treated stands and, for the most part, stands on the same aspect as treated stands. The indirect effect would be a reduced risk of uncharacteristic fire behavior for the fire regime within the untreated stand. The extent of the effect would depend on the condition of the untreated stands. The effect on untreated stands would be reduced for stands with uncharacteristic high fuel loads for the fire regime and PVG and would decrease with distance from the treated stand.

The proposed understory burn treatment in the Burn Only stands under the action alternatives would move closer to meeting the objectives of Purpose 1 than the No Action Alternative. The presence of more lodgepole pine and Douglas-fir in these stands than desired following treatment indicates that more than one understory burn would be needed to move the stands towards, and maintain them in, the desired condition.

Mechanical Treatments in the Mixed1 Fire Regime, outside of Plantations

The mixed1 fire regime includes stands in Strata B (PVGs 2/3, 2/7, 3 and 3/7); C (PVG 4); D (PVG 4/7 and 7); and E (PVG 10). Table 3-18 lists the number of stands and total acres proposed for mechanical treatment in the mixed1 fire regime, outside of and within plantations, by alternative. The same stands and acres are proposed under Alternatives B, C, E and F while an additional 6 stands covering 160 acres are proposed under Alternative D (Table 3-18).

A total of 64 stands, comprising 2,882 acres, are proposed for mechanical treatment in the mixed1 fire regime under Alternatives B, C, E and F, with an additional 6 stands on 160 acres proposed under Alternative D (Table 3-18). The majority of the stands and acres (50 stands 2,315 acres under Alternative B and 56 stands 2,475 acres under Alternative D) are outside of plantations (Table 3-18).

Table 3-18. Stands and acres in the mixed1 fire regime by alternative

Stratum	Mechanical Treatment	Alternatives B, C, E, and F		Alternative D		Alternative D Additional	
		Stands	Acres	Stands	Acres	Stands	Acres
OUTSIDE OF PLANTATIONS							
B	Mixed Treatment with Product Removal	0	0	1	50	1	50
	Thinning with No Product Removal	5	132	5	132	0	0
	Thinning with Product Removal	11	425	13	442	2	16
B Total		16	557	19	624	3	66
C	Mixed Treatment with Product Removal	2	87	2	87	0	0
	Thinning with No Product Removal	1	16	1	16	0	0
	Thinning with Product Removal	1	15	1	15	0	0
C Total		4	117	4	117	0	0
D	Mixed Treatment with Product Removal	11	733	11	733	0	0
	Thinning with No Product Removal	9	375	9	375	0	0
	Thinning with Optional Misc. Wood Product Removal	2	118	2	118	0	0
	Thinning with Product Removal	8	414	10	462	2	48
D Total		30	1,640	32	1,688	2	48
E	Mixed Treatment with Product Removal	**0**	**0**	1	46	1	46
E Total		**0**	**0**	**1**	**46**	**1**	**46**
TOTAL OUTSIDE OF PLANTATIONS		**50**	**2,315**	**56**	**2,475**	**6**	**160**
WITHIN PLANTATIONS							
B	Thinning (Optional Mastication) No Product Removal	2	59	2	59	0	0
	Thinning with No Product Removal	7	448	7	448	0	0
B Total		**9**	**507**	**9**	**507**	**0**	**0**
C	Thinning with No Product Removal	1	12	1	12	0	0
	Thinning with Product Removal	1	27	1	27	0	0
C Total		**2**	**39**	**2**	**39**	**0**	**0**
D	Thinning with No Product Removal	3	21	3	21	0	0
D Total		**3**	**21**	**3**	**21**	**0**	**0**
TOTAL WITHIN PLANTATIONS		**14**	**567**	**14**	**567**	**0**	**0**
GRAND TOTAL		**64**	**2,882**	**70**	**3,042**	**6**	**160**

Large Tree Canopy Cover

The FVS-calculated canopy cover of all trees in the large size class was used as an indicator for development of large trees. The stand mean large tree canopy cover was averaged for all stands in each stratum for each alternative. Stratum E was not included in the measures for development of large trees because large size class trees are rare in PVG 10 and typically do not include ponderosa pine and Douglas-fir.

Table 3-19 displays the average canopy cover of large size class trees for each alternative for all stands outside of plantations in the mixed1 fire regime with the rate of increase post-treatment (2014) to 2044. Large size class trees are not well distributed across the landscape in the project area. Some stands have more than 20 TPA in the large size class while others have less than 5. Note, on the Forest, each large tree represents approximately 1% canopy cover. Canopy cover of large size class trees increases primarily by ingrowth of trees from the medium size class. Large size class trees are often at higher risk of bark beetle attacks so the numbers in Table 3-19 reflect a net change (ingrowth plus mortality) in large tree canopy cover over time.

Table 3-19. Percent canopy cover of large size class trees for stands in the mixed1 fire regime, outside of plantations

Strata	Row Labels	No Action	Alt. B/C/F	Alt. D	ALT E
B,C,D	2014 (existing condition)	10.9	10.9	10.9	10.9
	2014 (post treatment)	10.9	9.9	9.9	10.9
	2024	12.5	11.8	11.8	12.9
	2044	14.8	14.6	14.9	15.7
	Rate of Increase from 2014 post-treatment to 2044	36%	47%	51%	44%

Alternative A—No Action

Under Alternative A, large tree canopy cover (LTCC) would increase from the existing condition of 10.9% to 14.8% over the long term (2044), which would be a 36% rate of increase (Table 3-19).

Alternative B/C/F

Under Alternatives B/C/F, LTCC would decrease following treatment to 9.9% but would recover to 14.6% by 2044, which would be just slightly below the average for Alternative A (Table 3-19). However, the rate of increase would be 47% which is greater than the No Action alternative (Table 3-19). The decline following mechanical treatment would be a direct effect of the treatment objectives to reduce the amount of subalpine fir in Strata B and C and remove large Douglas-fir trees with moderate-to-high dwarf mistletoe throughout the mixed1 fire regime. The temporary reduction in large trees would be compensated for by increased growth of the residual trees, leading to more medium size class trees growing into the large size class.

Alternative D

The average LTCC under Alternative D would be the same as under Alternatives B/C/F except in 2044 where it would be higher (14.9%) (Table 3-19). This difference can be attributed to the additional 5 stands proposed for treatment under Alternative D. The treatment in these stands would release more medium size class trees from competition and allowed them to grow into the large size class. Despite a temporary reduction in large tree canopy cover following treatment, by 2044, the average large tree canopy cover of all the stands in the mixed1 fire regime, outside of plantations, would exceed that of Alternative A and Alternatives B/C/F (Table 3-19). Alternative D would have the highest rate of increase of all alternatives (Table 3-19).

Alternative E

The average LTCC would not decrease under Alternative E following mechanical treatment due to the 18.0-inch dbh limit (Table 3-19). By 2044, the average and the total would increase to 15.7%, the highest of all the alternatives (Table 3-19). However, the rate of increase of LTCC would be lower than the other action alternatives, indicating slower growth rates of the residual trees currently in the upper end of the medium size class.

Summary

For Alternatives B/C/F and D, a short-term reduction in large size class trees would occur from the treatments followed by more rapid growth and development of large size class trees over the long term than under Alternative E (Table 3-19). For all action alternatives, this increase is likely the result of several factors that affect tree growth and development of large trees.

The 18.0-inch dbh limit under Alternative E would contribute to three factors that affect tree growth: higher average stand densities following mechanical treatments; higher retention of subalpine fir and lodgepole pine 18.0 inches and larger; and retention of all dwarf mistletoe–infected Douglas-fir larger than 18.0 inches. Higher residual stand densities lead to more inter-tree competition and stress and result in lower rates of individual tree growth. Therefore, fewer residual trees in the medium size class would grow into the large size class under Alternative E compared to Alternatives B/C/F and D. Lodgepole pine and subalpine fir are shorter lived than ponderosa pine and Douglas-fir and less likely to grow to be large. Trees that are moderately to severely infected with dwarf mistletoe will have slower overall growth rates (USDA Forest Service 2010c); are competing with healthier trees in the stand for limited resources; increase cross infection rates of adjacent trees; and lead to slower growth and fewer large trees. (Refer to section 0 regarding species composition and dwarf mistletoe infection rates.) Developing large tree canopy cover would have no indirect effects on adjacent stands.

Trees per Acre by Species

The desired species composition in the project area by stratum is displayed in Table 3-6. As an indicator of species composition, average percent of medium and large size class trees per acre for each stratum was used. Stratum E was not included in the analysis because large size class trees rarely develop in PVG 10. Relative percentages only include ponderosa pine, Douglas-fir, lodgepole pine, and subalpine fir because these are the most common tree species in the stands and are subject to cutting in the treatments. Engelmann spruce is relatively rare in the project area and primarily occurs in riparian zones where no tree cutting is proposed. Aspen rarely grows to medium size class and never achieves large size class in the project area. Because of the exclusion of Engelmann spruce and aspen, the desired ranges in Table 3-6 for ponderosa and Douglas-fir were increased somewhat for Stratum B and the values for lodgepole pine, ponderosa pine, Douglas-fir, and subalpine were increased in Stratum D. These desired conditions will apply to the assessment of both the large and medium size class trees. Species composition in the mixed1 fire regime, outside of plantations of the large size class trees is displayed in Table 3-20 and the medium size class trees in Table 3-21. Italic indicates values below the desired ranges and Bold letters denotes values above the desired ranges in both tables, with allowance for 1 percentage point.

Table 3-20. Percent canopy cover of large size class trees for stands in the mixed1 fire regime, outside of plantations

Stratum	Year (condition)	No Action				Alternative B/C/F				Alternative D				Alternative E			
		PP	DF	LP	AF	PP	DF	LP	AF	PP	DF	LP	AF	PP	DF	LP	AF
B	2014 (existing condition)	18	**79**	0	**3.0**	18	**79**	0	**3.0**	18	**79**	0	**3.0**	18	**79**	0	**3.0**
	2014 (post treatment)					20	**79**	0	**1.0**	19	**80**	0	**0.4**	18	**79**	0	**3.0**
	2024	17	**81**	0	**1.9**	18	**80**	0	**0.9**	18	**81**	0	**0.3**	16	**81**	0	**2.9**
	2044	16	**80**	0	**2.5**	18	**79**	0	**1.6**	18	**80**	0	**1.2**	16	**79**	0	**3.4**
C	2014 (existing condition)	14	81	0	**5.2**	14	81	0	**5.2**	14	81	0	**5.2**	14	81	0	**5.2**
	2014 (post treatment)					15	**85**	0	0	15	**85**	0	0	14	81	0	**5.2**
	2024	16	79	0	**5.3**	**17**	**83**	0	0	**17**	**83**	0	0	16	79	0	**5.3**
	2044	15	76	0	**8.6**	**17**	**83**	0	0	**17**	**83**	0	0	15	80	0	**4.9**
D	2014 (existing condition)	9	**66**	4	12	9	**66**	4	12	9	**66**	4	12	9	**66**	4	12
	2014 (post treatment)					10	**69**	4	8	10	**69**	3	8	9	**66**	4	12
	2024	8	**62**	8	14	10	**65**	7	9	10	**65**	7	9	9	**61**	8	14
	2044	9	**57**	10	17	10	**63**	9	12	10	**66**	5	12	9	**60**	10	16

Table 3-21. Percent species composition for medium size class trees, outside of plantations in the mixed1 fire regime

Stratum	Year (condition)	No Action				Alternative B, C, F				Alternative D				Alternative E			
		PP	DF	LP	AF	PP	DF	LP	AF	PP	DF	LP	AF	PP	DF	LP	AF
B	2014 (existing condition)	10	67	**6**	**13**	10	67	**6**	**13**	10	67	**6**	**13**	10	67	**6**	**13**
	2014 post treatment					13	70	**5**	**7**	14	72	**3**	**6**	11	71	**5**	**7**
	2024	9	62	**6**	**13**	13	64	**5**	**7**	13	65	**5**	**6**	11	65	**5**	**8**
	2044	18	54	**8**	**14**	27	52	**7**	**9**	28	54	**6**	**7**	24	55	**6**	**10**
C	2014 (existing condition)	1	81	0	**17**	1	81	0	**17**	1	81	0	**17**	1	81	0	**17**
	2014 post treatment					2	**98**	0	0	2	**98**	0	0	2	**98**	0	0
	2024	0	79	0	**21**	0	**100**	0	0	0	**100**	0	0	0	**100**	0	0
	2044	**20**	59	0	**21**	**18**	**82**	0	0	**18**	**82**	0	0	**18**	**82**	0	0
D	2014 (existing condition)	3	45	28	**24**	3	45	28	**24**	3	45	28	**24**	3	45	28	**24**
	2014 post treatment					4	**55**	24	19	4	**56**	23	16	4	**58**	22	16
	2024	4	41	29	**26**	5	51	24	19	5	**53**	23	17	5	**55**	23	16
	2044	4	37	31	**28**	6	**53**	21	20	6	**54**	20	19	7	**58**	19	16

Alternative A—No Action

Existing condition, large size class—In Stratum B, ponderosa pine is below desired conditions while Douglas-fir and subalpine fir exceed their desired ranges (Table 3-20). Large lodgepole pine is not present in the inventory data in Strata B and C. In Stratum C, ponderosa pine and Douglas-fir are within, or near, the desired ranges while subalpine is above the desired range (Table 3-20). In Stratum D, ponderosa pine is within, Douglas-fir exceeds, lodgepole pine is below, and subalpine fir is within the desired ranges (Table 3-20).

Long-term trend, large size class—Over the long term (2024), large tree size class ponderosa pine would decrease or remain about the same while subalpine fir would increase in all but Stratum B (Table 3-20). Douglas-fir would decrease in strata C and D due to dwarf mistletoe mortality.

Existing condition, medium size class—Ponderosa pine is below the desired ranges in all strata (Table 3-21). Douglas-fir is within the desired ranges for Strata B and D and slightly above in Strata C; lodgepole pine is above the desired range in Stratum B and within the desired range in Strata C and D; and subalpine fir is above the desired range in all three strata (Table 3-21).

Long term trend, medium size class—By 2044, medium size class ponderosa pine would increase to nearly within the desired range in Stratum D and exceed the desired range in Stratum C (Table 3-21). In Stratum C, ponderosa pine increase to 20 and be within the desired range by 2044 (Table 3-21). The increase would be the result of both an increase in the absolute number of TPA of medium size class ponderosa pine and a decrease in the absolute number of TPA of Douglas-fir. A relative increase in subalpine fir would occur in all strata throughout the analysis period.

Though some species of medium and large size class trees are within the desired ranges under the No Action Alternative, the long-term trend would move away from the desired condition as indicated by the increase in relative abundance of subalpine fir and decrease of Douglas-fir.

Alternatives B/C/F

Post-treatment, large size class—Following mechanical treatment in 2014, relative abundance of large size class ponderosa pine and Douglas-fir would increase while subalpine fir and lodgepole pine would decrease in all three strata in the mixed1 fire regime (Table 3-20).

Long term trend, large size class—The long-term trends show minor changes in relative abundance of large trees. Of particular note is the slight increase in ponderosa pine that would occur in Stratum C, though this would be offset by a decrease in Stratum B (Table 3-20). Douglas-fir would continue to exceed the desired range in all three strata. Subalpine fir would decline following treatment but would increase in the long term in Strata B and D (Table 3-20).

Post-treatment, medium size class—Medium size class ponderosa pine and Douglas-fir would increase in all strata while lodgepole pine and subalpine fir would decrease from treatment (Table 3-21).

Long term trend, medium size class—The relative species composition of medium size class ponderosa pine would increase to within or above the desired ranges (Table 3-21). Douglas-fir would remain within or slightly above the desired ranges in all strata; lodgepole pine and subalpine are currently above desired ranges in Stratum B and would begin to increase by 2044 (Table 3-21). In Stratum C, lodgepole pine is not present in the inventory data and all subalpine fir in the medium and large size classes would be removed during treatment (Table 3-21).

Alternative D

Post-treatment, large size class—The relative abundance of large size class trees following treatment under Alternative D would essentially be the same as Alternatives B/C/F. The relative abundance of ponderosa pine and Douglas-fir would increase following the treatment while lodgepole pine and subalpine fir would decrease (Table 3-20).

Long term trend, large size class—By 2044, relative species composition under Alternative D would be very similar to that of Alternatives B/C/F but with less lodgepole pine and more Douglas-fir in Stratum D (Table 3-20). This change would occur because the additional stands under Alternative D have relatively high stocking of lodgepole pine, which would be prioritized for cutting as part of the mechanical treatment.

Post-treatment, medium size class—The overall post-treatment species composition under Alternative D would be similar to Alternative B—ponderosa pine and Douglas-fir would be the same or slightly higher than under Alternatives B/C/F, and lodgepole pine and subalpine fir would be the same or slightly lower than under Alternatives B/C/F (Table 3-21). This would be the result of treating 5 more stands on 114 acres under Alternative D with the treatment objectives of reducing lodgepole pine and subalpine fir while promoting ponderosa pine and Douglas-fir in these strata.

Long term trend, medium size class—By 2044, the relative abundance of medium size class ponderosa pine and Douglas-fir under Alternative D would be the same or slightly higher than under Alternatives B/C/F (Table 3-21). Slightly more Douglas-fir and slightly less lodgepole pine and subalpine fir would be present in Strata B and D compared to Alternatives B/C/F (Table 3-21). Ponderosa pine would increase to within or above desired ranges. Douglas-fir would decrease in all strata from 2024 to 2044 but would remain within or above desired ranges. Where present in the stata following the treatment, lodgepole pine and subalpine fir would begin to increase in relative abundance by 2044 (Table 3-21).

Alternative E

Post-treatment, large size class—Relative large tree species composition would not change following treatment under Alternative E (Table 3-20) because of the 18.0-inch dbh limit.

Long term trend, large size class—In Stratum B, large size class ponderosa pine would remain below the desired range and would decrease by 2044 (Table 3-20). The only measurable change in relative abundance of large Douglas-fir would be in Stratum D where it would decline from 66% in 2014 to 60% in 2044 (Table 3-20). This decline would be caused by dwarf mistletoe mortality of large Douglas-fir and a relative increase in large lodgepole pine and subalpine fir. Subalpine fir would remain above the desired ranges in Strata B and C and within the desired range in Stratum D (Table 3-20).

Post-treatment, medium size class—As with the other action alternatives, the relative percentage of ponderosa pine and Douglas-fir would increase in all three strata following treatment while lodgepole pine and subalpine fir would decrease, reflecting the objectives of the proposed mechanical treatments (Table 3-21).

Long term, medium size class—The relative abundance of medium size class ponderosa pine would continue to increase in all three strata while Douglas-fir would decrease in Strata B and C and remain relatively constant in Stratum D (Table 3-21). Subalpine fir would continue to increase in Stratum B while it would remain the same in Stratum D (Table 3-21).

Summary

Due to the complexity of the species composition in the mixed1 fire regime and fluctuations over time, drawing definite conclusions of effects is difficult; though some trends are apparent.

Under Alternative A, subalpine fir is above the desired ranges in two of the three strata for large size class trees and all strata for medium size class trees. In general, over time, subalpine would increase in both size classes in all strata. In strata with existing lodgepole pine, its relative abundance would also increase over the long term. The relative abundance of medium size class Douglas-fir would decrease under the Alternative A in all strata. The relative abundance of ponderosa pine would increase in the medium size class but would remain close to the existing condition through 2044.

All of the action alternatives would reverse the long-term trend of decreasing relative abundance of Douglas-fir and increasing lodgepole pine. Alternatives B/C/F and D would result in a relative species composition closer to the desired ranges than the other action alternatives due to greater reductions of medium and large size class subalpine fir. By 2044, the proportion of large size class ponderosa pine would be slightly greater under Alternatives B/C/F and D than under Alternative A (Table 3-20). Over the long term, Alternative D would result in more stands closer to the desired conditions than Alternative B/C/F because it treats more acres.

The relative abundance of large size class Douglas-fir would exceed the desired ranges in the majority of the years for all strata under Alternatives B/C/F and D (Table 3-20). However, this would be less of a concern than subalpine fir exceeding its desired ranges in Strata B and C under Alternative E. The absolute numbers of large size class ponderosa pine and Douglas-fir trees are below desired levels throughout the entire project area whereas subalpine fir is not. Ponderosa pine and Douglas-fir provide more valuable wildlife habitat (including snags) for Family 1 and Family 2 species than subalpine fir. The greater numbers of large size class subalpine fir in Strata B and C under Alternative E is a long-term concern because these trees would provide a prolific seed source that would lead to additional subalpine fir regeneration, which over time, would further skew the species composition away from desired conditions.

An indirect effect of changes in the relative species composition to adjacent untreated stands would be a reduction in the natural regeneration of these species. This effect would depend on the presence of seed trees within the adjacent untreated stands and the location of the untreated stand relative to the treated stand. The effect would be most pronounced in stands that are of the same fire regime and are downwind and/or downhill from the treated stands. The effect would decrease with distance from the treated area.

Dwarf Mistletoe Infection Rates

The indicators for dwarf mistletoe infection are DMR, Average Infected TPA; and average Mortality TPA (Table 3-22). See section 0 for more detail about these measures. Additionally, the total number of Douglas-fir and lodgepole pine TPA are displayed next to the Infected TPA in Table 3-22 along with the calculated Infection Rate (Infected TPA/Total TPA) which is shown in parentheses. Stratum E was included in this analysis.

Table 3-22. Average dwarf mistletoe infection rates for Douglas-fir and lodgepole pine for all stands outside of plantations in the mixed1 fire regime

Year	No Action	Alt. B/C/F	Alt. D	Alt. E
Average DMR				
2014	1.8	1.8	1.8	1.8
2024	2.0	1.6	1.6	1.7
2044	2.1	1.6	1.6	2.0
Average Infected Trees Per Acre /Total Trees Per Acre (Infection Rate)				
2014	113 / 506 (21%)	113 / 506 (21%)	113 / 506 (21%)	113 / 506 (21%)
2024	150 / 492 (31%)	104 / 372 (28%)	78 / 332 (23%)	104 / 376 (28%)
2044	176 / 467 (37%)	121 / 361 (34%)	100 / 345 (29%)	117 / 327 (36%)
Average Mortality Trees Per Acre				
2014	7.9	7.9	7.9	7.9
2024	9.7	6.4	4.5	6.4
2044	11.9	6.5	4.9	6.6

No Action Alternative

The existing average DMR index of Douglas-fir and lodgepole pine in stands outside of plantations in the mixed1 fire regime is 1.8 (Table 3-22). There are, on average, 113 infected trees per acre out of a total of 506 (21% infection rate) (Table 3-22). On average 7.9 TPA currently die each year from dwarf mistletoe infection.

By 2024, all measures of dwarf mistletoe infection rates on Douglas-fir and lodgepole pine would increase (Table 3-22). The average Infected TPA would increase to 150 while the total TPA would decrease to 492 for an average infection rate of 31% of the trees (Table 3-22). By 2024, the DMR would increase to 2.0, and the average number of trees that would die each year would increase to 9.7 (Table 3-22).

By 2044, the DMR would increases to 2.1 while the number of Infected TPA would increase to 176 out of a total of 467 TPA (37% infection rate) and the number of trees/acre that would die each year would increase to 11.9 (Table 3-22).

One indirect effect of the increase in tree mortality would be an increase in surface fuels, leading to a higher risk of severe wildfire. A second indirect effect of the increasing number of infected trees would be an increased risk of DFB because dwarf mistletoe reduces individual tree vigor and resistance to DFB attack.

Alternatives B/C/F

Under Alternatives B/C/F, the DMR would decrease to 1.6, Infected TPA would decrease to 104 out of a total of 372 TPA (28% infection rate), and the average Mortality TPA would decrease to 6.4 by 2024 (Table 3-22). These changes would be a direct effect of prioritizing dwarf mistletoe–infected trees for removal during the mechanical treatments, which would result in a 31% decrease in the number of infected trees by 2024 compared to Alternative A (Table 3-22).

By 2044, the DMR would stay the same as in 2024, but the number of Infected TPA would increase to 121 out of 361 total TPA (34% infection rate) and the number of Mortality TPA would increase to 6.5 per year (Table 3-22). While Alternative A would result in a 56% increase from the current condition in Infected TPA by 2044, Alternatives B/C/F would result in a 7% increase over the same timeframe (Table 3-22).

Alternative D

The DMR for Alternative D would be the same as for Alternatives B/C/F in the short and long term (Table 3-22). However, the number of infected TPA would decrease to 78 out of a total of 332 TPA (23% infection rate) and the number of Mortality TPA would decrease to 4.5 by 2024 (Table 3-22). By 2044, the average would increase to 100 Infected TPA (29% infection rate) with a Mortality TPA of 4.9. Over the long term, Alternative D would result in a 12% reduction from the current condition in Infected TPA compared with an increase of 56% under Alternative A (Table 3-22).

Alternative E

Under Alternative E, the DMR would decrease to 1.7 by 2024, which would be slightly higher than the other action alternatives (Table 3-22). The number of Infected TPA would by 104 out of 376 (28% infection rate). The mortality TPA in 2024 would be 6.4 while the Infected TPA and Mortality TPA under Alternative E would be the same as Alternatives B/C/F (Table 3-22).

By 2044, the DMR under Alternative E would increase to 2.0, which would be higher than the other action alternatives (Table 3-22). The DMR of Alternative E would be 5% lower than the DMR of Alternative A while Alternatives B/C/F and D would be 24% lower than Alternative A (Table 3-22). The number of Infected TPA would increase to 117 out of 327 TPA (36% infection rate) (Table 3-22). While this value would be in between Alternatives B/C/F and D, the infection rate would be highest of the action alternatives because the DMR indicates that the residual trees would have higher average Hawksworth ratings than the other action alternatives as a result of the 18.0-inch dbh limit. Larger trees tend to be older with higher levels of infection, which would contribute to greater infection rates over time. The Mortality TPA would increase to 6.6, higher than the other action alternatives. Alternative E would result in a 4% increase from the current condition of Infected TPA compared with an increase of 56% under Alternative A (Table 3-22).

Summary

Under Alternative A, dwarf mistletoe infection rates and mortality would increase in the short term and long term (Table 3-22), indicating a decline in forest health, vigor, and resilience. Resulting high mortality rates would result in increased surface fuel loads.

All of the action alternatives would lower dwarf mistletoe infection rates and mortality. In the short term and long term, Alternatives B/C/F and D would result in the lowest DMR, but Alternative D would have fewer Infected TPA and the lowest infection rate and mortality of the action alternatives (Table 3-22).

By 2044, Alternative E would have a higher DMR and lower Infected TPA with a higher number of Morality TPA compared to Alternatives B/C/D/F (Table 3-22). Even though there would be fewer Infected TPA, the infection rate would be the highest of all the action alternatives. The DMR would be higher than the other action alternatives because the average Hawksworth rating would be higher. However, trees with higher DMR scores are more likely to die than trees with lower scores (as indicated by higher mortality rates under Alternative E).

Over the long term, all of the action alternatives would lower dwarf mistletoe infection rates more than Alternative A (Table 3-22). Alternative D would result in the lowest infection rates, followed by Alternatives B/C/F. Alternative E would result in the highest rates of infection of the action alternatives. All of the action alternatives would begin to show an increase in the number of Infected TPA and Mortality TPA from 2024 to 2044 (Table 3-22). As with Alternative A, the remaining infected trees in the overstory would continue to infect understory trees. However, the rate of infection would be highest for Alternative E.

Alternative D would result in the lowest dwarf mistletoe infection rates in the short and long term and would have the lowest rate of increase in Infected TPA and Mortality TPA of all of the alternatives. Indirectly, this is an indicator of greater overall stand health, vigor and resilience than the other alternatives.

An indirect effect of reducing dwarf mistletoe–infected trees would be a reduction of spread of dwarf mistletoe to adjacent stands. This effect would be most pronounced in stands that are downwind and/or downhill from treated stands and in stands that have little-to-no existing trees with dwarf mistletoe infection. This indirect effect would be greatest under Alternative D because more stands would be treated and more dwarf mistletoe–infected trees would be removed. This indirect effect would decrease over time.

Bark Beetle Risk Rating

Bark beetle hazard scores calculated in FVS were used as an indicator of forest health, vigor, and resistance to disturbance. The scores were converted to a bark beetle hazard rating based on the following ranges:

- ≤1.2 Low
- 1.2–1.99 Low-Moderate
- 2.0–2.99 Moderate
- 3.0–3.99 High
- ≥4.0 Very High

The two bark beetle hazard ratings used in this analysis are DFB and MPB-LP. Table 3-23 displays the total number of stands with moderate-to-high bark beetle hazard ratings (scores ≥2.0) for the two beetles of concern in the nonlethal fire regime, outside of plantations. Stratum E was included in the analysis.

Table 3-23. Number of stands with moderate-to-high bark beetle hazard ratings for Douglas-fir beetle and mountain pine beetle on lodgepole pine in the mixed1 fire regime, outside of plantations

Year	ALT A	ALTS B/C/F	ALT D	ALT E
Douglas-fir Beetle				
2014	25	25	25	25
2024	23	18	17	22
2044	24	18	19	22
Mountain Pine Beetle—Lodgepole Pine				
2014	13	13	13	13
2024	13	3	0	4
2044	15	4	1	4

Note: Total number of stands is 70

No Action

Currently, 25 (out of 70) stands have moderate-to-high DFB hazard ratings and 13 stands have moderate-to-high MPB-LP hazard ratings (Table 3-23).

Alternatives B/C/F

Under Alternatives B/C/F, the number of stands with moderate-to-high hazard scores for DFB would decrease from 25 to 18 and those of MPB-LP would decrease from 13 to 3 in 2024 (Table 3-23). From 2024 to 2044, the number of stands with moderate-to-high hazard ratings for DFB would not change while those of MPB-LP would increase by 1 stand (Table 3-23).

Alternative D

Under Alternative D, the number of stands with moderate-to-high hazard scores for DFB would decrease to 17 and to 0 for MPB-LP by 2024 (Table 3-23). The number of moderate-to-high hazard stands would be lower under Alternative D than under Alternatives B/C/F in 2024 (Table 3-23). In 2044, moderate-to-high DFB stands would increase to 19, one stand higher than under Alternatives B/C/F while moderate-to-high hazard MPB-LP stands would increase to 1 (Table 3-23).

Alternative E

Under Alternative E, the number of stands with moderate-to-high bark beetle hazard scores for DFB and MPB-LP would decrease by 2024 following the mechanical treatment but not as much as the other action alternatives (Table 3-23). From 2024 to 2044, the number of stands with moderate-to-high DFB and MPB-LP hazard ratings would not change. Over the long term, Alternative E would have more stands with moderate-to-high hazard for DFB then all other action alternatives (Table 3-23). For MPB-LP, Alternative E would result in same number of stands as Alternatives B/C/F and would have more stands with moderate-to-high ratings than Alternative D (Table 3-23).

Summary

For the stands outside of plantations in the mixed1 fire regime, all of the action alternatives would result in fewer stands with moderate-to-high DFB and MPB-LP hazard ratings following mechanical treatments than under Alternative A (Table 3-23).

In the short term, Alternative D would result in the fewest stands with moderate-to-high hazard ratings for both beetle species followed by Alternatives B/C/F, and Alternative E would have most stands with moderate-to-high beetle hazard ratings of all the action alternatives in 2024 (Table 3-23).

In the long term, Alternatives B/C/F would result in one fewer stand with moderate-to-high hazard rating for DFB than Alternative D. This one stand, which is mechanically treated under Alternative D but not under Alternatives B/C/F, is classified as PVG 3 and has very high stocking of subalpine fir. Under Alternative D, the DFB hazard score for this stand would increase from 1.5 in 2024 to 2.0 in 2044 as an unintended consequence of treatment. The treatment would shift the species composition to predominately Douglas-fir and reduce stand density, which would lead to increased growth of the residual trees and result in more trees over 9.0 inches dbh by 2044 than in the other alternatives. The DFB hazard score would increase when the number of Douglas-fir trees over 9.0 inches increase, which caused the rating to change into the moderate category for Alternative D.

In the long term, Alternative D would also result in the fewest number of stands with moderate-to-high hazard ratings while Alternatives B/C/F and Alternative E would have the same number of stands with moderate-to-high hazard ratings for MPB-LP.

There would likely be a slight indirect effect of reducing bark beetle hazards in treated stands to adjacent untreated stands. However, this indirect effect would depend on the existing condition and risk in the untreated stands. The reduced bark beetle hazard in treated stands throughout the project area would have the effect of reducing overall hazard to a landscape-scale outbreak.

Basal Area

Average stand BA is used as an indicator of stand health and resilience to disturbance and as a measure of achievement of objectivies by the mechanical treatments. Table 3-24 displays the average stand BA for all stands in the mixed1 fire regime, outside of plantations by stratum. Desired BA ranges by stratum are shown in Table 3-6.

Table 3-24. Average stand basal area for all stands in the mixed1 fire regime, outside of plantations

STRATUM	Year	No Action	Alt B/C/F	ALT D	ALT E
B	2014 (Existing Condition)	113	113	113	113
	2014 (Post Treatment)	113	88	78	99
	2024	121	96	86	107
	2044	136	107	97	116
C	2014 (Existing Condition)	103	103	103	103
	2014 (Post Treatment)	103	75	75	96
	2024	108	83	83	102
	2044	116	88	88	103
D	2014 (Existing Condition)	132	132	132	132
	2014 (Post Treatment)	132	89	85	92
	2024	142	100	96	102
	2044	157	100	97	101
E	2014 (Existing Condition)	68	68	68	68
	2014 (Post Treatment)	68	68	42	68
	2024	86	86	57	86
	2044	113	113	97	113

No Action

In the No Action alternative the average stand BA for all of the strata is above the desired post-treatment averages. Average stand densities increase throughout the planning period.

Alternatives B/D/F

The post-treatment basal areas are within the desired range for stratum C and slightly above the desired ranges for strata B and D. No stands in Stratum E are treated in this alternative. By 2044 average basal areas increase to above the desired ranges in all strata but are much lower than in the No Action alternative.

Alternative D

In Alternative D the post-treatment and long term average basal areas are the same or lower than those of Alternatives B/D/F.

Alternative E

Alternative E would result in higher post-treatment basal areas compared with the other action alternatives in all strata except for E because there are no stands treated in this stratum. The post-treatment basal areas are above the desired range in all strata except for E. By 2044 Alternative E would have lower average basal areas than the No Action alternative but higher than all other alternatives.

Summary

All of the action alternatives would result in lower stand densities but Alternative D would result in the most stands remaining within the desired stand densities for the longest time. The direct effect would be increased resilience to natural disturbances such as bark beetle outbreaks and wildfire as has been shown by other indicators in this report.

Mechanical Treatments in the Mixed1 Fire Regime within Plantations

Basal Area and/or Trees per Acre

As described above, a combination of BA and TPA are used to measure stand density based on the average size of the trees in the stand as measured by QMD. The desired stand densities by strata following treatment are listed in Table 3-6. The average QMD and BA includes all species while the average TPA only includes ponderosa pine, Douglas-fir, lodgepole, and subalpine fir. Aspen is excluded because it can dramatically affect TPA due to the high density of small aspen trees in clones. Engelmann spruce is rare in most stands and would not be removed with the proposed treatments.

The QMD, BA, and TPA averaged for all stands within the stratum are shown below in Table 3-25. Because no additional plantation stands are proposed for treatment under Alternative D, and because the proposed treatments are the same between Alternatives B/C/F and D, the results from the simulation of Alternatives B/C/F were applied to Alternative D.

Alternative A

The existing TPA for Strata B and C are within the post-treatment desired ranges (Table 3-25). However, these are averages of several stands, some of which have fairly low densities and reduce the overall average. The proposed treatment in plantation stands with relatively low densities is to remove undesirable species and dwarf mistletoe–infected trees. By 2044, the projected QMD under Alternative A would be 5.2 inches with 490 TPA and a basal area of 82 for Stratum B (Table 3-25). By 2044, the QMD for Stratum C would be the same as the current condition at 5.9 inches, but the average BA would increase to 146 and TPA to 386 (Table 3-25). In Stratum D, the existing QMD is 2.8 with 1,005 TPA, which indicates very dense stands of small trees. By 2044, the TPA in Stratum D would decrease to 856 with an average BA of 126 and QMD of 4.1 (Table 3-25).

Strata B and C would continue to increase in density in the short and long term with the establishment of natural regeneration. In Stratum D, many of the stands are at or near densities that produce high levels of inter-tree competition and, therefore, the average number of trees per acre would decrease from density-related mortality.

Alternatives B/C/D/F

Following mechanical treatments, the QMD would increase in all three strata, indicating the treatment would remove smaller trees and leave larger trees.

Following treatment, the TPA would be reduced to 164 in Stratum B, 93 in Stratum C, and 274 in Stratum D, all of which would be within or slightly below the desired post-treatment ranges (Table 3-25). Being slightly below the target density for PTA is not a concern, especially since TPA is a poor measure of density. The number of TPA would increase in all strata in 2024 and 2044 due to the regeneration programed in the FVS simulations for years 2024 and 2034 (Table 3-25).

Table 3-25. Average quadratic mean diameter (QMD) and basal area (BA) for stands within plantations in the mixed1 fire regime by Stratum

Stratum	Year	No Action	Alt. B/C/F	Alt. D	Alt. E
B	**AVERAGE QMD**				
	2014 (Existing Condition)	3.2	3.2	3.2	3.2
	2014 (Post Treatment)		3.5	3.5	3.5
	2024	3.9	3.8	3.8	3.7
	2044	5.2	4.6	4.6	4.5
	AVERAGE BASAL AREA (Desired Range is 55–80)				
	2014 (Existing Condition)	31	31	31	31
	2014 (Post Treatment)		21	21	21
	2024	43	34	34	34
	2044	82	56	56	56
	AVERAGE TPA (ponderosa pine, Douglas-fir, lodgepole pine, subalpine fir) (Desired Range is 140–320)				
	2014 (Existing Condition)	271	271	271	271
	2014 (Post Treatment)		164	164	164
	2024	343	296	296	310
	2044	490	407	407	437
C	**AVERAGE QMD**				
	2014 (Existing Condition)	5.9	5.9	5.9	5.9
	2014 (Post Treatment)		6.5	6.5	6.5
	2024	5.7	5.6	5.6	5.5
	2044	5.9	5.5	5.5	5.3
	AVERAGE BASAL AREA (Desired Range is 6–80)				
	2014 (Existing Condition)	77	77	77	77
	2014 (Post Treatment)		67	67	66
	2024	105	93	93	91
	2044	146	106	106	105
	AVERAGE TPA (ponderosa pine, Douglas-fir, lodgepole pine, subalpine fir) (Desired Range is 110–260)				
	2014 (Existing Condition)	132	132	132	132
	2014 (Post Treatment)		93	93	91
	2024	230	221	221	232
	2044	386	336	336	360

Stratum	Year	No Action	Alt. B/C/F	Alt. D	Alt. E
D	**AVERAGE QMD**				
	2014 (Existing Condition)	2.8	2.8	2.8	2.8
	2014 (Post Treatment)		3.9	3.9	3.9
	2024	3.3	4.0	4.0	4.0
	2044	4.1	4.6	4.6	4.5
	AVERAGE BASAL AREA (Desired Range is 55–85)				
	2014 (Existing Condition)	74	74	74	74
	2014 (Post Treatment)		58	58	58
	2024	98	78	78	78
	2044	126	87	87	87
	AVERAGE TPA (ponderosa pine, Douglas-fir, lodgepole pine, subalpine fir) (Desired Range is 210–380)				
	2014 (Existing Condition)	1,005	1,005	1,005	1,005
	2014 (Post Treatment)		274	274	274
	2024	986	391	391	405
	2044	856	419	419	450

Alternative E

Only a slight difference would occur between Alternative E and the other action alternatives (Table 3-25) because the proposed treatment in all but one of the plantations is noncommercial thinning with a 13.9-inch dbh limit of cut trees. The remaining stand is proposed for commercial thinning where the 18.0-inch dbh limit would have an effect different from Alternatives B/C/F and D. This stand is in Stratum C where the post-treatment BA and TPA would be slightly lower under Alternative E than under the other action alternatives (Table 3-25). Reduced BA and TPA would be a result of thinning more trees in the 10.0 to <18.0 inch dbh size to compensate for not removing trees over 18.0 inches dbh while still achieving the target post-treatment densities.

The FVS modelling resulted in slightly higher TPA in 2044 under Alternative E because of the way regeneration was established in modelling parameters (Table 3-25).

Summary

For plantation stands in the mixed1 fire regime, existing average stand densities are within or above the desired post-treatment densities in each stratum (Table 3-25). By 2044, average stand densities nearly double in terms of basal area or average TPA (Table 3-25). These averages don't consider the wide range of conditions within and between stands. Many of the plantations have undesirable species for the PVG and moderate-to-high levels of dwarf mistletoe.

The proposed mechanical treatments in 2014 in all the action alternatives would reduce stand densities to below or near the lower end of the target post-treatment ranges (Table 3-25). The average QMD would increase following mechanical treatments in all strata, indicating that the treatment would successfully promote larger trees and remove smaller trees (Table 3-25). Furthermore, the stands would remain within the desired ranges for a longer period compared to Alternative A (Table 3-25). The average stand QMD in the short term and long term would be higher under Alternative A than under the three action alternatives due to an anomaly of how natural regeneration was established in the modeling (Table 3-25). Under

the action alternatives, assumed regeneration rates were established based on PVG, cover type, alternative, and proposed treatment. The total number of seedlings per acre established in each cycle ranged from 70 to 190. Under Alternative A, natural regeneration was modeled at a weighted average of about 110 trees per acre. For the stands in the mixed1 fire regime, within plantations, 150 TPA were established under Alternatives B, C, D and F, and 164 TPA under Alternative E (Table 3-25). All of the action alternatives established more TPA than Alternative A, resulting in a lowering of the average QMD over time. The important indicator is that the average QMD increases following the mechanical treatments under all action alternatives.

All action alternatives would equally reduce stand densities and maintain densities at levels that would increase individual tree growth and development of large trees of the desired species for the PVG through the analysis period.

For untreated stands adjacent to treated stands in the mixed1 fire regime, within plantations, there would be no indirect effects as a result of the reduction in treated stand densities. This is because fire behavior and bark beetle risk within the mixed1 fire regime are highly variable, even within the same stand and characterizing any variability of risk in adjacent, untreated stands as an indirect effect of the treatments would be difficult.

Dwarf Mistletoe Infection Rates

Three metrics of dwarf mistletoe infection rates are used as indicators of dwarf mistletoe infection and as an indirect indicator of overall stand health: DMR, Infected TPA, and Infection Rate (Table 3-26). See section 0 for more detail about the measures.

Table 3-26. Dwarf mistletoe infection of Douglas-fir and lodgepole pine for all stands <u>within</u> plantations in the <u>mixed1</u> fire regime

Year	No Action	Alt. B/C/F	Alt. D	Alt. E
Average DMR				
2014	1.1	1.1	1.1	1.1
2024	1.3	0.8	0.8	0.7
2044	1.5	0.8	0.8	0.7
Average Infected TPA / Total DF and lodgepole pine TPA (Infection Rate)				
2014	29 / 294 (10%)	29 / 294 (10%)	29 / 294 (10%)	29 / 294 (10%)
2024	32 / 321 (10%)	35 / 194(18%)	35 / 194(18%)	31 / 204 (15)%
2044	87 / 352 (25%)	78 / 278 (28%)	78 / 278 (28%)	66 / 300 (22)%
Average of Mortality TPA				
2014	1.0	1.0	1.0	1.0
2024	2.0	1.0	1.0	1.0
2044	5.0	2.0	2.0	2.0

<u>Alternative A—No Action</u>

The average DMR is 1.1 with an average of 29 Infected TPA (10% Infection Rate) and the average Mortality TPA is 1.0 per year (Table 3-26). Over the short term, the DMR, Infected TPA, and Mortality TPA would increase while the Infection Rate would remain the same to an increase in total TPA (Table 3-25). Over the long term, the DMR would increase to 1.5

with an average of 87 Infected TPA (Infection Rate of 25%) and the average Mortality TPA would increase to 5.0 (Table 3-25).

Alternatives B/C/D/F

By 2024, the DMR would decrease from 1.1 to 0.8 under Alternatives B/C/F (Table 3-25), primarily from removing understory Douglas-fir and lodgepole pine with moderate-to-severe dwarf mistletoe infection. The average Infected TPA would increase to 35, the Infection rate would increase to 18%, and the Mortality TPA would remain at 1.0 (Table 3-25). By 2044, the DMR would remain constant at 0.8 with an increase in the infection rate to 28% and Mortality TPA to 2.0 per year (Table 3-25). Compared to Alternative A, more Infected TPA would be present and the Infection Rate would increase to 18% in 2024 as a combined effect of more infected TPA and fewer total trees per acre (Table 3-25). This is the result of the upper diameter limits of 12.0 inches for Douglas-fir and 14.0 inches for lodgepole pine in the noncommercial thinning treatments proposed for the plantations under all action alternatives. Treatment would not remove infected trees over the diameter limits, leaving a high number of infected trees in the stands that would result in more trees being infected from 2014 to 2024 (Table 3-25). However, by 2044, the average Infected TPA would increase to 78, which is lower than under Alternative A (Table 3-25).

Dwarf mistletoe indices under Alternative D would be the same as Alternatives B/C/F since no additional plantations are proposed for treatment under Alternative D (Table 3-25).

Alternative E

Dwarf mistletoe measures under Alternative E would be different than Alternatives B/C/F and D because one plantation stand infected with dwarf mistletoe is proposed to be treated with a commercial thin (Table 3-25). This stand, which is in Stratum C (PVG 4), would have no diameter limit for lodgepole pine and a 28-inch diameter limit for Douglas-fir. Furthermore, only part of the stand would be treated with a commercial thin; the majority of the stand would be treated with a noncommercial thin similar to all other planted stands in the mixed1 fire regime. However, for the FVS analysis, the entire stand was simulated with a commercial thin and, under Alternative E, this stand would have an 18.0-inch dbh limit for all species, which would result in more trees under 18.0 inches dbh being removed in order to achieve desired stand densities. As a result, more dwarf mistletoe–infected Douglas-fir trees would be removed, and Alternative E would have lower DMR and Infection Rates than all other action alternatives.

Summary

Any of the action alternatives would lower dwarf mistletoe infection rates and mortality more than Alternative A for plantations in the mixed1 fire regime. Alternative E would result in the lowest infection rates. However, the data are represented by only one stand, which would be treated with a commercial thin. As mentioned above, only portions of this stand would be harvested; the majority of the stand would be treated with a noncommercial thin.

Indirect effects reducing dwarf mistletoe hazard in the mixed1 fire regime, within plantations, would be similar to those in the nonlethal fire regime. The spread of dwarf mistletoe to adjacent stands would be reduced. This effect would be most pronounced in stands that are downwind and/or downhill from treated stands and in stands that have little-

to-no existing trees with dwarf mistletoe infection. This indirect effect would decrease over time.

Variable Spacing

See above for a discussion on the benefits of variable spacing to achieve the desired tree distribution and aggregation.

Burn Only Treatments in the Mixed1 Fire Regime Stands

Trees per Acre in the Small Size Class

As described in section 0, the change in average small size class (5.0–11.9 inches dbh) TPA by species was used to analysis and compare the effects on vegetation of the understory burn.

The same stands are proposed for Burn Only treatment under all action alternatives, therefore, Alternative B is used to represent all action alternatives. A comparison of the relative amounts of small size class trees by species in 2034 between Alternative A and Alternative B is used to measure the effects of the understory burn in the Burn Only treatments. Table 3-27 shows the comparison of average TPA for all stands proposed for Burn Only treatments in the mixed1 fire regime. The percent reduction (percent change) of each species was calculated to measure change. Aspen was not included because FVS is programmed to sprout aspen following any disturbance, which would mask the effects of the treatments on the other species. Engelmann spruce was not included because it is a minor species in the mixed1 fire regime, primarily occurring in riparian areas that are not proposed for understory burning.

Table 3-27. Comparison of average trees per acre (TPA) of small size class trees for all stands proposed for Burn Only Treatment in the mixed1 fire regime

		Average TPA Small Size Class			
	Year	PP	DF	LP	AF
Existing Condition	2014	1.8	17.8	27.7	24.6
No Action	2034	1.4	13.8	22.5	27.4
Alternative B	2034	0.9	9.6	12.1	14.8
Percent Difference between No Action and Alt B. (Mortality Rate)		–36%	–30%	–21%	–45%

No Action Alternative

The existing condition of mixed1 stands proposed for Burn Only treatment shows that subalpine fir and lodgepole pine account for the majority of the small trees (Table 3-27). Between 2014 and 2034, all species except subalpine fir would decrease, indicating a long-term trend away from desired condition (Table 3-27). The decline in ponderosa pine, Douglas-fir, and lodgepole pine would likely occur due to the effects of dwarf mistletoe, bark beetles, and density-related mortality.

Alternatives B, C, D, E and F

The understory burn in 2024 would result in an overall reduction of the four species compared to Alternative A. The largest reductions would be in ponderosa pine (36%) and subalpine fir (45%) (Table 3-27). Subalpine fir is the least adapted to low intensity fire and

thus shows the highest mortality rate. Ponderosa pine however is considered to be most adapted to low intensity fire and the high mortality rate is likely a function of the low numbers of TPA. If one tree dies as a result of the burn it has a much greater impact on the percentage difference between the alternatives.

Summary

The understory burn proposed for all the action alternatives in the Burn Only stands in the mixed1 fire regime would begin to transition the stands to the desired species composition and densities over the long term. The reduction in TPA would result in effects similar to a thinning from below, which would reduce overall stand densities.

The indirect effects of the understory burn would include reduced surface and ladder fuels and recycling of nutrients. Aspen would respond to the burning and subsequent reduction in conifer densities by increased root sprouting promoting long-term development and health of aspen clones.

Indicators for Needs 1–3

While addressing needs 1 through 3, old forest and wildlife source habitat components characteristic of the fire regime should be maintained where present; where not present, restoration should be promoted.

The desired conditions for old forest habitats are described in Appendix E of the Forest Plan (USDA Forest Service 2010a). The old forest habitat characteristics specific to the project area are listed in Table 3-28. The following stand attributes were extracted or calculated from FVS output data for all the stands proposed for mechanical vegetation treatment and burn only treatments in all alternatives:

- Canopy cover (CC) of all large size class trees (percent)
- Canopy cover of all trees ≥0.1 inches dbh (percent) (also referred to as total canopy cover)
- Percent of all large size class trees comprised of ponderosa pine
- Percent of all large size class trees comprised of Douglas-fir
- Sum of percent large size class ponderosa pine and percent large size class Douglas-fir
- Medium size snags at least 30 feet tall (snags per acre)
- Large size snags at least 30 feet (snags per acre)
- Coarse woody debris (CWD) ≥3.0 inches in diameter (tons per acre)
- Percent of CWD that is 12.0 inches in diameter and larger (percent)

The last two items are derived from the Fire and Fuels Extension (FFE) for FVS. Fuels data were not included in the stand exam data collection for the project area, therefore, CWD was estimated using FFE based on the fuel model. The fuel model is determined in FFE based on the cover type, canopy cover, and other site characteristics. The old forest habitat desired condition for large CWD is based on a minimum diameter of 15 inches. However, in FFE, fuel size classes are preset with the largest break at 12.0 inches. The amount of CWD 12.0 inches and greater was used as a surrogate for the 15.0 inch CWD.

A total of 322 stands are proposed for vegetation treatments. The large size class canopy cover and species composition, total canopy cover, CWD, and snags were assessed to see if they met the desired conditions of old forest habitats by PVG and fire regime. Table 3-28 summarizes the number of stands by alternative that meet each old forest habitat attribute for the stands proposed for mechanical treatment.

Table 3-29 does the same for the stands proposed for Burn Only treatment. The same stands are proposed for Burn Only treatment under all action alternatives.

Table 3-30 lists the other attributes of stands that meet the large tree CC minimums.

Table 3-28. Summary of stands meeting Old Forest Habitat (OFH) attributes for all mechanically treated stands by alternative and year (total 206 stands)

Year (condition)	30% Large Tree CC	CC of All Trees	Large Tree Species Composition	Snags 10.0-19.9 inches	Snags 20.0+ inches	CWD 3+ inches	PCT CWD 12+ inches	All OFH Attributes
Alternative A								
2014 (existing condition)	3	106	79	109	23	50	0	0
2024	4	119	73	133	34	58	1	0
2044	7	148	71	164	65	92	3	0
Alternatives B/C/F								
2014 (existing condition)	3	106	79	109	23	50	0	0
2014 (post treatment)	0	35	83	109	23	50	0	0
2024	2	55	80	173	37	7	1	0
2044	5	79	83	92	42	35	9	0
Alternative D								
2014 (existing condition)	3	106	79	109	23	50	0	0
2014 (post treatment)	0	33	73	109	23	50	0	0
2024	2	54	80	170	37	0	1	0
2044	5	78	84	90	42	29	9	0
Alternative E								
2014 (existing condition)	3	106	79	109	23	50	0	0
2014 (post treatment)	3	35	79	109	23	50	0	0
2024	5	58	71	172	42	7	1	0
2044	6	82	76	101	50	35	9	0

Table 3-29. Summary of stands meeting Old Forest Habitat (OFH) attributes for all stands proposed for Burn Only treatment (total 116 stands). Note that the number stands proposed for Burn Only treatment are the same in all action alternatives

Year (condition)	30% Large Tree CC	CC of All Trees	Large Tree Species Composition	Snags 10.0-19.9 inches	Snags 20.0+ inches	CWD 3+ inches	PCT CWD 12+ inches	All OFH Attributes
Alternative A								
2014 (existing condition)	1	38	49	58	14	28	0	0
2024	0	46	49	73	19	29	0	0
2044	1	79	52	90	35	45	4	0
Alternatives B, C, D, F, and E								
2014 (existing condition)	1	38	49	58	14	28	0	0
2024	0	46	49	106	32	7	2	0
2044	1	65	55	85	34	46	5	0

Table 3-30. Stands that have at least 30% large tree canopy cover in 2014 and 2044 in the No Action Alternative

Year	Treatment	Stratum	Stand ID	Large Tree CC	CC of All Trees	Large Tree Species Composition	Snags 10.0-19.9 inches	Snags 20.0+ inches
2014	Burn Only	D	0035020520	30.1	Yes	X	X	
	Mechanical and Burn	A	0035040526	30.3	Yes		X	X
			0035040542	32.8	Yes		X	X
		C	0035020541	30.8		X	X	X
2044	Burn Only	B	0035020539	30.8	Yes	X	X	X
	Mechanical and Burn	A	0035040515	31.2	Yes		X	X
			0035040526	34.4	Yes		X	X
			0035040542	32.0	Yes		X	X
			0035040704	30.8	Yes			X
		B	0035020539B	30.8	Yes	X	X	X
		C	0035020541	35.6	Yes	X	X	X
		D	0035020518	32.7		X	X	X

Alternative A—No Action

No stands proposed for treatment in the project area have all of the old forest habitat attributes nor would any attain all attributes the short or the long term (Table 3-28 and Table 3-29).

Stands Proposed for Mechanical Treatment—The number of stands that meet each individual attribute would increase from 2024 to 2044 except for large size class species composition which would decrease (Table 3-28). This decrease would be due to the relative

increase in large Douglas-fir in Stratum A compared to large ponderosa pine and the relative increase in lodgepole pine and subalpine fir in Strata B, C and D. Therefore, even though the number of large size class trees would increase in the long term, it would not be of the desired species for the PVG.

Stands Proposed for Burn Only Treatment—Of the stands proposed for Burn Only treatment in all alternatives, one stand currently meets the condition for Large Tree Canopy Cover, 38 for CC of All Trees and 49 stands meet the condition for Species Composition (

Table 3-29). Under Alternative A no stands would have 30% CC of large trees by 2024 (

Table 3-29); one stand would by 2044 (but that would be a different stand, see

Table 3-30), while the number of stands meeting all other old forest habitat attributes would increase. With no action, the number of stands meeting the condition for Large Tree Species Composition would be 52 in 2044 (

Table 3-29).

Large Tree CC Stands—Three stands proposed for mechanical treatment and one stand proposed for "Burn Only" treatment have at least 30% large tree canopy cover.

Table 3-29 lists the other attributes of stands that meet the large tree CC minimums in 2014 and 2044 for Alternative A. CWD is not included but it would follow similar patterns as snags.

Of the four stands that meet the 30% large tree canopy cover in 2014, two (both in Stratum A) do not meet the species composition because ponderosa pine does not comprise at least 60% of the large trees. By 2044, eight stands would have 30% large tree canopy cover, one stand proposed for Burn Only and seven stands proposed for mechanical treatment. Stand 35020520 would not have 30% large tree CC by 2044 due to mortality of large Douglas-fir between 2024 and 2034. None of the four stands in Stratum A would have the desired large tree species composition by 2044.

Alternatives B/C/F

Under Alternatives B/C/F, as with all other alternatives, no stands would achieve all the old forest habitat characteristics in the short term or long term.

Mechanically Treated Stands—The number of stands that have at least 30% CC of large size class trees would decrease following treatment from removing large trees that are either an undesirable species for the PVG or have moderate-to-severe dwarf mistletoe infections. The number of stands that meet the large tree canopy cover would increase to 5 by 2044, two less than under Alternative A. The number of stands meeting the total CC attributes would decrease following treatment but would recover in the long term. The number of stands with the desired large tree species composition would increase to 83 following treatment, with a decrease in the short term and increase back to 83 in the long term.

The number of stands that would meet the desired conditions for medium size snags would increase from 109 to 173 by 2024, and then decrease to 92 by 2044. By 2024, the number of stands meeting desired conditions for medium size snags would be higher under Alternatives B, C, and F than under Alternative A, likely as a result of a few medium size trees that would be killed by the understory burn in 2024. The decline in 2044 is likely from reducing the total

number of medium size trees following all the treatments, leaving fewer that would become snags, and many of the medium size snags that were present in 2024 would have fallen by 2044.

The number of stands meeting the condition for large snags under Alternatives B/C/F would increase in 2024 and 2044. Alternatives B/C/F would result in more stands meeting the desired condition in 2024, but in 2044, Alternatives B/C/F would have fewer stands meeting the desired condition for large snags than Alternative A. This is likely the result of the mechanical treatments that would reduce overall stand densities, which would reduce density-related mortality of all trees, including large size class trees in addition to removing the large size class trees Douglas-fir with moderate-to-severe dwarf mistletoe, which likely would have died during the analysis period. The number of stands meeting the desired amounts of CWD would decrease by 2024 under all action alternatives because of the slash treatments following thinning and the understory burn, which would be completed by 2024.

Burn Only Stands—Under the proposed underburn treatments under all action alternatives, the number of stands meeting the 30% large tree canopy cover would be the same in 2024 and 2044 as under Alternative A. However, the number of stands with the desired large tree species composition would increase to 55 by 2044, three more than with no action (

Table 3-29). Fewer stands would meet the total canopy cover condition due to mortality from the understory burn. However, the number of stands meeting the condition for medium size snags would increase to 106 by 2024 as a result of mortality caused by the burn, and then decrease to 85 by 2044 (

Table 3-29). The long-term decrease would be an indirect effect of fire-induced mortality of medium size trees, thus reducing overall stand density and density-related mortality, leading to fewer long-term snags. Furthermore, the medium size snags killed by the fire would likely fall by 2044.

The number of stands meeting the condition for large snags would increase to 32 by 2024 under Alternatives B/C/F compared to 19 under Alternative A. The reason for this increase is not clear: it could be from fire-caused mortality or cumulative stress from multiple agents. Some direct mortality of large trees during burn and some delayed mortality within 2 to 3 years following the burn from root and cambial damage from the heat and/or bark beetle attacks to fire injured trees would be likely. The number of stands meeting the condition for large snags would be 34 over the long term, one less than under Alternative A.

The number of stands meeting the condition for CWD 3 inches and larger would be reduced to 7 under all action alternatives compared with 29 under Alternative A as a direct result of consuming woody debris during the burn. However, as the fire-killed trees and branches fall to the ground, the number of stands meeting this condition would increase to 46 (45 with no action) by 2044. Furthermore, more stands with large CWD would occur under the action alternatives compared to Alternative A.

To summarize the effect of the proposed Burn Only treatment, some short-term trade off in total CC would occur under all action alternatives, but over the long term, more stands would develop old forest habitat attributes, especially for Large Snags and CWD under the action alternatives than under Alternative A.

Stands with at least 30% Large Tree Canopy Cover—Table 3-31 displays the existing condition and long term trend of stands under Alternatives B, C, D and F that have at least 30% large tree canopy cover in 2014 and 2044.

In 2014, 4 stands proposed for mechanical treatment under Alternatives B, C, D and F have at least 30% large tree canopy cover (Table 3-31). By 2044, six stands would have at least 30% canopy cover. One stand proposed for Burn Only treatment in Stratum B (0035020539) would meet all criteria by 2044 except for percent of large CWD (Table 3-31). Two stands in Stratum A (0035041027 and 0035040526) would meet the total canopy cover but not species composition or CWD attributes. And, while stand 0035041027 would meet the snag attribute, stand 0035040526 would not. The other three stands (in Strata B, C and D) would have the desired species composition but not have the desired total canopy cover. Stand 0035020541 in Stratum C would meet all of the old forest attributes except for CC of all trees (Table 3-31).

Alternative D

Mechanically Treated Stands—Under Alternative D, as with all other alternatives, no stands would achieve all the old forest habitat characteristics in the short term or long term. Alternative D would be similar to Alternatives B/C/F with some small differences. Following treatment, Alternative D would have two fewer stands that would meet the total canopy cover compared to Alternatives B/C/F. By 2044, Alternative D would result in one fewer stand meeting the total canopy cover, but one additional stand would meet the large tree species composition (Table 3-28). In the short term and the long term, Alternative D would result the most stands meeting the condition for large tree species composition of all the alternatives.

Burn Only Stands—The results of the Burn Only stands are the same as for all action alternatives and discussed above under Alternatives B/C/F.

Alternative E

Mechanically Treated Stands—Under Alternative E, as with all other alternatives, no stands would achieve all the old forest habitat characteristics in the short term or long term. Alternative E would result in no decrease in the number of stands that meet large tree CC following treatment in 2014 due to the 18.0-inch dbh limit on all tree species. In the long term, the number of mechanically treated stands under Alternative E within the total CC ranges would decrease following treatment, and then increase to 82 by 2044. The number of mechanically treated stands that meet the large tree species composition would decrease to 76 by 2044, which would be higher than Alternative A, but lower than all other action alternatives (Table 3-28).

Similar to the other action alternatives, the amount of medium snags would decrease from 2024 to 2044, and the number of large snags would be higher than the other action alternatives but lower than Alternative A (Table 3-28). This difference would be an indirect effect of not removing dwarf mistletoe–infected trees over 18 inches dbh, which would otherwise be removed in the other action alternatives. FVS predicts that these trees would die over the long term, adding to the number of stands meeting the conditions for snags.

The number of stands meeting the conditions for CWD under Alternative E is the same as under Alternatives B/C/F.

Burn Only Stands—The results of the Burn Only stands are the same as for all action alternatives and discussed above under Alternatives B/C/F.

In the long term, the number of stands with minimum 30% large tree CC would increase to 7, two of which would not have the desired species composition (both in Stratum A) and two stands which would not have the desired total CC (one each in Strata C and D) (Table 3-32).

Table 3-31. Stands the have at least 30% large tree canopy cover in 2014 and 2044 under Alternatives B, C, D, and F

Year	Treatment	Stratum	Stand ID	Large Tree CC	CC of All Trees	Large Tree Species Composition	Snags 10.0-19.9 inches	Snags 20.0+ inches	Coarse Woody Debris ≥3.0 inches	Percent Coarse Woody Debris ≥12 inches
2014	Burn Only	D	0035020520	30.1	X	X	X			
	Mechanical and Burn	A	0035040526	30.3	X		X	X		
			0035040542	32.8	X		X	X		
		C	0035020541	30.8		X	X	X		
2044	Burn Only	B	0035020539	30.8	X	X	X	X	X	
	Mechanical and Burn	A	0035021027	31.5	X					
			0035040526	31.7	X		X	X		
		B	0035020539B	31.4		X		X		
		C	0035020541	32.3		X	X	X	X	X
		D	0035020518	32.0		X		X	X	X

Table 3-32. Old Forest Habitat attributes for stands with at least 30% large tree canopy cover in 2014 and in 2044 under Alternative E

Year	Treatment	Stratum	Stand ID	Large Tree CC	Total CC	Large Tree Spp. Comp.	Snags 10.0-19.9 inches	Snags 20.0 inches+	Coarse Woody Debris ≥3.0 inches	Percent Coarse Woody Debris ≥12 inches
2014	Burn Only	D	0035020520	30.1	X	X	X		X	X
	Mechanical and Burn	A	0035040526	30.3	X		X	X		
			0035040542	32.8	X		X	X	X	X
		C	0035020541	30.8		X	X	X		
2044	Burn Only	B	0035020539	30.3	X	X	X	X		
	Mechanical and Burn	A	0035040526	34.7	X		X	X	X	X
			0035040542	33.0	X			X		
		B	0035020539B	31.4	X	X	X	X	X	
			0035020577	31.2	X	X	X	X		
		C	0035020541	35.7		X	X	X		
		D	0035020518	32.2		X	X	X	X	

Summary

No stands proposed for vegetation treatments meet all old forest habitat attributes. The most limiting old forest habitat attribute is large trees CC followed by percent CWD 12.0 inches and large snags.

Mechanically Treated Stands—Under Alternative A, the total number of stands meeting the condition for large tree CC would increase (Table 3-28). However, the number of stands meeting large tree species composition would decrease. The number of stands that meet the condition for large snags would increase the most for all alternatives. However, when considering all the other indicators, the large numbers of snags would be due to increased mortality caused by stand density, dwarf mistletoe and bark beetles and would be unsustainable due to high fuels loads and increased wildfire hazard.

Following treatment in 2014, Alternatives B/C/F and D would have no stands meeting the condition for large tree CC but the number of stands meeting the condition for large tree species composition would increase for Alternatives B/C/F/D (Table 3-28). Under Alternative E, the number of stands meeting large tree CC and large tree species composition would not change immediately following the treatment because of the 18.0 inch dbh limit.

The number of mechanically treated stands with the desired amounts of CWD would decrease by 2024 under all action alternatives because of slash abatement following treatment and the understory burn, which would be completed by 2024. Recent field reconnaissance in the project area indicate that the stand exam data collected prior to 2007 does not include mortality that has occurred recently. As a result, FVS-FFE likely under estimated the amount of CWD currently in the stands and under-predicted the amount that would remain following fuel treatments. Furthermore, the way that slash (activity fuel) was modelled in FVS likely resulted in over predicting consumption of CWD by the slash abatement treatments in some stands.

Of the mechanically treated stands, no stands under any alternative would meet all attributes for old forest habitat in 2044. Alternative A would result in the most stands achieving 30% large tree CC, one more than Alternative E and two more than Alternatives B/C/F and D (Table 3-28). Alternative D would result in the most stands achieving large tree species composition, one more than Alternatives B/C/F, 8 more than Alternative E, and 13 more than Alternative A (Table 3-28). By 2044, Alternative A would have the most stands within the desired ranges for total CC in the long term (148), followed by Alternatives B/C/F (79). Alternative D would result in one fewer stand meeting the total CC than Alternatives B/C/F, and Alternative E would result in more stands achieving total CC by 2044 than the other action alternatives.

Burn Only Treatment—None of the stands proposed for Burn Only treatment currently meet all OFH attributes. One stand meets the condition for large tree CC, 49 meet the condition for large tree species composition, 58 for medium snags, and 14 for large snags (Table 3-29).

Under Alternative A, no stands meet the condition for large tree CC by 2024 as some large trees are predicted by FVS to die from insect, disease, and/or stand-density related stress. The number of stands with large tree species composition and CWD remain the same while the number of stands meeting most of the remaining attributes increase.

By 2044, the proposed treatments in the Burn Only stands would increase two and decrease three OFH attributes; two would not change (Table 3-29). The number of stands meeting the desired conditions for large tree species composition would be 55, compared with 52 under Alternative A. The number of stands with CWD 3+ and percent CWD >12 would both be higher under the action alternatives while large snags would be slightly lower (one stand) (Table 3-29). The number of stands meeting the conditions for medium snags and total CC would be lower than under Alternative A.

Summary of all Proposed Treatments—Some short-term declines in some of the OFH attributes would occur under all action alternatives, but in the long term, Alternative A would result in the most stands with at least 30% large tree canopy cover (one more than Alternative E) but Alternative D would result in the most stands with the desired species composition (1 more than Alternatives B, C and F) (Table 3-29).

Landscape Patch and Pattern—Synthesis of Indicators

The objective of proposed treatments within the project area would be to move toward vegetative conditions that allow natural process to operate in a manner more characteristic of historical disturbance processes within the nonlethal and mixed1 fire regime patches. In contrast to the extensive early successional conditions created by recent wildfires within historically nonlethal and mixed1 patches outside the project area (Figure 3-13), proposed treatments would develop conditions more resilient to wildfire while maintaining and promoting large tree size class that meet the desired species composition. Treatments would help maintain conditions within and across patches that are more consistent with the historical fire regimes by altering species composition and reducing the density and continuity of surface and ladder fuels.

Within the nonlethal and mixed1 fire regimes, the desired conditions within patches are large tree size class with species composition dominated by ponderosa pine and/or Douglas-fir. Surface and ladder fuels would be at levels and arrangement where wildfire mortality would be within the historical range (see the fire and fuels section).

On acres proposed for mechanical treatment, 1,960 acres are in the large tree size class (**Table** 3-33). Of these, 5.4% meet the desired conditions. In the event of a wildfire, fuel conditions are such that overstory mortality would exceed desired ranges within the nonlethal and mixed1 fire regime patches (see section 3.2, “Fire and Fuels”), which increases the risk that disturbance from fire would create early successional patches similar to those found outside the project area rather than patches containing larger trees.

Table 3-33. Acres of large tree size class with percent change and percent of large tree size class acres that meet the desired conditions in areas proposed for mechanical treatments by alternative for existing condition (2014) and year 2044

Year	No Action	Alt. B/C/F	Alt. D	Alt. E
	Acres of Large Tree Size Class			
2014	1,960	1,850	1,960	1,850
2044	4,660	4,740	5,060	4,930
Percent Change	138%	155%	158%	166%
Percent of Large Tree Size Class Acres that Meet Desired Conditions				
2014	5.4%	5.7%	5.4%	5.7%
2044	8.3%	9.4%	10.6%	8.3%

Alternative A—No Action

Alternative A would have no direct effects on the extent and conditions within the nonlethal and mixed1 fire regime patches. However, in the absence of disturbance, the number of acres in the large tree size class would increase 138% (the lowest of all alternatives) by 2044 (**Table 3-33**). Of these acres, 8.3% would meet the desired conditions. The proportion of acres in large tree size class that meet the desired conditions would be lower under Alternative A than Alternatives B/C/F and D, but similar to Alternative E.

Structural conditions within the patches would be different than historical conditions. Ladder fuels would continue to increase as would fuel continuity in plantations. Regeneration of desired species would continue to decline as fire-intolerant lodgepole pine and later seral species expand. Clumps, groups, and canopy gaps would continue to be less distinct and more homogenous across the patches, which would increase the risk of high overstory mortality in the event of wildfire (section 3.2, “Fire and Fuels”) further exacerbating the issues associated with the deficit of large tree size class. Overall, Alternative A would be the least effective for developing large tree size class of the desired species and within patch arrangement.

Alternative B/C/F

Under Alternatives B/C/F, large tree size class acres would increase 155% by 2044 across the patches (Table 3-33). This increase would be more than under Alternative A but less than under Alternatives D and E. Of these acres, 9.4% would meet the desired conditions—more than Alternatives A and E but less than Alternative D.

Treatments would develop structural conditions more similar to historical. Ladder fuels and the proportion of fire-intolerant species would be reduced. Vertical and horizontal arrangement, including in plantations, would be more diverse and clumps, groups, and canopy gaps would be more distinct, which would increase opportunities for regeneration of desired species due to more and larger canopy gaps as well as a reduction in seed-producing, fire-intolerant tree species. The risk of overstory mortality would be lower than the current condition, which would increase the likelihood of retaining larger trees in the event of a wildfire (see section 3.2, “Fire and Fuels”). Overall, Alternatives B/C/F would be more effective than Alternative A in developing large tree size class of the desired species within patches. Though Alternative E would produce more acres of large tree size class, more of

these large tree size class acres would contain the desired species under Alternatives B/C/F. However, Alternative D would produce greater large tree size class acres of the desired species than Alternatives B/C/F.

Alternative D

By 2044, Alternative D would increase acres of large tree size class by 158% across the patches (Table 3-33). This would be a greater increase than would occur under Alternatives A and B/C/F but would be less than Alternative E. Of these acres, 10.6% would meet the desired conditions, which would be the highest proportion of all alternatives.

Treatments would develop structural conditions more similar to historical. Ladder fuels and the proportion of fire-intolerant species would be reduced. Vertical and horizontal arrangement, including in plantations, would be more diverse and clumps, groups, and canopy gaps would be more distinct, which would increase opportunities for regeneration of desired species due to more and larger canopy gaps as well as a reduction in seed-producing, fire-intolerant tree species. The risk of overstory mortality would be lower than the current condition, which would increase the likelihood of retaining larger trees in the event of a wildfire (section 3.2, “Fire and Fuels”). Overall, Alternative D would be the most effective in developing large tree size class acres of the desired species within patches. Although Alternative E would produce more acres of large tree size class, more of the large tree size class acres would contain the desired species under Alternative D.

Alternative E

By 2044 Alternative E would increase the acres of large tree size class by 166% across the patches (**Table 3-33**). Though total acres would be less than Alternative D, the percent change from the current condition would be greatest for Alternative E. However, the proportion of acres that would meet the desired species would the same as Alternative A and lower than the other action alternatives due to the 18-inch and greater diameter retention.

Treatments would develop structural conditions different from Alternative A and more similar to historical conditions in the nonlethal fire regime patches. However, in the mixed1 fire regime patches, a greater proportion of tree cover would occur in the overstory than the understory compared to the other action alternatives. This difference would be from the 18-inch and greater diameter retention. As a result, in the event of a wildfire, overstory mortality would be lower under this alternative than Alternatives B/C/F and D due to less continuous ladder fuels (section 3.2, “Fire and Fuels”). In addition, canopy gaps would likely be smaller, resulting in a greater diversity of fire tolerant and fire-intolerant regeneration than Alternatives B/C/F and D due to the diameter retention that would maintain the majority the seed-producing trees of all species. Overall, Alternative E would produce the greatest percent change in the large tree size class acres compared to the other alternatives, but desired species would be similar to Alternative A and structure would less diverse than the other action alternatives.

Summary

Over time, the number of acres in large tree size class would increase across patches under all alternatives. Alternative A would produce the fewest large tree size class acres and Alternative D the most, though the percent change from the current condition would be

greatest for Alternative E. The proportion of large tree acres that would meet the desired species would be greatest for Alternative D. Under Alternative E, the percent of desired species would be the same as Alternative A and structure within patches would be less diverse than Alternatives B/C/F and D due to the 18.0-inch dbh limit. In addition, regeneration would be a greater mix of fire-tolerant and fire-intolerant species under Alternative E compared to the other action alternatives. All action alternatives would increase the clump, group, and opening diversity compared to Alternative A across the patches. Within the project area, the action alternatives would develop a greater diversity of patch conditions, and a lower risk of losing existing and future large tree patches to wildfire than Alternative A.

3.2.6.2 Cumulative Effects

The cumulative effects analysis area covers an area of 100,857 acres and includes all or portions of Beaver-Edna, Kirkham, Pikes Fork, Lower Crooked River, Rock Creek, Upper Crooked River and Big-Owl-Wren 6th level HUCS on the North Fork Boise and South Fork Payette rivers (Figure 3-14). The majority of the cumulative effects analysis area is on the Idaho City District (North Fork Boise River). Landownership includes 620 acres of private land; the rest is NFS lands.

The following is a list of current and ongoing projects and disturbances in the cumulative effects analysis area that affect forested vegetation:

- Rock Creek Timber Sale
- Low Rock Rerun 2014
- Abby Fire 2009, Resource Benefit fire
- Abby Fire Recovery Reforestation
- Road Construction/Maintenance
- Trail Construction/Maintenance
- Wildfire Suppression
- Sheep Grazing in the Boise Basin and North Fork Allotments
- Fuelwood Gathering
- Christmas Tree Program

The following is a list of reasonably foreseeable activities that would affect forested vegetation:

- Rock Creek Timber Sale revised
- Sheep Grazing in Boise Basin and North Fork Allotments

See Appendix C for details regarding these projects.

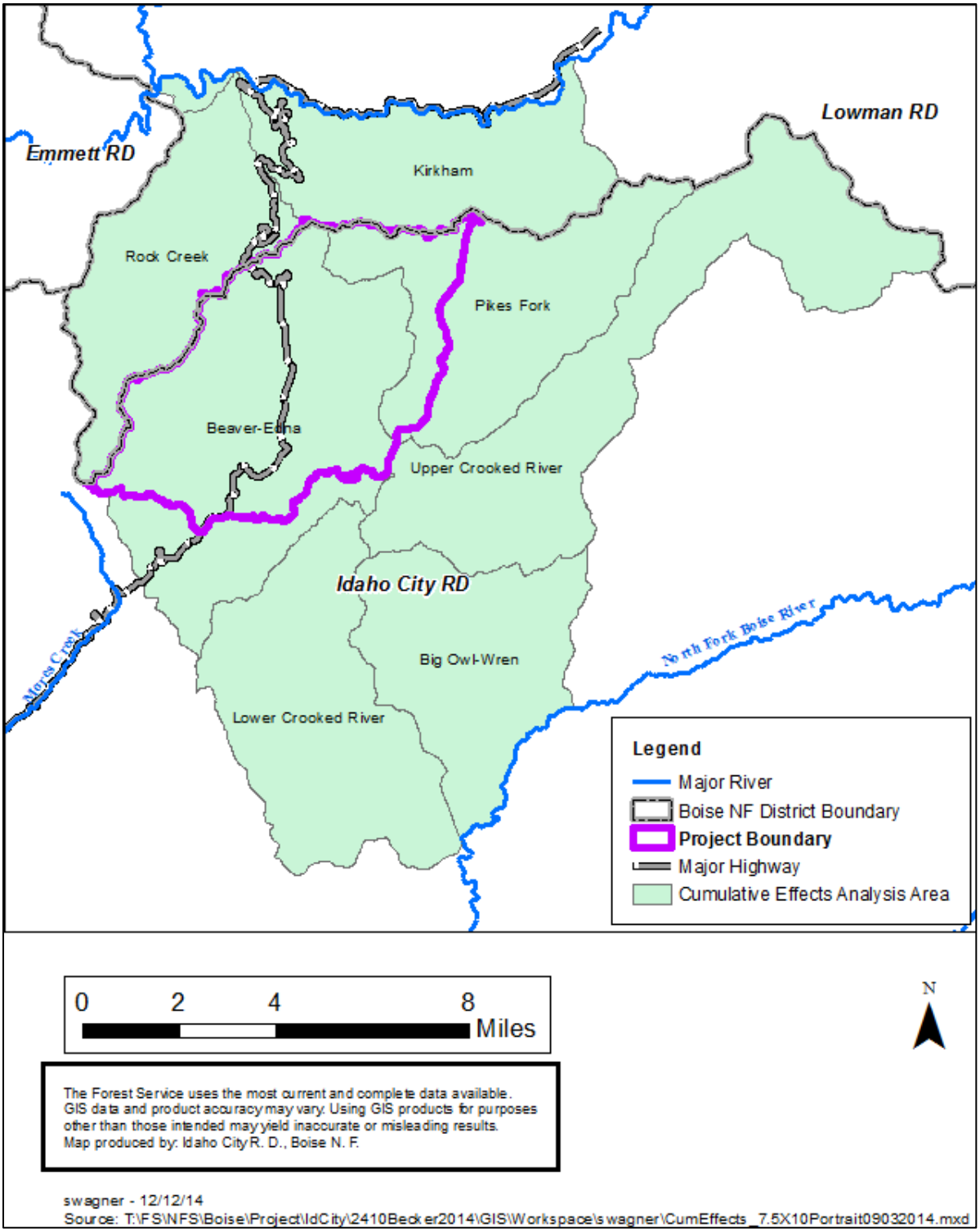


Figure 3-14. Becker Integrated Resource Project cumulative effects analysis area

Thinning proposed under the Rock Creek Timber Sale would likely occur in 2016, which would be concurrent with the first of the proposed Becker treatments. With the exception of forest productivity, the purpose of the Rock Creek Timber Sale is very similar to the Becker project vegetation purpose. The Rock Creek and Becker projects combined could result in 10,287 acres of mechanical vegetation treatment for Becker Alternatives B, C, E, and F and 10,469 acres for Becker Alternative D. Based on the projected schedule for implementation, the cumulative area treated would impact 10.2% of the cumulative effects analysis area, or about 1%–2% per year for 10 years.

The Abby Fire in 2009 was a resource benefit fire that burned 839 acres. Portions of the fire burned at high intensity and were planted with containerized ponderosa pine and Douglas-fir from 2012 through spring 2014. A total of 347 acres were planted with an average 47% survival rate as of 2014.

Fuelwood gathering is an ongoing activity across the Forest. All of the cumulative effects analysis area is open to fuelwood gathering except for 300 feet on either side of Highway 21. Data regarding the number of trees cut and removed each year for fuelwood in the cumulative effects analysis area are not available.

The cumulative effects of fuelwood gathering and limited cutting of large live and dead trees for road/trail rights-of-way and public safety would decrease large ponderosa pine and Douglas-fir snags. Protecting all medium-to-large snags and implementing the proposed treatments that would promote development of large size class ponderosa pine and Douglas-fir trees in the treatment units would offset the loss of snags adjacent to open roads and developed recreational facilities.

Since seasonal closures and weather frequently restrict access to the lower elevations and Douglas-fir is a preferred species for many Christmas tree cutters, the effects of cutting Christmas trees in the cumulative effects analysis area would be to reduce the density of sapling size Douglas-fir primarily in PVGs 1 through 3.

Sheep grazing occurs in the project area and cumulative effects analysis area annually. Generally, sheep grazing would not impact forested vegetation except for trampling seedlings; trampling would be limited to the routes where the sheep are trailed each year and would only be a concern in the 2- to 5-acre created canopy gaps where long-term regeneration of ponderosa pine and Douglas-fir is desired. Wildfire suppression is a continuous, ongoing activity that has an indirect effect on the vegetation in the cumulative effects analysis area. The majority of the wildfires in the cumulative effects analysis area are contained during initial attack and are generally <5 acres. Fire is a natural disturbance that occurs in all of the vegetation types in the cumulative effects analysis area. As described in Chapter 1 of the DEIS, many of the problems related to the current condition of forested vegetation in the project area are the result of over 100 years of wildfire suppression. Ingrowth of less fire tolerant species and accumulation of fuels have led to a situation where much of the forested vegetation is at high risk of uncharacteristic wildfire behavior for the vegetation type and fire regime, especially during unusually dry fire seasons. Managing wildfire for resource benefit (formerly called Wildland Fire Use) is permitted in most of the cumulative effects analysis area. Under the right conditions, wildfires managed for resource benefits could be very beneficial. Low-intensity, understory fire in PVGs 1 through 3 would help to reduce surface fuels, raise ladder fuels, and thin small trees. One of the objectives of

the proposed treatments is to improve forest resilience to wildfire, which could allow for more opportunities for managing wildfires for resource benefit.

3.3 FIRE AND FUELS

3.3.1 Analysis Scale, Data Sources, and Methodology

3.3.1.1 Analysis Scale

The analysis area for direct and indirect effects was defined as the 13,610 acres proposed for mechanical and prescribed fire treatments in Alternative D (the largest area of proposed treatment) within the 19,327-acre project area (Figure 3-15). This analysis area was chosen because it represents the largest extent where treatments would change the fuel loading and affect the fire behavior.

The cumulative effects analysis area is the same as that used for landscape patch and pattern described in the vegetation section (Figure 3-16). This area was chosen because of the interconnected relationship between vegetative conditions, fire, and wildlife habitat; it is also believed to encompass the largest extent that could be influenced by the indirect and cumulative effects of acres treated by the proposed activities. Fire is the biggest disturbance process on the western landscape, and as such, it is also the natural process that is most likely to change vegetative and habitat conditions.

3.3.1.2 Data Sources and Methodology

The analysis was based on stand exam data collected from 2000 to 2009 and personal field reconnaissance using stereo photo series for quantifying natural fuels (Ottmar et. al 1998).

For the purposes of this analysis, the *Forest Vegetation Simulator-Fire and Fuels Extension* (FVS-FFE) model (Dixon 2002) was used to estimate flame lengths, canopy base height (CBH), and overstory mortality. This model was selected because, unlike most other fire behavior models, it can accept stand data directly and reflects the effects and behavior of fire given the various forested vegetation tree size classes within the project area. Additionally, the model can estimate fire behavior based on simulated future stand and fuels conditions after mechanical and prescribed fire treatments.

Within the analysis area, FVS-FFE used stand exam data to model surface fuel loading. FVS-FFE modeled fuel loading for existing conditions (2014) as well as for any areas receiving mechanical treatments. The modeled fuel loadings were verified by comparing FVS-FFE outputs with observations derived from field reconnaissance and examination of the photo series (see vegetation technical report available in the project record).

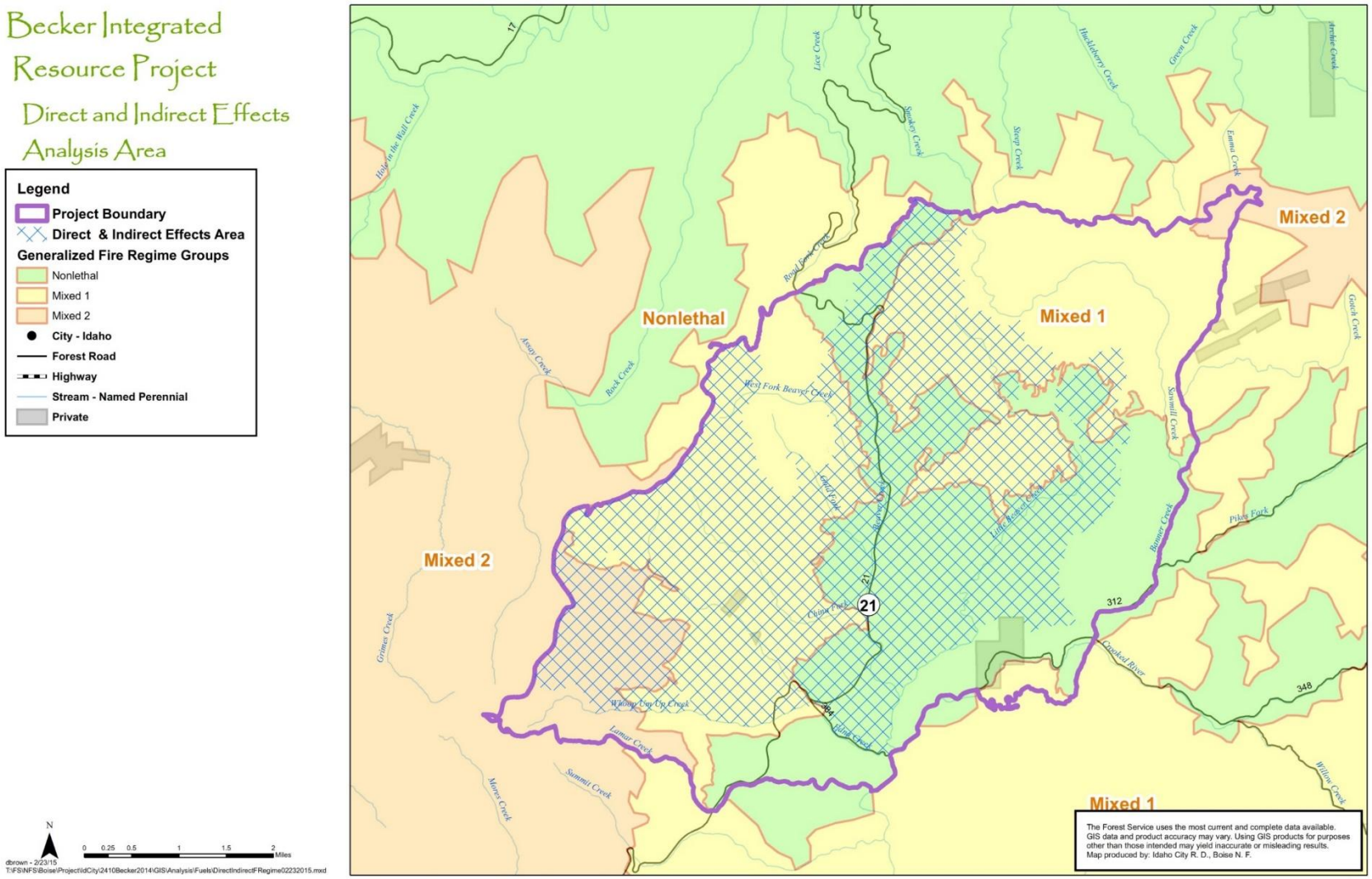


Figure 3-15. Analysis area for direct and indirect effects

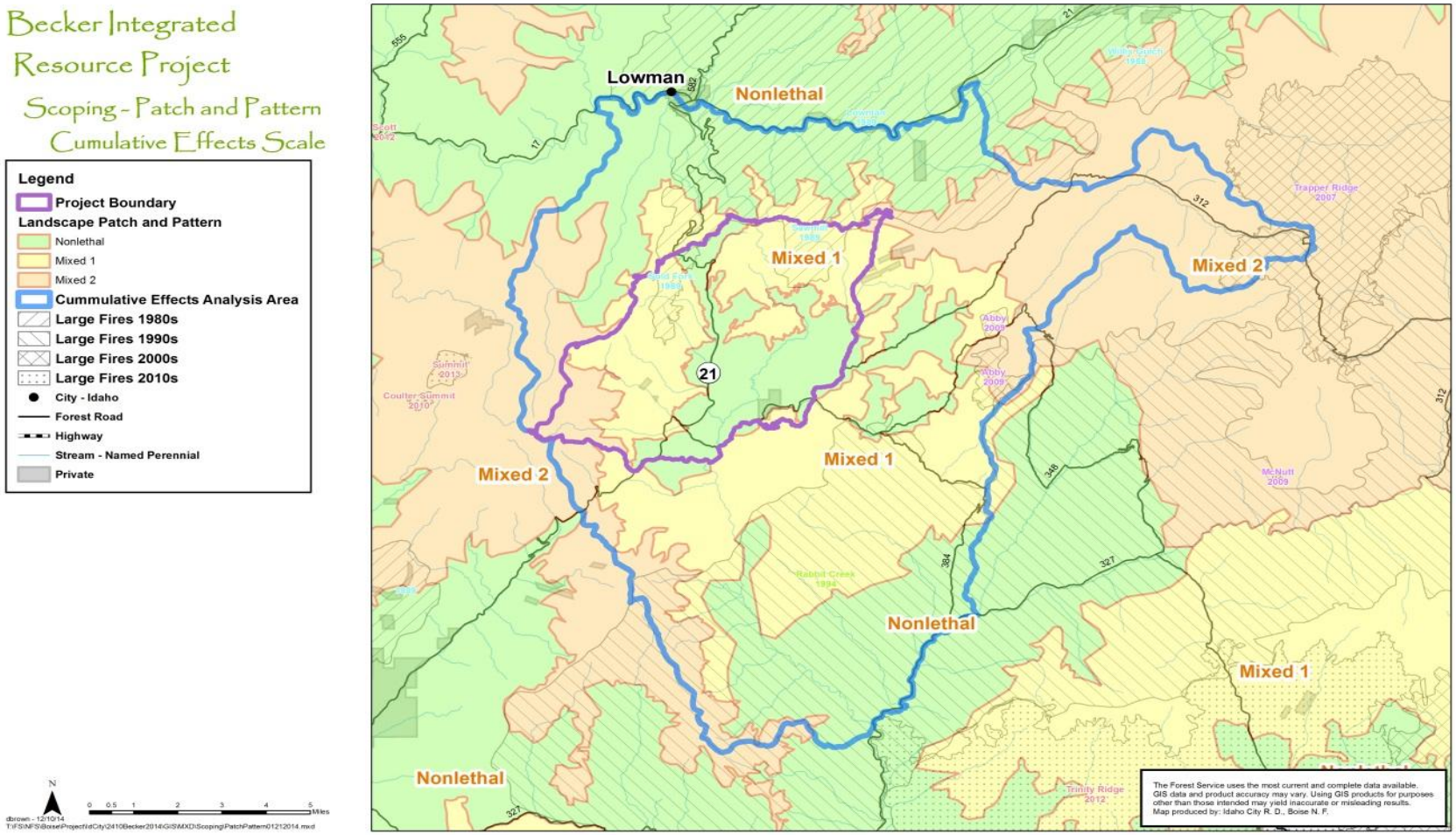


Figure 3-16. Analysis area for cumulative effects analysis

For the purposes of this analysis, representative stands from each fire regime patch were selected and analyzed. These stands were determined in consultation with the project silviculturist to represent the suite of proposed treatments, potential vegetation groups (PVGs), and fire regime patches across the broad spectrum of vegetation within the Project area. (See Appendix I of the fire and fuels technical report [available in the project record] for representative stands that were selected for analysis.)

Wildfire susceptibility analysis was developed using the worst-case (highest likelihood of extreme fire behavior) 90th-percentile summer fire weather data recorded at the Town Creek Remote Automated Weather Station (RAWS, located approximately 15 miles west of the project area). These records were compiled using 1982–2007 data and analyzed using *FireFamilyPlus4* (USDA 2002).

The analysis was also based on several assumptions concerning mechanical treatments, activity fuels, timing, and environmental conditions.

Mechanical Treatments—Under all action alternatives, mechanical treatments would occur before a stand received either activity fuels or natural fuels treatments (see Chapter 2 for a description of the treatments proposed by alternative). For analysis purposes, all mechanical treatments, followed by activity fuels treatments or natural fuel treatments, would be completed by 2024. Changes to the forested vegetation and surface fuel loading caused by these mechanical treatments were incorporated into the FVS-FFE modeling for analysis of wildfire susceptibility.

Activity Fuels—In stands receiving piling of activity fuels, the piled material would be burned within 1–2 years of the mechanical vegetation treatment. During pile burning, environmental conditions would be such that no natural fuels outside the piled activity fuels would likely be consumed. The FVS-FFE-estimated fuel loading for the wildfire susceptibility analysis was based on post-pile burn conditions.

In stands receiving whole tree yarding and lop and scatter treatments, the activity fuels would not be piled and burned. They would remain onsite and be treated along with the natural fuels during the 2024 prescribed fire. The FVS-FFE-estimated fuel loading was based on the residual slash left in the stands following mechanical treatments.

Wildfire susceptibility during implementation of any action alternative would be expected to increase above that associated with the existing conditions. During implementation of proposed treatments, slash associated with commercial harvesting and thinning of submerchantable trees would increase fuel loads up to the time of activity fuels treatments or prescribed burning (2–3 years after the mechanical treatment). This potential increase in wildfire susceptibility would be offset somewhat by the benefits of reduced ladder fuels and increased CBH.

Timing—For analysis purposes, baseline current conditions were set for 2014. For effects analysis, all action alternative treatments (mechanical and prescribed fire) were assumed to be complete in 2024. For the wildfire susceptibility analysis, a wildfire occurring under 90th-percentile conditions was assumed to occur in 2034. The same analysis time periods were used for Alternative A.

Environmental Conditions—Environmental and fuel moisture conditions for prescribed fire were developed in consultation between the project silviculturist and Idaho City Ranger

District fuels specialist. These represent the environmental conditions from previous prescribed fires with similar objectives and fuels loading on the Idaho City Ranger District. For analysis purposes, the following assumptions were made regarding prescribed burning to be completed in 2023 and the wildfire mentioned above assumed to occur in 2034:

- Prescribed burning:
  - Timing: April–May and Sept–Nov in 2024
  - Temperature: 65 °Fahrenheit, 20 feet;
  - 20 foot wind speed: 8 miles per hour
  - 1- and 10-hr fuel moisture: 10%
  - 100-hr fuel moisture: 14%
  - 1,000-hr fuel moisture: 25%
  - Duff moisture: 125%
  - Herbaceous and live woody fuel moisture: 150%
- Assumed wildfire:
  - Timing: Aug 2034
  - Temperature: 95 °F, 20 feet
  - Wind speed: 10 miles per hour
  - 1- and 10-hr fuel moisture: 3%
  - 100-hour fuel moisture: 6%
  - 1,000-hour fuel moisture: 7%
  - Duff moisture: 35%
  - Herbaceous fuel moisture: 30%;
  - Live woody fuel moisture: 70%

3.3.1.3 Analysis Process/Indicators

The effects indicator for alternative comparison is wildfire susceptibility. The measures for wildfire susceptibility are flame length, CBH, and overstory mortality from a wildfire. The comparison unit is how well an alternative recreates the average total flame length and overstory mortality that would be expected for the respective historical fire regime patch.

3.3.2 Affected Environment

3.3.2.1 Fire Regimes

Vegetation across any landscape that historically developed under similar wildfire frequencies and intensities can be categorized into "fire regimes" (Table 3-34). Fire regimes are often characterized by the effects of fire on the overstory vegetation and the frequency or return interval of those fires. If most of the dominant overstory tree canopy is expected to

survive a fire event, it is considered a nonlethal fire. By contrast, a fire that consumes or kills 90% or more of the existing vegetation is considered to be a lethal fire regime. If the intensity is in between, it is classified as a mixed fire regime, either mixed1 or mixed2 (Figure 3-17) (USDA Forest Service 2010a).

Table 3-34. Fire regime definitions

Fire Regime	Fire Interval	Fire Intensity	Vegetation Patterns (Agee 1998)
Nonlethal	5–25 years	<10% mortality	Relatively homogenous with small patches generally <1 acre of different seral stages, densities, and compositions created from mortality.
Mixed1	5–70 years	10–50% mortality	Relatively homogenous with patches created from mortality ranging in size from <1 to 600 acres of different seral stages, densities, and compositions.
Mixed2	70–300 years	50–90% mortality	Relatively diverse with patches created by mixes of mortality and unburned or underburned areas ranging in size from >1 to 25,000 acres of different seral stages, densities, and compositions.
Lethal	100–400 years	90% mortality	Relatively homogenous with patches sometimes >25,000 acres of similar seral stages, densities, and compositions. Small inclusions of different seral stages, densities, and compositions often result from unburned or underburned areas.

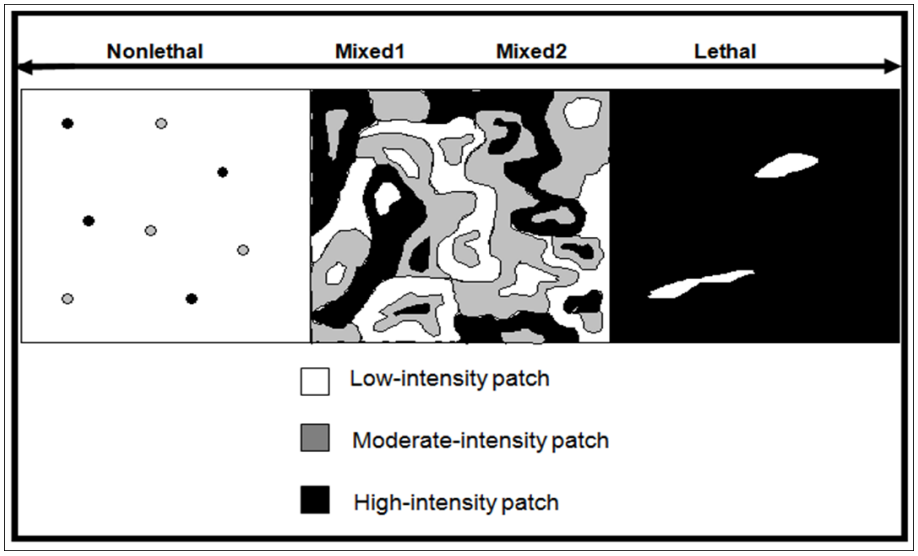


Figure 3-17. Fire regime patch and pattern

Historically, stands in the nonlethal fire regime experienced fire every 5 to 25 years. Fire in these stands commonly occurred as low-intensity ground fires, with flame lengths from 1 to 4 feet, and resulted in overstory tree mortality of 10% or less (Agee 1998).

The mixed1 fire regime differs from the nonlethal fire regime in that it generally had a decreased frequency of fire return and an increased lethality in the overstory from a fire

occurrence. Estimates of the historical fire return interval for the mixed1 fire regime are 5 to 70 years (Agee 1998). Relatively frequent surface fires maintained early seral species such as ponderosa pine and Douglas-fir, but the decreased fire frequency compared with the nonlethal fire regime allowed greater fuel accumulations and larger regeneration patches to develop. The resultant fires would burn with greater intensity and lethality. Flame lengths generally ranged from 2 to 6 feet, and overstory mortality would be approximately 10% to 50% (Table 3-34). Additionally, the patches of moderate to high severity in the mixed1 fire regimes were generally larger in extent and more frequently distributed than the patches seen in the nonlethal fire regime (Figure 3-18).

Mixed2 fire regimes continue the pattern of decreased frequency and increased lethality. The fire return interval is historically between 70 and 300 years (Agee 1998). Fires in the mixed2 fire regime are greater than 10 feet, with overstory mortality between 50% and 90% (Table 3-34). The patches of mortality are generally larger in size than those for the mixed1 fire regime, with fewer and smaller areas of low-to-moderate intensity among the patches of high intensity (Figure 3-18).

Within any given fire regime patch, some areas might, for site-specific reasons, have a different historical fire return interval resulting in different effects on the vegetation compared with other sites within the patch. These areas are the minority within the patch, tend to be small, and contribute to the overall patch diversity.

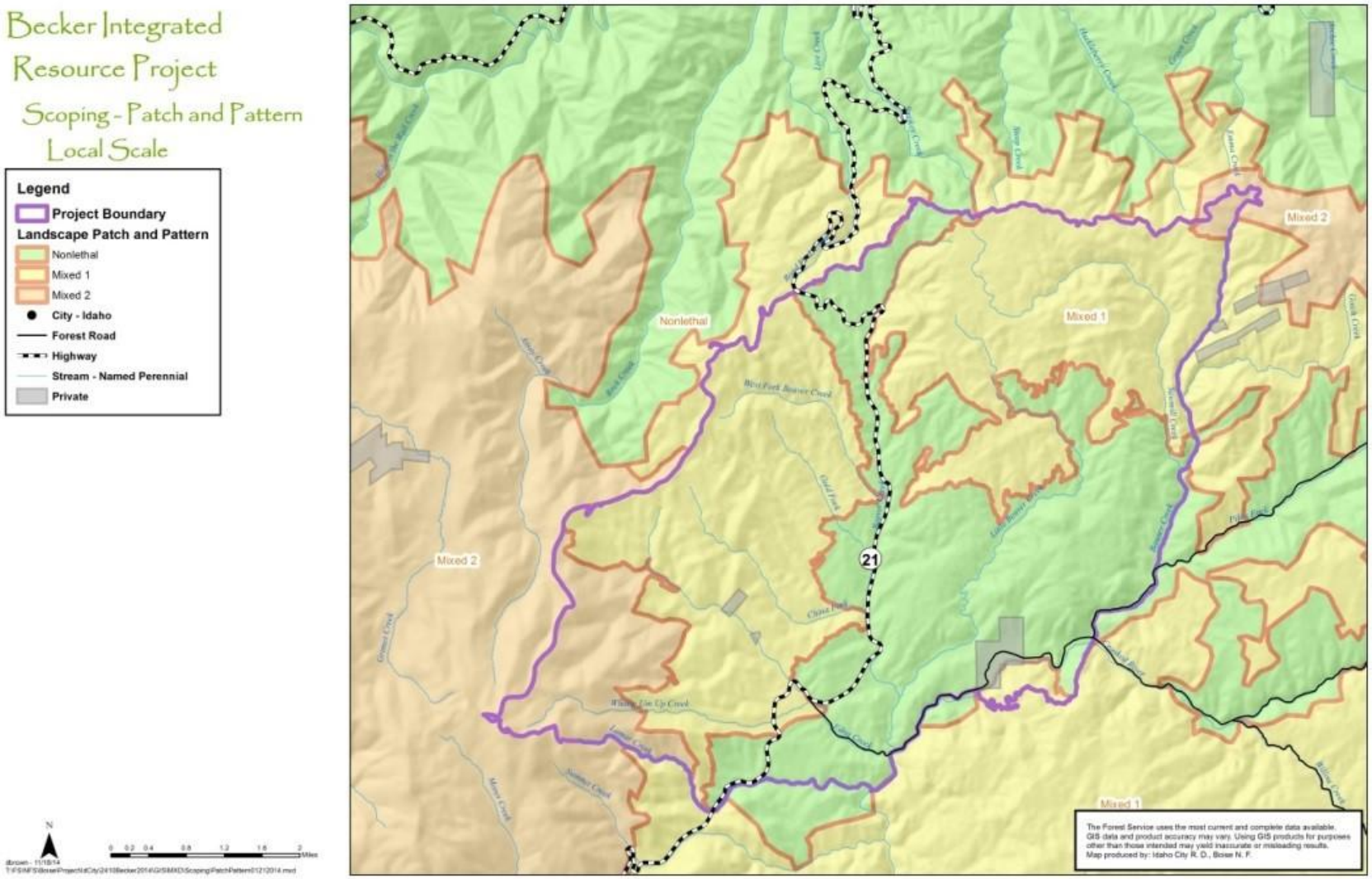


Figure 3-18. Fire regime landscape patch and pattern for the Becker project area

3.3.2.2 History and Fire Occurrence

Historically, the forested vegetation in the direct and indirect effects analysis area was dominated by stands of relatively open, large tree size class dominated by ponderosa pine in the lower elevations and large, seral Douglas-fir in the higher elevations, with occasional pockets of medium size class mixed conifer stands of lodgepole pine and subalpine fir. The forested vegetation within the direct and indirect effects analysis area was categorized into the appropriate fire regime patches based on PVG, habitat types, vegetative species, and site conditions. Vegetative communities were categorized into nonlethal, mixed1, and mixed2 fire regime patches (Table 3-35 and Figure 3-17). For the remainder of this section, areas in the mixed2 fire regime patches proposed for treatments are considered equivalent to the mixed1 fire regime patches: they represent stands that have a seral ponderosa pine component that historically acted more like a mixed1 fire regime at the site-specific (stand) scale.

Table 3-35. Fire regime patch for the Becker project area

Fire Regime Patch	Acres	Percentage of Project Area
Nonlethal	7570	39
Mixed1	10,117	52
Mixed2	1684	9

With the removal of Native American burning and the introduction of livestock grazing, timber harvesting, and wildfire suppression, conditions within historical fire regime patches have been interrupted. The resulting lack of fire has allowed fuel accumulations to increase above historic norms. This increased fuel loading has increased the intensity and lethality of fires, especially in the nonlethal and mixed1 fire regimes. This shift was reflected in the uncharacteristic 1989 Lowman Complex (including the Sawmill and Goldfork fires) that occurred in similar vegetative communities immediately adjacent to and within the Becker project area. Flame lengths in the Lowman Complex often exceeded 10 feet, and nearly all the overstory trees were killed across large portions of the landscape. For an area characterized by nonlethal and mixed1 fire regimes, this type of fire behavior was atypical (Agee 1998). This pattern of uncharacteristic burning was seen again in the 1994 Rabbit Creek fire and in portions of the 2007 Trapper Flat fire. These fires burned with similar intensity and lethality in the nonlethal and mixed1 fire regimes as the Lowman Complex did. These large- scale uncharacteristic fires in immediate proximity to the Becker project area have created a situation where the Becker project area is a remnant “island” of structurally (large tree stands, coarse woody debris, and snags) late-seral vegetation that is surrounded by a “sea” of nonlethal and mixed1 stands in a very early-seral condition. This situation causes the Becker project area to have unique value for multiple resources. (See Figure 3-16 for the location of wildfires in and around Becker project area.)

3.3.2.3 Wildfire Susceptibility

Although the conditions and timing of a wildfire are difficult to predict, FVS-FFE modeling suggests that, if an ignition occurs under conditions where a wildfire is likely to escape initial attack (90th-percentile weather) and impact vegetation on a landscape scale, that wildfire is likely to have flames averaging close to 9 feet (1–4 feet historically) and kill almost 60% of the overstory trees greater than 15 inches in diameter at breast height (dbh) in the nonlethal

fire regime patch (<10% historically) (Table 3-36). The high intensity and mortality are facilitated in part by the low CBH of 11 feet, which represents a dense stand with many ladder fuels. A similarly high-intensity wildfire is likely to occur in the mixed1 fire regime patches, with average flame lengths close to 13 feet (2–6 feet historically) and overstory mortality exceeding 75% (30%–50% historically) (Table 3-36).

Table 3-36. Current wildfire susceptibility modeled by FVS-FFE at 90th-percentile weather conditions

	2014 Total Average Flame Length (feet)	2014 Canopy Base Height (feet)	2014 Overstory Mortality (%)
Nonlethal Fire Regime Patch	8.9	11.2	58.6
Mixed1 Fire Regime Patch	13.2	9.0	77.2

While FVS-FFE modeling doesn't describe the extent of potential mortality, many examples in similar vegetation types around the Becker project area suggest that mortality would be widespread and large in extent. All of these characteristics—intensity, mortality, and extent—are inconsistent with the historical norms associated with the nonlethal and mixed1 fire regimes (Table 3-34).

3.3.3 Environmental Effects

3.3.3.1 Direct and Indirect Effects

Prescribed Fire Treatments

Alternative A

Under Alternative A, no prescribed fire treatments would be planned, so there would be no direct effects.

All Action Alternatives

This project proposes mechanical thinning and prescribed fire treatments in a portion of the Riparian Conservation Area (RCA). Numerous design features have been established as part of the proposed actions to protect vegetation and resources within the RCA (Chapter 2). The areas of the RCA receiving treatment are predominately the upland vegetative communities, and as such, they are similar to vegetative communities outside the RCA in regards to fuel loading and stand densities. Therefore, the treated upland vegetation in the RCA would react similarly to vegetation outside the RCA, as described for each action alternative (Table 3-37).

In areas where backing fire would be allowed to enter into those portions of the RCA not targeted for direct treatment, the prescribed fire would likely be even more benign and have less impact than those listed in Table 3-37. This conclusion is based on the inherent assumptions built into the FVS-FFE model. The model assumes a head fire spreading uphill in a continuous fuel bed. Backing, or flanking fire, which is the most likely type of fire

spread to occur within the RCA buffers, has less intensity and effects than those associated with the head fire.

Table 3-37. Environmental consequences of prescribed fire treatments for Alternatives B, C, F and E

Alternatives	2024 Total Flame Length for Rx Treatments (feet)	2025 Canopy Base Height (feet)	2024 Overstory Mortality from Rx Treatments (%)
Nonlethal Fire Regime Patch			
Alternatives B, C, and F	2.1	22.9	7.4
Alternative E	2.1	23.8	6.8
Mixed1 Fire Regime Patch			
Alternatives B, C, and F	2.2	18.6	8.0
Alternative E	1.9	17.3	7.1

Alternatives B, C, and F

Alternatives B, C, and F would institute prescribed fire treatments across 13,428 acres of the analysis area, following the proposed 8,353 acres of mechanical and fuels abatement treatments. Alternative C has a slight difference from Alternatives B and F in harvest systems, but the silvicultural prescriptions are similar between all three alternatives. The differences in activity fuels generated by the different harvest systems were examined and found to have a negligible impact on the fuel loading at the fire regime patch scale. Therefore, information about the environmental consequences for prescribed fire treatments and effects analysis for wildfire susceptibility for Alternatives B, C, and F are combined in this section.

The mechanical and activity fuels treatments for Alternatives B, C, and F were included in the FVS-FFE modeling to estimate the effects of the prescribed fire and wildfire susceptibility within each fire regime patch.

Nonlethal Fire Regime Patch

After the mechanical and activity fuels treatments are completed, a low- to moderate-intensity prescribed fire would be implemented. The prescribed fire in the nonlethal patch is expected to burn in a relatively uniform fashion, with small localized patches of increased intensity. Few areas in the burn unit would likely be unavailable at the time of ignition, and most of the burn unit would receive prescribed fire treatment. The average flame lengths associated with the prescribed burn are modeled by FVS-FFE to be around 2 feet, and the post-treatment CBH in the nonlethal patch is estimated to be almost 23 feet (Table 3-37). This high CBH represents a relatively open condition with only a few dense pockets of ladder fuels existing after treatment.

FVS-FFE modeling predicts that the prescribed fire would cause first-order direct mortality of between 7% and 8% of overstory trees greater than 15 inches dbh (Table 3-37). The overstory mortality would be primarily in the fire-intolerant species such as Douglas-fir, subalpine fire, and lodgepole pine. Some large ponderosa pine could also be killed by the prescribed fire, but it would represent a small amount (<2%) of the total overstory mortality.

Mixed1 Fire Regime Patch

After mechanical and activity fuels treatments are completed, a low- to moderate-intensity prescribed fire would be implemented resulting in localized patches of increased intensity. In the mixed1 patch, the prescribed fire would generally burn in a less uniform fashion than in the nonlethal patch. There would be a greater mix of unburned areas combined with larger areas of higher intensity than those seen in the nonlethal patch. On the whole, the prescribed fire in the mixed1 fire regime is modeled by FVS-FFE to have an average flame length of around 2 feet, and the post-treatment CBH is estimated to be close to 19 feet (Table 3-37). This CBH also represents generally open stands, but due to the greater irregularity of burning in the mixed1 patch, more pockets of dense regeneration that are unaffected by the prescribed fire would occur than in the nonlethal fire regime patch.

FVS-FFE modeling predicts that, in the mixed1 fire regime patch, the direct overstory mortality of trees greater than 15 inches dbh would be around 8% (Table 3-37). This mortality would largely occur in to the less fire-tolerant species of Douglas-fir, subalpine fir, and lodgepole pine. FVS-FFE predicts that a small amount (<2%) of the large ponderosa pine and Douglas-fir would be killed by the prescribed fire.

Alternative D

Environmental consequences of the prescribed fire treatments for Alternative D are expected to be the same as those for Alternative B, C, and F, except for 182 acres of additional vegetation management activities and associated activity fuels treatments. Activity fuels treatments (pile burning) would occur on these 182 acres, but they would have little impact on the natural fuels. Additionally, the pile burning would not significantly affect the remaining forested vegetation. (See the vegetation technical report for the effects of commercial and precommercial thinning on the forested vegetation treated under Alternative D.)

Alternative E

Alternative E would institute a prescribed fire across 13,428 acres of the analysis area, following the proposed 8,353 acres of mechanical and fuels abatement treatments. Those treatments were included in the FVS-FFE modeling to estimate the effects of the prescribed fire within each fire regime patch.

Under Alternative E, FVS-FFE modeling predicts essentially the same effects as those modeled for Alternatives B, C, and F (Table 3-37). The 18-inch dbh limit for commercial harvest in this alternative would not change the environmental consequences of this alternative from Alternatives B, C, and F.

Nonlethal Fire Regime Patch

The prescribed fire would be a low- to moderate-intensity burn, with small localized patches of increased intensity. The prescribed fire in the nonlethal patch is expected to burn in a relatively uniform fashion, with few areas being unavailable to burn at the time of ignition. The average flame lengths associated with the prescribed fire are modeled by FVS-FFE to be around 2 feet, and the post-treatment CBH in the nonlethal patch is estimated to be almost 24 feet (Table 3-37). This high CBH represents a relatively open condition with only a few dense pockets of ladder fuels existing in this patch post treatment.

FVS-FFE modeling predicts that the prescribed fire would cause first-order direct mortality of around 7% of the overstory trees greater than 15 inches dbh (Table 3-37). The overstory mortality would be primarily in the fire-intolerant species such as Douglas-fir, subalpine fire, and lodgepole pine. Some large ponderosa pine could also be killed by the prescribed fire, but it would represent a small amount of the total overstory mortality.

Mixed1 Fire Regime Patch

The prescribed burn would be a low- to moderate-intensity burn with localized patches of increased intensity. In the mixed1 patch, the prescribed fire would generally burn in a less uniform fashion than in the nonlethal patch. There would be a greater mix of unburned areas combined with larger areas of higher intensity than those seen in the nonlethal patch. On the whole, the prescribed fire in mixed1 fire regime is modeled to have an average flame length of around 2 feet, and the post-treatment CBH in the mixed1 patch is estimated to be close to 17 feet (Table 3-37). This CBH also represents generally open stands, but due to the greater irregularity of burning in the mixed1 patch, more pockets of dense regeneration that are unaffected by the prescribed fire would occur.

FVS-FFE modeling predicts that, in the mixed1 fire regime patch, the direct overstory mortality of trees greater than 15 inches dbh would be around 7% (Table 3-37). This mortality would largely occur in to the less fire-tolerant species of Douglas-fir, subalpine fir, and lodgepole pine. FVS-FFE predicts that a small amount of the large ponderosa pine and seral Douglas-fir would be killed by the prescribed fire.

Wildfire Susceptibility

Alternative A

Ladder fuels and stand densities, expected flame lengths, and expected overstory mortality are expected to increase over time. Based on projected stand conditions and fuel loads under mid-August, 90th-percentile weather conditions, FVS-FFE modeling predicts that an ignition would currently result in flame lengths that average approximately 9 feet in the nonlethal fire regime patch and over 13 feet in the mixed1 fire regime patch (Table 3-38).

Modeling results for 2034 indicate that the wildfire susceptibility would continue to increase, with flame lengths reaching more than 14 feet for the nonlethal and 21 feet for the mixed1 fire regimes. Additionally, the trend would continue for forested stands to see an increasing number and density of ladder fuels. Therefore, the CBH would continue to lower over time and eventually reach less than 6 feet. This densification of the stands, combined with increased flame lengths, would easily facilitate fire reaching into the overstory canopy, and the resulting overstory mortality would likely be greater than 75% for both fire regimes (Table 3-38). The effects of a likely wildfire under this alternative would be uncharacteristic for either fire regime (Table 3-34).

Table 3-38. Effects of action alternatives on wildfire susceptibility

	2014 Total Flame Length (feet)	2014 Canopy Base Height (feet)	2014 Overstory Mortality (%)	2034 Total Flame Length (feet)	2034 Canopy Base Height (feet)	2034 Overstory Mortality (%)
Nonlethal Fire Regime Patch						
Alternative A	8.9	11.2	58.6	14.3	5.8	75.3
Alternatives B, C, D, F	8.9	11.2	58.6	5.2	24.1	44.2
Alternative E	8.9	11.2	58.6	5.4	25.3	45.0
Mixed 1 Fire Regime Patch						
Alternative A	13.2	9.0	77.2	21.0	4.3	85.0
Alternatives B, C, D, F	13.2	9.0	77.2	5.8	17.1	44.4
Alternative E	13.2	9.0	77.2	5.5	19.2	33.9

Alternatives B, C, D, and F

The direct and indirect effects of Alternatives B, C, D, and F on wildfire susceptibility would essentially be the same. None of the action alternatives would fully restore the nonlethal fire regime patch to historical levels of wildfire susceptibility (<10% mortality). Nevertheless, by reducing the existing surface fuel loads and abundance and density of ladder fuels and by disrupting the fuel continuity, flame lengths and overstory mortality would be more closely aligned with those expected for the nonlethal patch. The mixed1 fire regime patch would be restored to historical levels (10%–50% mortality) of wildfire susceptibility under these action alternatives (Table 3-38).

Nonlethal Fire Regime Patch

FVS-FFE modeling predicts that an ignition occurring 10 years post-treatment (2034) during mid-August, 90th-percentile weather conditions would result in average flame lengths of around 5 feet. Few ladder fuels would be available to facilitate the fire readily moving into the crowns of the trees, with a CBH of around 24 feet. Modeling predicts that about 44% of the overstory trees would be killed by the fire (Table 3-38).

Average flame lengths would be slightly higher than those expected in a nonlethal patch, but they are significantly closer to the historical average than to Alternative A for no action. Additionally, the 44% of overstory mortality predicted is significantly higher than expected in a nonlethal fire regime (Table 3-34). This relatively high level of overstory mortality is primarily a result the large number of fire-intolerant species (Douglas-fir, subalpine fir, and to a lesser extent, lodgepole pine) that uniquely comprise part of the overstory in the Becker project area. Overstory mortality of large ponderosa pine from the modeled fire would be closer to levels expected for a nonlethal fire regime patch (<15% overstory mortality).

Mixed1 Fire Regime Patch

FVS-FFE modeling predicts that an ignition occurring 10 years post treatment during mid-August 90th percentile weather conditions would result in average flame lengths of close to 6 feet. The slightly denser and clumpier stand conditions of the mixed1 patch result in a relatively lower canopy base height of around 17 feet. This base height is still high enough

that it would be difficult for fire to transition into the canopy of most stands but there would be more intermittent torching and larger patches of mortality than the nonlethal fire regime. FVS-FFE modeling predicts that about 44% of the overstory trees would be killed by the wildfire (Table 3-38).

The decreased overstory mortality, increased CBH, and lessened flame length are more representative of those likely to occur in a mixed 1 fire regime. *(*Agee 1998, Graham 2004, Fitzgerald 2005) (Table 3-34).

Alternative D

While the direct and indirect effects of Alternative D are summarized with the other action alternatives, it differs in that an additional 182 acres of area would be treated. Because the additional acres proposed for treatment fall within a mixed1 fire regime patch, the effects of treatment on those additional acres would be would have results in regards to wildfire similar to the rest of the treated area. By implementing Alternative D, an additional 182 acres of mixed 1 fire regime would be improved from the current condition by increasing CBH and reducing expected flame lengths and overstory mortality if a wildfire occurred.

Alternative E

Alternative E would temporarily move the mixed1 fire regime patch into historical levels for wildfire susceptibility. By reducing the abundance and density of ladder fuels, disrupting the fuel continuity, and lifting the CBH, flame lengths and overstory mortality would be more closely aligned with those expected for the mixed1 fire regimes.

Alternative E would not likely restore the nonlethal fire regime patch to historical levels of wildfire susceptibility. Nevertheless, by reducing the existing surface fuel loads and abundance and density of ladder fuels and by disrupting the fuel continuity, flame lengths and overstory mortality would be more closely aligned with those expected for a nonlethal fire regime than they would be under Alternative A.

Nonlethal Fire Regime Patch

FVS-FFE modeling predicts that an ignition occurring 10 years post-treatment during mid-August, 90th-percentile weather conditions would result in average flame lengths of around 5 feet. Few ladder fuels would be available to facilitate the fire readily moving into the crowns of the trees, with the CBH of around 25 feet. Modeling predicts that about 45% of the overstory trees would be killed by the fire (Table 3-38).

Average flame lengths would be slightly higher than those expected in a nonlethal patch but they would be closer to the historical average than under Alternative A. Additionally, the 45% of overstory mortality predicted is higher than expected in a nonlethal fire regime, primarily because of mortality in the large number of fire-intolerant species (Douglas-fir, subalpine fir, and to a lesser extent, lodgepole pine) that comprise part of the overstory in the Becker project area. Overstory mortality of large (>15 inches dbh) ponderosa pine from the modeled fire would be closer but still above levels expected for a nonlethal fire regime patch (<30% overstory mortality).

While Alternative E includes an 18-inch dbh limit for commercial harvest, impacts of that limit would not significantly differ from the other action alternatives for the nonlethal fire regime patch. The effects would be similar in part because of Design Feature VM-5, which limits commercial harvest of ponderosa pine to those less than 20 inches dbh. Ponderosa pine comprises the majority of the overstory in the nonlethal fire regime patch; therefore, a similar diameter limit is already in place.

Mixed1 Fire Regime Patch

FVS-FFE modeling predicts that an ignition occurring 10 years post-treatment (2034) during mid-August, 90th-percentile weather conditions would result in average flame lengths of between 5 and 6 feet. The slightly denser and clumpier stand conditions of the mixed1 patch would result in a lower CBH of around 19 feet (Table 3-38). This CBH is still high enough that it would be difficult for fire to transition into the canopy of most stands, but more intermittent torching and larger patches of mortality would occur than under the nonlethal fire regime. FVS-FFE modeling predicts that about 34% of the overstory trees would be killed by wildfire (Table 3-38).

The decreased overstory mortality, increased CBH, and lessened flame length are more representative of those likely to occur in a mixed 1 fire regime. *(*Agee 1998, Graham 2004, Fitzgerald 2005) (Table 3-34).

Alternative E has an 18-inch dbh limit to commercial harvest. This limit reduces the amount of overstory that can be removed via commercial thinning. In fact, Design Feature VM-5 imposes a less than 20-inch dbh limit on ponderosa pine for commercial harvest. As ponderosa pine comprise the majority of the overstory in the nonlethal fire regime patch, little difference would be seen in wildfire susceptibility between the action alternatives. Because the mixed1 fire regime patch has a lesser degree of ponderosa pine in the overstory, the 18-inch dbh limit would have a greater impact on this regime patch. To meet desired stand density conditions, more trees would be removed from the understory if trees could not be removed from the overstory, simplifying the stratification of a stand and causing fewer ladder fuels to be available to facilitate movement of fire into the overstory canopy. This reduction in ladder fuels would result in less overstory mortality than for the other action alternatives.

Alternative E would cause the mixed1 fire regime patch to be less susceptible to wildfire, but this result would come from a simplifying and stratifying of the mechanically treated stands. This tradeoff could have consequences for restoring vegetative conditions and wildlife habitat. See the vegetation and wildlife sections for a description of the effects of Alternative E on conditions within the mixed1 fire regime.

3.3.3.2 Cumulative Effects

The cumulative effects analysis area for landscape patch and pattern was used to assess the cumulative effects of wildfire susceptibility (Figure 3-16). Past activities in this area since 1960 include 26 acres of prescribed burning, 132,960 acres of timber harvesting, 9,403 acres of precommercial thinning, and 42,484 acres of wildfire. These acres burned predominately at an uncharacteristically high intensity, leading to large areas of mostly early seral conditions throughout the burned areas.

None of the action alternatives would affect wildfire susceptibility (i.e., fuel loads, ladder fuels, and stand densities) that overlap in time and space with similar effects outside the Project area. These treatments might decrease the likelihood of a fire to spread into untreated areas, but they would not affect how those areas would burn if the fire reached them.

Ongoing and/or foreseeable future activities that could add incrementally to impacts on wildfire susceptibility within the cumulative effects area include the Lower Lowman Wildland-Urban Interface (WUI) Resource Management Project. This project includes 257 acres of precommercial thinning and 257 acres of prescribed burning. See Appendix B for additional information and maps related to the cumulative effects analyses completed for this project.

The vegetation technical report describes assumed conditions within the landscape patch and pattern cumulative effects analysis area. The most recent data available were used to identify the existing baseline conditions, thereby reflecting incremental impacts of past activities and any increments of recovery that have occurred.

Alternative A

Over time, stand densities, fuel loads, and ladder fuels would increase under Alternative A. Although the details and effects of the Lower Lowman WUI Resource Management Project are unknown, given current Forest Plan direction, the assumption is that this project would be designed to reduce wildfire susceptibility. The cumulative effect of Alternative A, when combined with past, ongoing, and foreseeable future activities, would be an incremental increase in wildfire susceptibility within the cumulative effects area. The lack of fuels-reduction activities and the increase in these fuels over time would not contribute to Forest restoration objectives.

All Action Alternatives

Alternatives B, C, D, E, and F would reduce existing fuel loads and their distribution, the abundance of ladder fuels, and the continuity and density of vegetation. Although the details and effects of the Lower Lowman WUI Resource Management Project are unknown, given current Forest Plan direction, the assumption is that it would result in effects similar to those described for this project. The cumulative effect of Alternatives B, C, D, E, and F, combined with past, ongoing, and foreseeable future activities, would be an incremental decrease of wildfire susceptibility within the cumulative effects area. These alternatives would also contribute to Forest restoration objectives.

3.4 AIR QUALITY

3.4.1 Analysis Scale, Data Sources, and Methodology

3.4.1.1 Analysis Scale and Methodology

All actions of prescribed burning, hand pile burning, and landing pile burning were considered in this analysis because they will have direct, indirect, and cumulative effects to air quality. All other actions taking place in the project area will not have an effect on air quality because they are not expected to contribute to particulate matter smaller than 2.5 microns ($PM_{2.5}$).

The analysis area for direct, indirect, and cumulative effects to air quality consists of a 62-miles (100-kilometer [km]) radius around the project area (Figure 3-19). This area was used to evaluate impacts of smoke generated from proposed activities on sensitive areas, including mandatory Class I areas, non-attainment areas, maintenance areas, and/or population centers, as directed by the forest-wide air quality guideline ASGU02 (USDA Forest Service 2010a, p. III-17). While the air quality analysis was completed for this project at a 62-mile (100-km) radius of the project area, only maintenance areas, mandatory class I and Class II areas, and population centers/sensitive areas within a 15-mile (24-km) radius of the project area will be presented. This is based on smoke modeling results, which indicated only sensitive areas within 15 miles (24 km) would potentially be impacted by smoke from project activities. In addition, the 15-mile (24-km) distance is the radius used for the Interagency Intermountain Region Prescribed Fire Burn Plan and the Boise National Forest Prescribed Fire Burn Plan sensitive area evaluation.

3.4.1.2 Data Sources

A personal communication with R1 and R4 Smoke Coordinator Thomas Dzomba was conducted and to ensure compliance with NAAQS, the Smoke Impact Spreadsheet (SIS) was recommended to be was used to estimate smoke production, dispersion, and potential impacts to receptors based on common weather and fuel moisture conditions when burn activities would occur within the analysis area. The model can predict 1-hour and 24-hour average $PM_{2.5}$ concentrations at increments of distance either straight down wind or at a user-defined offset. The 24 hour average $PM_{2.5}$ is the NAAQS of concern and will be the indicator of measure for this analysis. Site-specific wind direction, wind speed, mixing height, and ventilation index inputs for SIS were obtained based on knowledge of the area and historical Remote Automated Weather System (RAWS) data. For the burning modeling process, it was assumed that approximately 20 landing piles per day would be treated and 2,000 acres of the proposed underburning would be ignited in one burn period and 150 acres of hand piles would be ignited in one burn period.

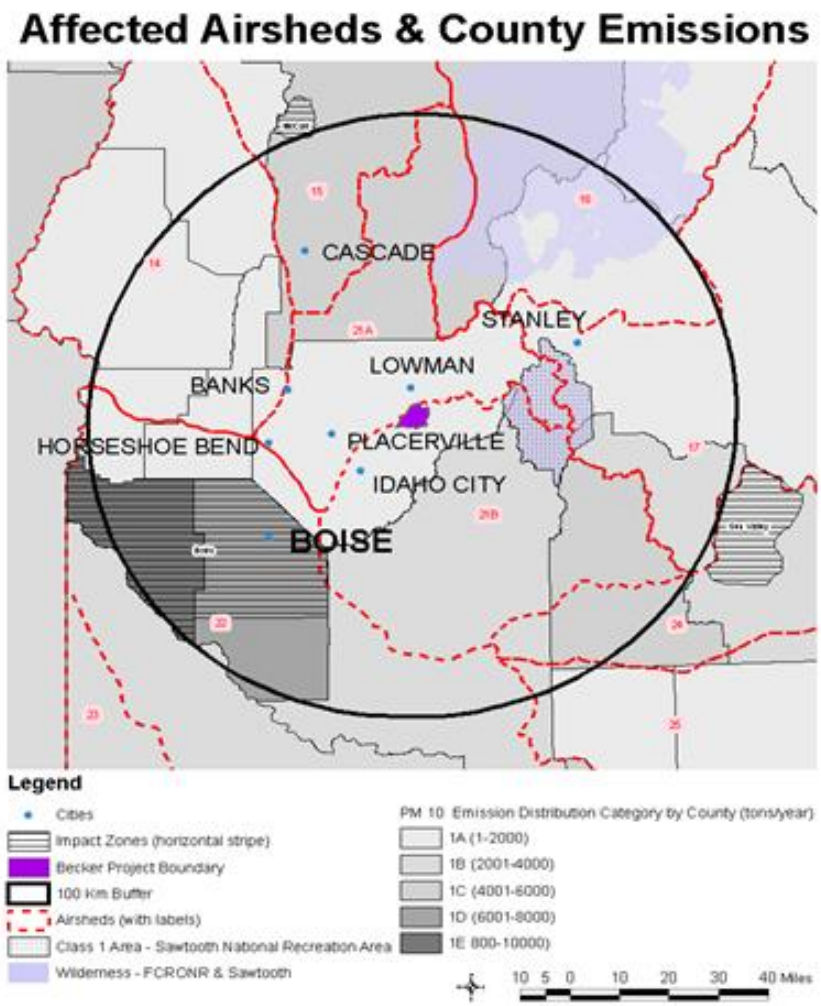


Figure 3-19. The 62-mile (100-kilometer) radius around the Becker Integrated Resource Project area

3.4.2 Analysis Process/Indicators

Although several pollutants listed in the standards can be identified in smoke from burning vegetation, particulate matter is typically of most concern from a human health and visibility standpoint (Story and Dzomba 2005). In 1987, the Environmental Protection Agency (EPA) established annual and 24-hour NAAQS for PM_{10} and $PM_{2.5}$. The $PM_{2.5}$ NAAQS applicable for this project is 35 micrograms per cubic meter ($\mu g/m^3$) in a 24-hour period. About 80% of smoke combustion of woody biomass is smaller than 2.5 microns (Story and Dzomba 2005) and can lodge deeply in the lungs and is more likely to cause health effects; therefore, $PM_{2.5}$ is the standard of focus. Based on this standard, $PM_{2.5}$ is the indicator used in SIS for analyzing particulate matter impacts from prescribed burn treatments within the project area.

3.4.3 Affected Environment

The basic framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act (CAA), as amended in, 1977, 1990 (USDI EPA 2015). The CAA was

designed to "protect and enhance" air quality. Although smoke from wildfire is considered a natural event by the EPA's Natural Events Policy, smoke generated from prescribed burning must meet federal land and State air quality standards set forth in the CAA. Several parts of the amended CAA could apply to the use of prescribed fire (management-ignited) activities. These standards would be met by following the National Ambient Air Quality Standards (NAAQS). The EPA established the NAAQS according to the federal CAA of 1970 (CAA Part A Section 109) to protect human health and comfort. In addition to the NAAQS, provisions were added to the CAA (as amended in 1977) which included, Prevention of Significant Deterioration (PSD) (CCA Part C Section 160–169B) and may apply project level General Conformity and Regional Haze requirements. The Idaho Department of Environmental Quality (IDEQ) does not apply PSD increments for prescribed fire, since prescribed fire activities and burning of post-harvest slash are considered temporary and short-lived sources. Significant Deterioration Regulations, therefore, will not be discussed further in this document.

3.4.3.1 General Conformity

No mandatory Class I areas, maintenance areas, or nonattainment areas exist within the project area, so elements pertaining to General Conformity do not apply and will not be discussed further in this document. In addition, the EPA regards prescribed fire as an area source and one that is temporary and short-lived (USDI EPA 1998) and must meet federal land and State air quality standards set forth in the CAA (section 160) and the NAAQS. In Idaho, coordination and compliance with the Montana/Idaho (MT/ID) Airshed Group is also necessary. This organization was created to ensure air quality guidelines are not violated through the cumulative additions of member's management actions to existing levels of pollutants. This group has been certified to the EPA by the IDEQ to meet the Interm Policy's necessary basic elements of a smoke management program. The MT/ID Airshed Group monitors daily emissions, burning activities, and particulate matter levels with established monitoring units and certified meteorologists to estimate whether NAAQS are within compliance.

3.4.3.2 Regional Haze

National goals exist for improving visibility in Class I Areas. The Sawtooth Wilderness is the closest mandatory Class I Area within the analysis area. Studies conducted at similar or nearby Class I areas (primarily wilderness areas) indicate that visibility is better in the western half of the United States than the eastern half. Without the effects of manmade air pollution, a natural visual range would be nearly 140 miles (225 km) in western areas and 90 miles (145 km) in eastern areas (EPA 2001). Pollutants contributing to visibility impairment include sulfates, organic carbon, and nitrates, and are primarily from industrial or urban activities. Elemental carbon, or soot, from wood combustion and soil also contribute to visibility impairment. Visual range currently averages about 60–90 miles, or about one-half of the estimated natural background for the West (NWCG 2001). In the western United States, 5%–15% of visibility impairment is attributable to elemental carbon (NWCG 2001). Particulate matter from prescribed burning would be a source of elemental carbon.

The Regional Haze Rule was designed by the EPA to call on States to establish goals for improving visibility in mandatory Class I Areas and to develop long-term strategies for reducing emissions of air pollutants that cause visibility impairment to these areas. In

October 2010, the IDEQ completed the Regional Haze Plan for the state of Idaho. Through its participation with the MT/ID Airshed Group, the Forest will be following rules and procedures outlined in section 12.6.5 of the *State of Idaho Department of Environmental Quality Regional Haze Plan* (IDEQ 2010). Therefore, regional haze will not be discussed further.

3.4.3.3 National Ambient Air Quality Standards

The EPA has established NAAQS for six pollutants: carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, and particulate matter. Although several pollutants listed in the standards can be identified in smoke from burning vegetation, particulate matter is typically of most concern from a human health and visibility standpoint (Story and Dzomba 2005). In 1987, the EPA established annual and 24-hour NAAQS for $PM_{10.}$ In 1997 NAAQS were established for $PM_{2.5}$. The PM_{10} NAAQS is 150 µg/m^3 in a 24-hour period. The $PM_{2.5}$ NAAQS applicable for this project is 35 µg/m^3 in a 24-hour period. About 80% of smoke combustion of woody biomass is smaller than 2.5 microns (Story and Dzomba 2005), therefore, the $PM_{2.5}$ standard is the focus of this air quality analysis.

The Becker project area lies within Boise County and the upper middle portion of the MT/ID Airshed 21B. The MT/ID Airshed Group was created to minimize or prevent adverse smoke impacts that may occur through the cumulative additions of member's management actions to protect public health and meet State and federal ambient air quality standards and visibility guidelines while using fire to accomplish land management objectives. This group has been certified to the EPA by the IDEQ to meet the Interm Policy's necessary basic elements of a smoke management program. The MT/ID Airshed Group monitors daily emissions, burning activities, and particulate matter levels with established monitoring units and certified meteorologists to estimate whether management actions can occur without violating NAAQS.

Ambient air quality for this area is likely to be good due to the lack of urban and industrial sources that are primary sources of man-made pollutants, and a minimum of other activities that would generate pollutants. Relatively minor amounts of pollutants could come from fugitive road dust, motorized vehicles, prescribed fire and wildfire, or other rural or agricultural activities. In 1998, the State of Idaho started developing a monitoring network to determine designations for $PM_{2.5}$. Monitors were initially located near urban and industrial sources of pollutants such as Boise, Caldwell, and Nampa. In MT/ID Airshed 21B, two ambient air monitors are located near Idaho City and Garden Valley. Specific ambient air concentration data for the MT/ID Airshed 21B are lacking, but according to the EPA's AirData records (http://airquality.deq.idaho.gov*)*, the closest monitoring station to the project area—Idaho City—recorded a 24-hour average of 5.9 µg/m^3 of $PM_{2.5}$ in 2014. No PM_{10} data were available at this site.

3.4.4 Environmental Effects

3.4.4.1 Direct and Indirect Effects

Alternative A—No Action

Alternative A does not propose any management actions, so no direct effects to air quality would occur. Air quality impacts from existing sources, such as dust and vehicle emissions, would be expected to continue in the analysis area.

A greater risk of a wildfire exists with this alternative (see the Fire and Fuels section) and, consequently, air quality would be affected if a wildfire were to occur in the analysis area. While the occurrence of a wildfire in the analysis area is speculative, if a wildfire were to occur, it would have a different and unpredictable impact compared to a controlled prescribed burn. Prescribed fire effects usually last for a short time, are managed, and may be mitigated. Smoke from wildfire is unmanageable. It can occur when dispersion is poor, is likely to occur in large quantities with abundant particulates, and lasts longer than planned ignitions. The duration and severity of air quality degradation from wildfire is difficult to predict. In general, a wildfire occurring in a previously untreated area would be expected to produce more particulate matter at one time than prescribed burning because of the greater amount of fuel consumed (EPA 1992; NWCG 2001). Large wildfires can adversely impact air quality for weeks, as demonstrated by the 1989 Lowman Complex, Sawmill Wildfire, and Goldfork Wildfire; the 1994 Rabbit Creek Wildfire; and the 2007 Trapper Ridge Wildland Fire Use and Abby Wildland Fire Use near Idaho City and Lowman (Fuels IDT member professional judgment based on experience).

Action Alternatives

Smoke from prescribed underburning would temporarily reduce air quality. Burning would likely occur in spring or fall and would be scheduled to occur when fuel moistures and atmospheric conditions are conducive to meeting resource objectives. Other pollutants that could temporarily reduce air quality would be smoke, dust, and vehicle emissions that could occur while implementing any of the action alternatives. These emissions could combine with air pollutants from other sources, including other prescribed fires, wildfires, rural or agricultural activities, industrial sources, and/or recreation uses on adjacent National Forest System, State, and private lands.

All action alternatives would have temporary direct impacts (1–3 days) on air quality standards; nonetheless, air quality would comply with State and federal air quality regulations. The Idaho Department of Parks and Recreation (IDPR) yurt system that runs through the project area would be affected during burning operations. Coordination with IDPR would follow the procedures as outlined in the Recreation Management Design Features (RR-10 a, c–g). To ensure compliance with NAAQS, the Smoke Impact Spreadsheet (SIS) (EPA 2011) was used to estimate smoke production and dispersion and potential impacts to receptors based on common weather and fuel moisture conditions when burn activities would occur within the analysis area. The model can predict 1-hour and 24-hour average $PM_{2.5}$ concentrations at increments of distance either straight down wind or at a user defined offset. Site-specific wind direction, wind speed, mixing height, and ventilation index inputs for SIS were based on professional judgment and knowledge of the area. In

addition, application of project Design Features FF-1, FF-2, AQ-1, AQ-2, AQ-3, and RR-10 (a, c–g), as described in Chapter 2, would ensure the prescribed fire is in prescription when the burn is ignited and smoke is monitored throughout the ignition. These design features require coordination with federal, State, and local governments. They also require public notification of the potentially affected areas, including posting warning signs on primary access routes.

Smoke dispersal output generated by SIS for the proposed underburn activity and natural fuels, landing pile, and hand pile burn treatments indicate that impacts to all sensitive areas would be in compliance with $PM_{2.5}$ standards when combined with average ambient pollutants (see the air quality technical report for a detailed list of sensitive areas). For underburn treatments, SIS was used to represent the proposed underburn, about 2,000 acres in a burn period, under fall and spring burning conditions with near neutral to neutral atmospheric conditions, to generate smoke in a single-day burn with no wind offset.

The acreage burned under Alternative D differs from Alternatives B, C, and F by approximately 182 acres of underburn treatment. This difference would not have a measureable impact to $PM_{2.5}$, as the 182 additional acres in Alternative D was incorporated into the 2,000 acres modeled in a single burn period. SIS model inputs assumed that 2,000 acres would be burned in a single entry; burning 2,000 acres in a single burn period represents the worst case scenario for smoke conditions and $PM_{2.5}$ standards and captures impacts to the closest sensitive receptors (Lowman and State Highway 21). Lowman lies approximately 3 air miles north of the project area. Highway 21 runs through the project area, and then approximately 3–10 miles north of the project area along the South Fork Payette River. After approximately 10 miles, the road begins a northerly direction, furthering its distance from the project area. Both the community of Lowman and State Highway 21 are subject to effects from the prevailing wind and nighttime diurnal flows that could transport smoke down drainage into the community and along the highway. The smoke from prescribed burning is then trapped underneath the nighttime inversion and, consequently, negatively impacts air quality. An additional SIS analysis was completed for the Sawtooth Wilderness, which is approximately 15 miles east of the project area. It is considered a Class 1 Area and has strict regulations defined in the CAA (1977). In this analysis, a 45 degree offset was incorporated to capture the Sawtooth Wilderness location to the proposed activities.

The worst case scenario smoke conditions and $PM_{2.5}$ standards for the landing pile burn treatments for all action alternatives was modeled using SIS to represent the pile type, size, material, and number of piles (20 piles) impacted to generate smoke in a single-day burn with no wind offset. An analysis utilizing the 45 degree offset was also completed for the Sawtooth Wilderness.

The worst case scenario smoke conditions and $PM_{2.5}$ standards for the hand pile burn treatments for all action alternatives was modeled using SIS to represent the pile type, size, material, and number of acres (150 acres) impacted to generate smoke in a single-day burn with no wind offset. An analysis utilizing the 45 degree offset was also completed for the Sawtooth Wilderness.

Outputs for the prescribed underburn (both fall [Figure 3-20] and spring [Figure 3-21] conditions) indicated that within 1 mile, the $PM_{2.5}$ generated would be below the 24-hour

$PM_{2.5}$ NAAQS. The Sawtooth Wilderness would not be impacted (Figure 3-22 and Figure 3-23). The landing pile and hand pile burn treatments are also within 24-hour $PM_{2.5}$ NAAQS at all distances from the landing pile (Figure 3-24) and hand pile burn activities (Figure 3-25). The closest sensitive receptor, Lowman, would not be impacted. Lowman is lower in elevation than the project area and is separated from the project area by 3 air miles and geographic features that limit the ability of smoke to impact the town without first dispersing. The Sawtooth Wilderness would also not be impacted by the landing pile (Figure 3-26) and hand pile burn activities (Figure 3-27). Each action alternative analyzed in the SIS would be in compliance with the NAAQS for $PM_{2.5}$.

Prescribed fires, whenever possible, are planned to occur before an approaching front. This technique uses frontal winds to disperse smoke and usually rain or snow accompanies the weather system, all of which help limit nuisance smoke impacts. Nuisance smoke impacts are usually short lived and typically last 12–24 hours. Nuisance smoke not only has public health concerns but also may jeopardize public safety if prescribed fires are conducted near public travel ways. Prescribed fires will be conducted near transportation routes and Highway 21. As standard operating procedure, the affected highway and other open roads will be well signed prior to burn implementation, and public notification will be conducted in compliance with Design Features FF-2, AQ-3, and RR-10 (a, c–g). In a typical year, 3–4 prescribed fires will be implemented in the project area, resulting in approximately 6–15 days of nuisance smoke near the project area.

Prior to any burning activities, the District fuels specialist would prepare prescribed burn plans specifically addressing site, fuel moisture, and weather conditions. Coordination of burning activities with other entities that may impact the same airshed would be completed. In addition, coordination with the MT/ID Airshed Group would be required. As an active partner with the Airshed Group, the Boise National Forest must submit all planned prescribed burn projects prior to such activities taking place. Based on weather conditions and other proposed activities within the airshed, a decision is made by the MT/ID Airshed Group as to whether or not a burn can be implemented on a given day.

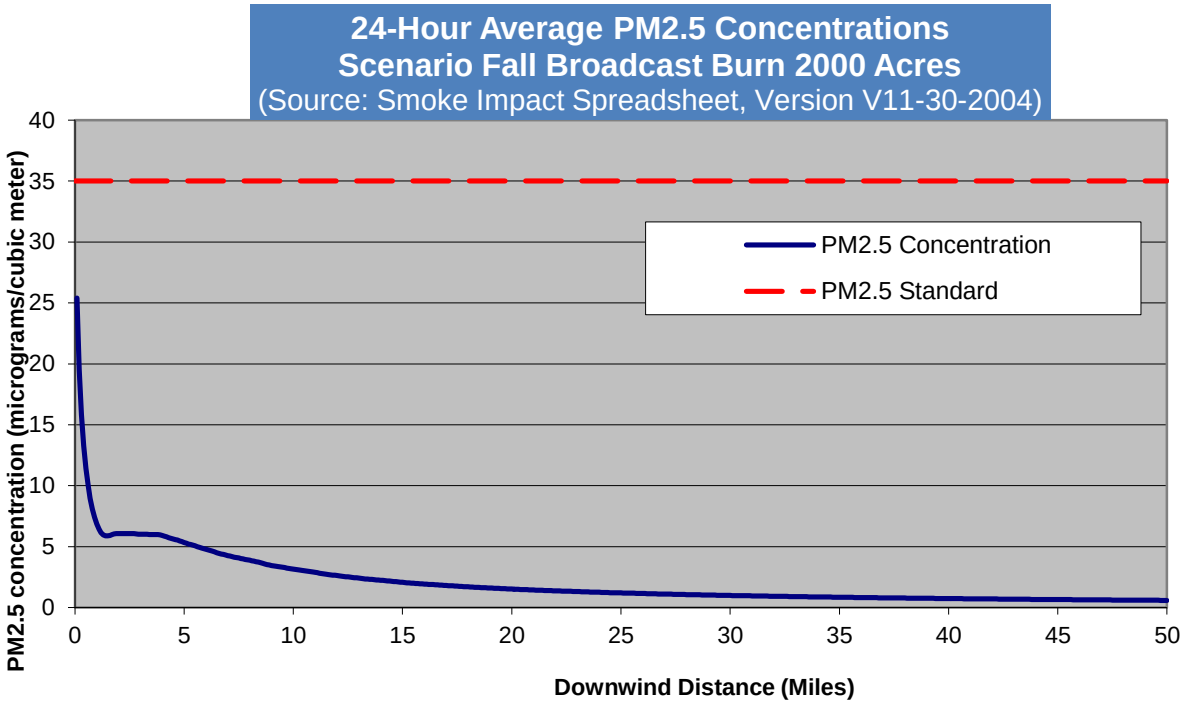


Figure 3-20. Twenty-four hour $PM_{2.5}$ standard SIS results of proposed underburn activities (fall) in micrograms per cubic meter (y axis) and distance from source in miles (x axis)

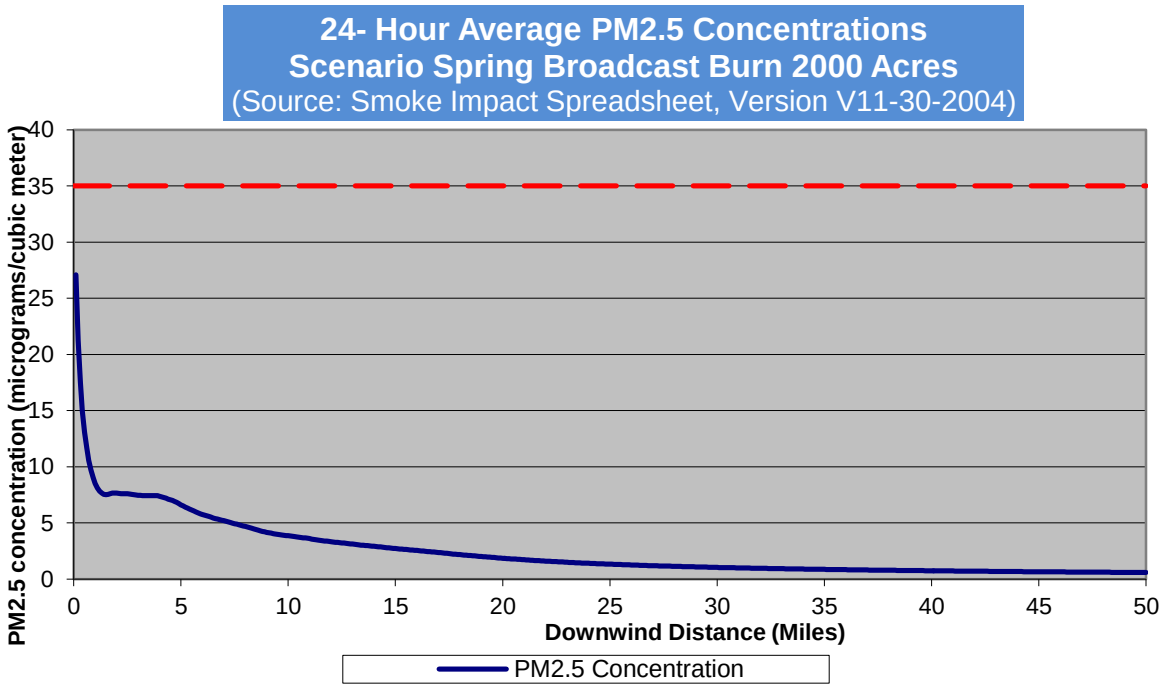


Figure 3-21. Twenty-four hour $PM_{2.5}$ standard SIS results of proposed underburn activities (spring) in micrograms per cubic meter (y axis) and distance from source in miles (x axis)

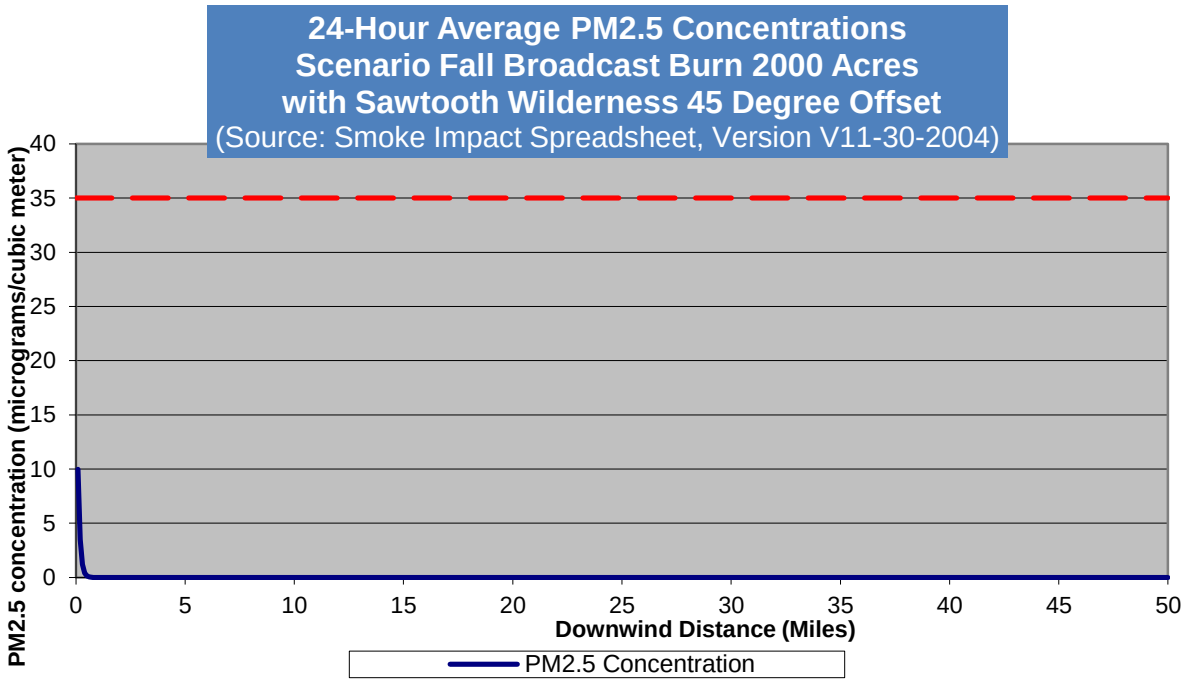


Figure 3-22 .Twenty-four hour $PM_{2.5}$ standard SIS results of proposed underburn (fall) activities with Sawtooth Wilderness 45 degree offset in micrograms per cubic meter (y axis) and distance from source in miles (x axis)

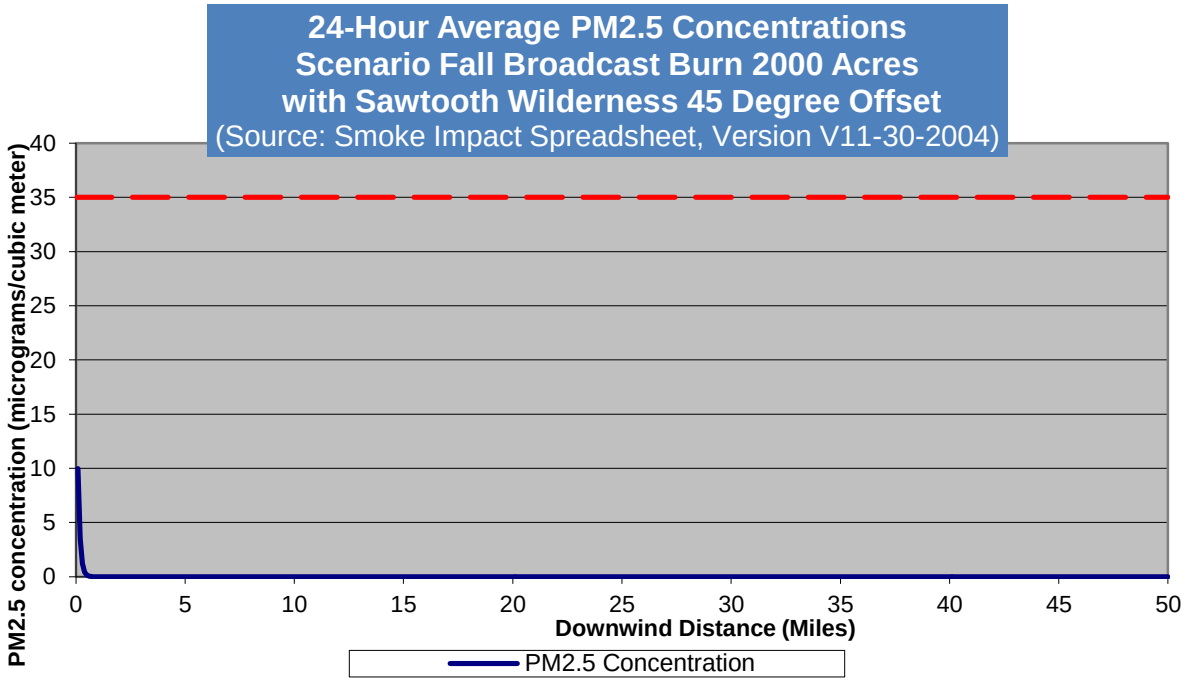


Figure 3-23. Twenty-four hour $PM_{2.5}$ standard SIS results of proposed underburn (spring) activities with Sawtooth Wilderness 45 degree offset in micrograms per cubic meter (y axis) and distance from source in miles (x axis).

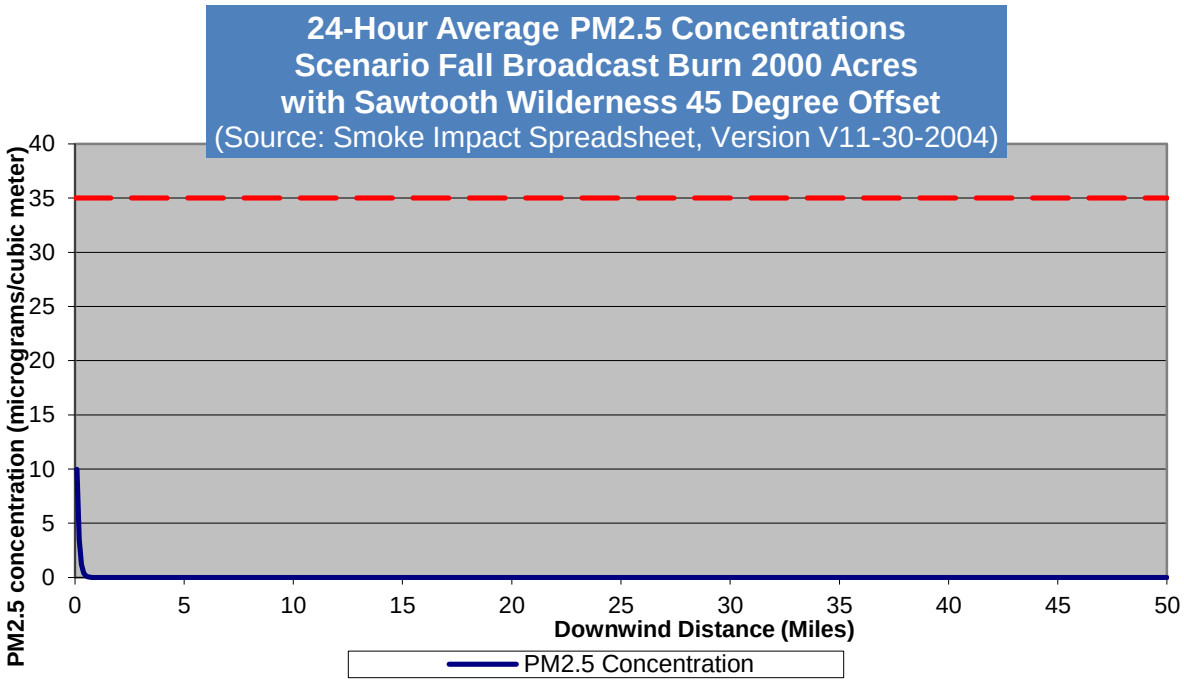


Figure 3-24. Twenty-four hour $PM_{2.5}$ standard SIS results of proposed landing pile burn activities in micrograms per cubic meter (y axis) and distance from source in miles (x axis)

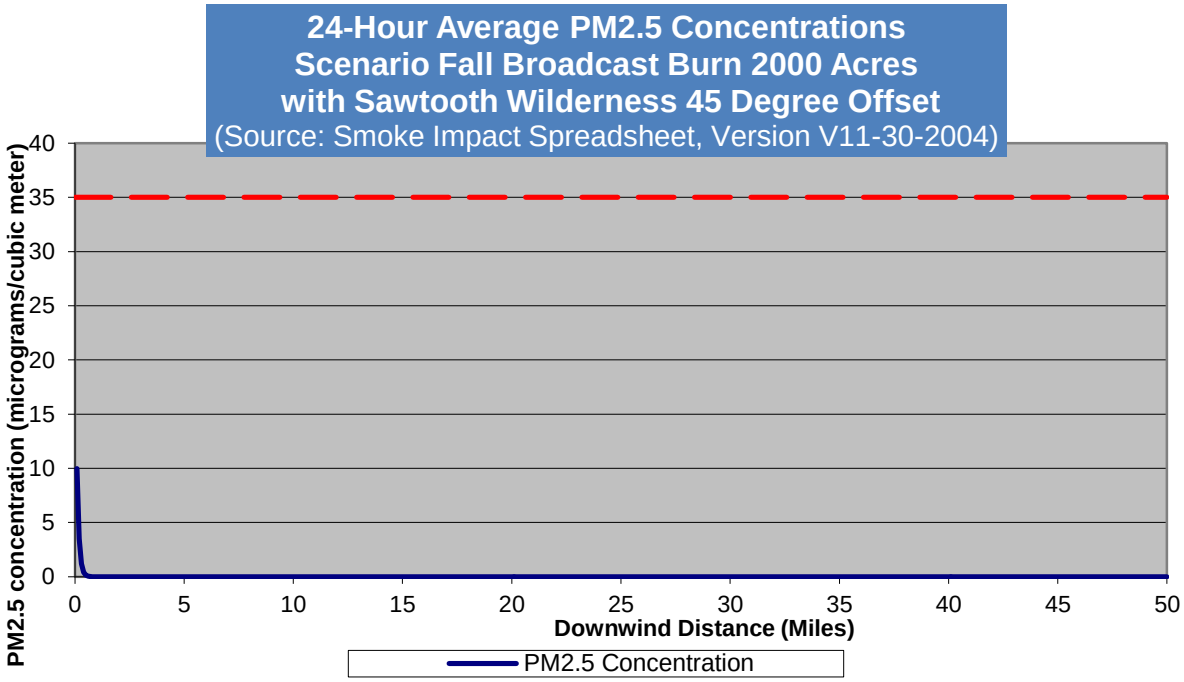


Figure 3-25. Twenty-four hour $PM_{2.5}$ standard SIS results of proposed[37] hand pile burn activities in micrograms per cubic meter (y axis) and distance from source in miles (x axis)

[37]

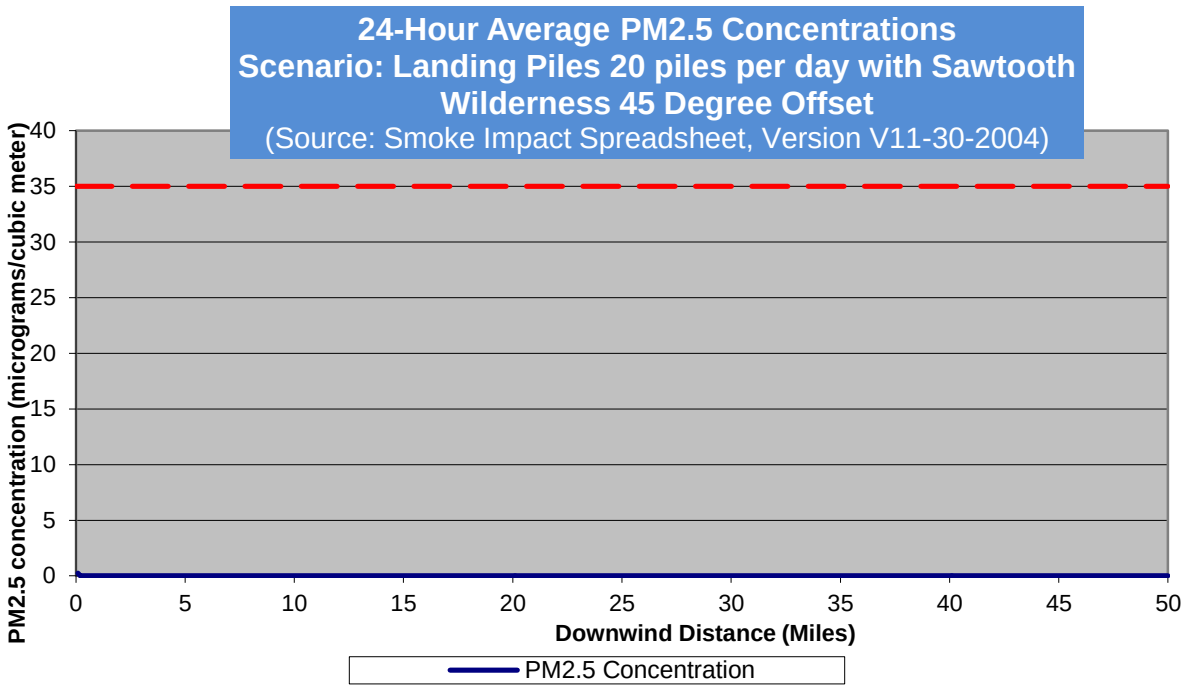


Figure 3-26. Twenty-four hour PM2.5 standard SIS results of proposed landing pile burn activities with Sawtooth Wilderness 45 degree offset in micrograms per cubic meter (y axis) and distance from source in miles (x axis)

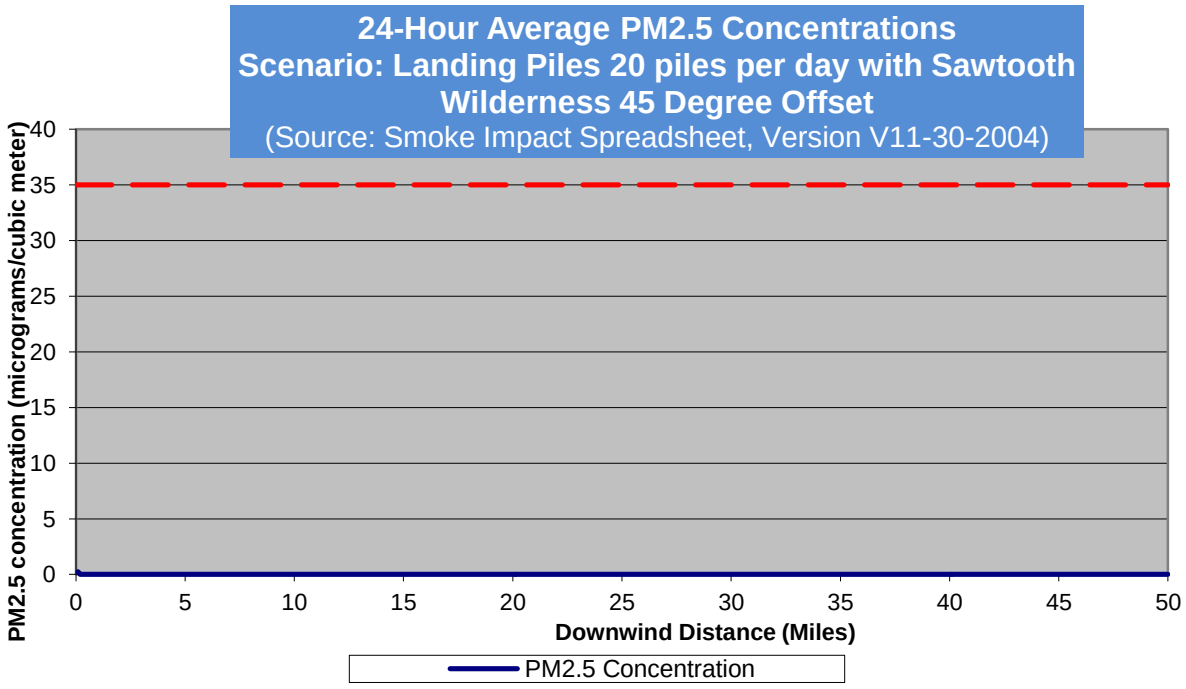


Figure 3-27.Twenty-four hour $PM_{2.5}$ standard SIS results of proposed hand pile burn activities with Sawtooth Wilderness 45 degree offset in micrograms per cubic meter (y axis) and distance from source in miles (x axis)

3.4.4.2 Cumulative Effects

Appendix B, Table B-1, outlines the past, ongoing, and foreseeable actions evaluated for inclusion in this analysis. Past, present, and ongoing activities that are likely to continue include recreation, road use and maintenance, livestock grazing, vegetation management, and fire suppression. Reasonably foreseeable future actions considered in this cumulative effects analysis include burning activities associated with the present/ongoing timber sales (Rock Creek and Low Rock ReRun) located to the northwest of the project area. The fuel treatment activities with these sales would be limited to burning of landing piles. Other reasonably foreseeable future actions would include prescribed burning of hand piles associated with the Lowman Wildland Urban Interface (WUI) Corridor and Clear Creek Noncommercial Thinning, located northeast of the project area.

Alternative A—No Action

Because Alternative A does not proposed to implement any management activities that would have a direct or indirect effect on air quality, no cumulative impact on air quality would occur in the analysis area under Alternative A.

Action Alternatives

Smoke, dust, and vehicle emissions that result from any of the action alternatives could combine with air pollutants from other projects, including other prescribed fires, wildfires, mining activities, and/or recreation uses on adjacent National Forest System, State, and private lands. Each of these activities is largely driven by seasonal opportunities or requirements that present similar parameters on resource managers, landowners, and users to conduct their activities simultaneously. Even though the impacts of these activities are largely unknown, of short duration, and widely spaced over vast, complex terrain, cumulative impacts to air quality could occur at localized sites, if activities are implemented at the same time.

The Boise National Forest is a member of the MT/ID Airshed Group and would use the services of their meteorologist and the most appropriate smoke monitoring unit to determine appropriate days for implementing burning without exceeding NAAQS. Should a cumulative airshed problem be detected, immediate action would be taken to curtail this Project’s contribution by delaying or coordinating timing of burning operations.

3.5 WILDLIFE

3.5.1 Wildlife Habitat

3.5.1.1 Old Forest and Large-tree Habitat—Families 1 and 2

Old-forest habitat is an important source habitat condition that provides essential denning, nesting, foraging, and cover habitat for many wildlife species. Appendix E of the Forest Plan (USDA Forest Service 2010a, p. E-25) describes desired attributes of old forest habitat by PVG. These include canopy cover of live trees ≥20 inches dbh; canopy cover of live trees ≥0.1 inch dbh; species composition of live trees ≥20 inches dbh; snag quantities per acre; and quantities of coarse woody debris (CWD) per acre (USDA Forest Service 2010a, p. E-24). These habitats may vary extensively by tree size, age class, and presence and abundance of structural elements, depending on habitat type, site quality, climate, and disturbance patterns (Table 3-39).

Table 3-39. Definitions for old forest habitat within Potential Vegetation Groups that occur within the analysis area, measured at the stand level

Strata	PVG	Stand Scale Fire Regime	Large Tree Canopy Cover	All Tree Canopy Cover	Large Tree Species Composition	Snag Density (10–19.9 inches dbh)	Snag Density (≥20 inches dbh)	Coarse Woody Debris (CWD) Tons/Acre (≥3 inches diameter)	Percentage of CWD in the large log size class (≥15 inches diameter)
A	1	Nonlethal	≥30%	≥30% and <70%	PP ≥60%	≥1	≥1	≥6	>75%
	2	Nonlethal	≥30%	≥30% and <70%	PP ≥60%	≥2	≥2	≥9	>75%
B	3	Mixed1-Mixed2	≥30%	≥50% and <70%	PP and/or DF ≥60%	≥2	≥1	≥9	>65%
C	4	Mixed1-Mixed2	≥30%	≥50% and <70%	D F≥60%	≥2	≥1	≥9	>65%
D	7	Mixed2	≥30%	≥50% and <70%	DF ≥60%	≥3	≥2	≥12	>50%

Affected Environment

The analysis area for old forest and large tree habitat includes all stands within the 19,327-acre project area with actual or assigned stand examination data. All stands proposed for treatment under the action alternatives are included in the analysis area. This area was selected due to the availability of stand data used to project trends in stand conditions through time under the different alternatives. Changes to vegetation structural characteristics from the action alternatives was confined to the analysis area.

Large tree habitat is an important foundational component of old forest that has been identified at the scale of the Forest as being below desired quantities in nonlethal and mixed1 fire regimes. Large tree habitat can be a critical building block to restoring old forest habitat when quantities and distribution of old forest do not reflect historic conditions. These forests can provide foraging and breeding habitat for many wildlife species that also use old forest.

Within the project area, the topography, aspect, terrain, elevation, and vegetation community create a diverse and complicated mix of forested habitat types and categorized PVGs. This complexity created a stratification of those habitat types and PVGs. In some cases, classified stands displayed habitat types representative of multiple PVGs, which resulted in stands being classified as multiple PVGs in the silvicultural analysis (Table 3-40; see vegetation section 3.2). This added complexity made assessing old forest in the project area difficult based on how old forest habitat characteristics area assessed (USDA Forest Service 2010a, Appendix E).

Table 3-40. Detailed silvicultural stratum–Potential Vegetation Group (PVG) crosswalk table for the project area (adapted from vegetation section)

Stratum	Primary PVG	Fire Regime	Included PVG(s)	Cover Types[a]	Description
A	1 and 2	Nonlethal	1,1/2, 2	PP, DF, LP	Presence of ponderosa pine primary indicator. Many stands dominated by DF or LP due to fire exclusion and past activities
		Nonlethal/ Mixed1	1/2, 1/3, 2, 2/3, 2/4, 2/7, 4		
		Mixed1	2		
B	3	Mixed1	2/3, 3	DF, PP, LP	Predominately PVG 3 or wetter/cooler range of PVG 2. PP occurs but not dominant. Higher percentage of less fire-tolerant, more shade-tolerant species.
C	4	Mixed1	4	DF, LP	DF is primary species but some stands are dominated by LP. PP is more common than in other PVG4 stands on the Boise National Forest.
D	7	Mixed1	2/7, 3, 3/7, 4/7, 7	DF, LP, PP	Predominately PVG7 or wetter/cooler extremes of PVG2, PVG3, PVG4. DF presence throughout. Subalpine fir and LP common, PP rare except on warmer drier microsites.
		Mixed1/ Mixed2	2/7, 3/7, 4/7, 7	DF, LP	
		Mixed2	7	DF, LP, SF	

[a]PP = ponderosa pine. DF = Douglas-fir. LP = lodgepole pine. AF = subalpine fir. SF = Englemann spruce and subalpine fir

The Forest Plan provides historical estimates for large tree size class and old forest by PVGs (USDA Forest Service 2010a, Appendix A, Table A-5 and Appendix E, Table E-3). While these estimates (Table 3-41)were meant to be applied to scales above the site- or project-level, they do provide some reference information to assess current conditions in the project area and what would have been expected historically, particularly for PVGs within the

nonlethal and mixed1 fire regimes. Forests within these fire regimes tended to be fairly homogeneous with relatively small patches (≤600 acres) created by fire disturbances. These fire regimes occur on 10,117 acres within the project area. This area is large enough relative to historical patch size to expect that large tree size class and old forest would be present in the project area. Therefore, reference acreage based on historical estimates provides a meaningful method of comparing current versus historical conditions in the nonlethal and mixed1 fire regimes. This comparison does not work in mixed2 and lethal fire regimes where patch size created by fire disturbances can be many thousands of acres. The mixed2 fire regime totals 1,684 acres in the project area. No stands are classified as within the lethal fire regime. Based on historical fire regimes and patch size, all, none, or a portion of mixed2 types within the project area would have been in the large tree size class or old forest conditions at any point in time.

Large tree size class occurs on approximately 2,983 acres or 15% of the project area (Table 3-41), which is below historical estimates in the nonlethal fire regime and within historical ranges for mixed1and mixed2 fire regimes.

No individual stand exhibits the complete array of desired characteristics for old forest (Table 3-41). While large tree stands are present in the project area, these stands lack other components of old forest, including sufficient large tree canopy closure, snags and down log densities, and or tree species compositions (see "Vegetation" section).

Table 3-41. Existing old forest and large tree size class by Potential Vegetation Group (PVG) for the project area

Description	Measure	Stratum A		Stratum B	Stratum C	Stratum D	Total
		PVG 1	PVG 2	PVG 3	PVG 4	PVG 7	
		Non-lethal	Non-lethal	Mixed1	Mixed1	Mixed1-Mixed2	
Acres		11,470		2,366	957	3,786	18,579[a]
Large Tree Size Class Historical Estimates[b]	Percent PVG	47–91	59–80	23–41	20–34	10–21	—
	Reference Acres for Analysis Area	6,767–9,176[d]		544–970	191–325	378–795	—
Large Tree Size Class	Acres	1,545		507	191	740	2,983
Old Forest Historical Estimates[c]	Percent PVG	17–49	17–49	19–35	23–34	23–34	—
	Reference Acres for Analysis Area	1,950–5,620		450–828	220–325	871–1,287	—
Old Forest	Acres	0	0	0	0	0	0

aTotal does not include persistent lodgepole pine (PVG 10), which does not develop old forest conditions considered source habitat for focal species or species of concern (USDA Forest Service 2010a, p. E-26). Locally, some lodgepole pine may reach ≥20 inches dbh; however, these trees are rarely abundant enough for the stand to classify into the large tree size class. This total also does not include non-forest habitats within the project area.

b,cThese estimates are more appropriately applied at the watershed and higher scales, but are shown here to provide some reference for current conditions.

dReference Acres for Silviculture Strata A (PVGs 1 and 2) are based upon PVG 2 historical distributions, as PVG 2 represents the vast majority of Strata A (see "Vegetation" section).

These conditions are not surprising based on the management history of the area. Nearly all of the stands have been affected to some degree by timber sales, salvage sales, or wildfire. Harvest activity dates back to the late 1950s and continued into the 1990s. These sales often

removed large live trees and snags. For many years, ponderosa pine was the favored species for removal. Extensive salvage sales also cover much of the area and, at various times, removed diseased, insect-infested, or fire-killed trees. Roads occur throughout the area (160.7 miles, 5.3 mi/mi^2) and many (87 miles, 2.9 mi/mi^2) remain open today, providing access for firewood gatherers and the ongoing removal of snags from the area. Fire suppression has also disrupted historical fire disturbances and regimes, resulting in additional changes to vegetation structure and composition.

Environmental Consequence

Indicators include abundance of large tree size class and old forest by PVG. The stand components used to describe old forest (large tree canopy cover, stand canopy cover, species composition, snag density, and CWD tonnage and size distribution) provide additional indicators to assess trends in moving stands toward old forest conditions. These indicators were assessed immediately following implementation (2014) and about 30 years post-implementation (2044). Graphs and additional discussion for the representative stand modeling are found in the vegetation technical report (project record).

Table 3-42 assess the change in Large Tree and Old Forest habitats in the project area by alternative. With Large Tree Size Class Stands, all alternatives would result in an increase acres of large tree habitat over the mid to long term. However, the action alternatives (Alternatives B–F) would result in a greater rate of increase, in particular PVGs 1 and 2, where by 2044, the increase would be roughly 400 acres greater than Alternative A.

Table 3-42. Change in large tree size class and old forest abundance by Potential Vegetation Group (PVG), year, and alternative

Indicator	Year	Alternative	PVG 1 and PVG 2 (11,470 ac)	PVG 3 (2,366 ac)	PVG 4 (957 ac)	PVG 7 (3,786 ac)	Total
Large Tree Size Class (acres)	2014	Existing	1,545	507	191	740	2,983
Change in acres from Existing Condition	2024	Alternative A	2,494	543	223	790	4,050
		Alternatives B, C, F	2,548	543	223	761	4,075
		Alternative D	2,548	543	223	761	4,075
		Alternative E	2,548	543	223	905	4,219
	2044	Alternative A	4,609	543	291	1,318	6,761
		Alternatives B, C, F	5,000	666	319	1,096	7,081
		Alternative D	5,000	680	319	1,096	7,081
		Alternative E	5,037	666	319	1,249	7,271
Old Forest (acres)	2014	Existing	0	0	0	0	0
Change in acres from Existing Condition	2024	All Alternatives	0	0	0	0	0
	2044	Alternative A	0	0	0a	0	0a
		Alternatives B, C	0	0	0b	0	0b

As noted above, no stands within the project area fully develop Old Forest characteristics. By 2044, some stands meet some old forest definitions. However, several features, including species composition and snag and large wood densities, would still be deficient.

Table 3-43 assess trends in development of old forest habitat in the project area for the criteria that defines Old Forest habitat criteria in Appendix E of the Forest Plan (USDA Forest Service 2010a, Appendix E, Table E-2, USDA Forest Service 2010a) as it relates to the alternatives considered for this project. This table assess the trends in changes to each of the Old Forest attributes considered as an indicator of effects to those attributes.

Table 3-43. Value trend[a,b] in stand components describing old forest based on the large tree size class in each Potential Vegetation Group (PVG[c]) as compared with the existing condition (*bold* text indicates assessed average that falls within the desired condition described for individual old forest stands[c])

PVG	Description	Old Forest Habitat Attributes						
		Large Tree Canopy Cover	Stand Canopy Cover	Species Composition of Live Trees ≥20 inches dbh	Number of Snags per Acre by Size Class		Coarse Woody Debris	
							Tons/Acre	Percent Tons/Acre
					10–19.9 inch	≥20 inch	≥3 inch	≥12 inch
1/2	Desired Conditions for Individual Stands	≥30%	≥30% and <70%	PP≥60%	≥2	≥2	≥9	≥75%
1/2	Existing	15.5	**44.2**	29.7	**2.4**	1.0	5.3	5.2%
	Alt. A	0/+	**+/+**	-/++	**++/+++**	+/++	+/+	+++/+++
	Alt. B/C/F	-/+	**-/-**	+/++	**+++/+**	++/+	--/-	+++/+++
	Alt. D	-/+	**-/-**	+/++	**+++/+**	++/+	--/-	+++/+++
	Alt. E	-/+	**-/-**	-/++	**+++/+**	++/+	--/-	+++/+++
3	Desired Conditions for Individual Stands	≥30%	≥50% and <70%	PP and/or DF ≥60%	≥2	≥1	≥9	≥65%
3	Existing (baseline)	18.7	45.5	**94.3**	**5.7**	**1.7**	5.9	7.2%
	Alt. A	+/+	**+/+**	**0/-**	**+/+**	**++/+++**	**+/++**	+++/+++
	Alt. B/C/F	+/+	-/-	**+/+**	**+/--**	**++/++**	--/+	+++/+++
	Alt. D	+/+	-/-	**+/+**	**+/--**	**++/++**	--/+	+++/+++
	Alt. E	+/+	-/+	0/-	**++/-**	**++/+++**	--/+	+++/+++
4	Desired Conditions for Individual Stands	≥30%	≥50% and <70%	DF ≥60%	≥2	≥1	≥9	≥65%

PVG	Description	Old Forest Habitat Attributes						
		Large Tree Canopy Cover	Stand Canopy Cover	Species Composition of Live Trees ≥20 inches dbh	Number of Snags per Acre by Size Class		Coarse Woody Debris	
							Tons/Acre	Percent Tons/Acre
					10–19.9 inch	≥20 inch	≥3 inch	≥12 inch
4	Existing (baseline)	20.9	**51.6**	**91.8**	**4.6**	**3.0**	6.2	9.4%
	Alt. A	-/0	**+/+**	**0/-**	**+/+**	**+/+**	+/++	++/+++
	Alt. B/C/F	-/-	-/-	**+/-**	**+/-**	**+/-**	--/+	+++/+++
	Alt. D	-/-	-/-	**+/-**	**+/-**	**+/-**	--/+	+++/+++
	Alt. E	-/-	+/-	**+/-**	**+/-**	**+/-**	--/+	+++/+++
7	Desired Conditions for Individual Stands	≥30%	≥50% and <70%	DF ≥60%	≥2	≥1	≥9	≥65%
7	Existing	17.9	**50.8**	**72.6**	**6.8**	**2.7**	**8.2**	11.6%
	Alt. A	+/-	**+/+**	**-/-**	**++/++**	**+/++**	**+/+++**	+++/+++
	Alt. B/C/F	0/-	-/-	**-/-**	**+++/-**	**++/+**	--/**++**	+++/+++
	Alt. D	0/-	-/-	**-/-**	**+++/-**	**++/+**	--/**++**	+++/+++
	Alt. E	0/-	-/-	**-/-**	**+++/-**	**++/+**	--/**++**	+++/+++

[a]Shown as 'short-term/long-term' for each alternative. Short-term = 2016; long-term = 2044.
[b]Trend: no change = '0', increase = '+', decrease = '-'. Multiple + or – symbols are used to display relative differences between alternatives (e.g., '++' indicates greater increase than '+') for the same timeframe.
[c]Old forest attributes are described for individual stands in the Forest Plan; however, are used to compare trends for all large tree size class stands within a PVG.

Direct and Indirect Effects

Alternative A

Alternative A would have no direct or indirect effects to old forest habitats.

The large tree size class would increase by roughly 1,067 acres in the short term and 3,778 acres in the long term (Table 3-42) under Alternative A. PVGs 1 and 2 would see the most dramatic increase (2,115 acres) in large tree size class stands. The change in large tree habitats would be substantially less dramatic in PVGs 3, 4, and 7. As noted in Table 3-43, the trends in large tree habitat development would be largely positive for all PVGs, with the exception of PVG 7.

Old Forest habitat, meeting all components of habitat features and conditions described in Appendix E of the Forest Plan (USDA Forest Service 2010a), would not develop in Alternative A. Several habitat components, in particular large snags and CWD, would fall below minimums for old forest habitat (Table 3-43). The trend towards desired condition, however, would be positive for those features, particularly over the long term.

Such trends would improve the trend relative to source habitat function for both Family 1 and 2 species for which source habitat exists or would develop in the project area in the short and long term. See specific family and associated focal species discussions for more detailed analysis of those effects.

All Action Alternatives

Actions proposed would not directly reduce or otherwise adversely modify large tree habitat such that there would be a reduction in total acres of that habitat. Likewise, old forest habitat would not be modified, since none exists at the time of this project's implementation.

The action alternatives would result in similar outcomes and trends as it relates to large tree and old forest habitats in the project area. Across all PVGs, the difference in large tree habitat would be less than 3% between action alternatives, with all but PVG 7, which would register a <1% difference (Table 3-42). Likewise, the trends in development of old forest characteristics would also be functionally identical across all action alternatives, with limited difference between alternatives. As such, the effects of those alternatives are considered together in this analysis.

Under Alternatives B, C, D, and F, large tree habitat would increase 1,092 acres in the short term and 4,098 acres in the long term (Table 3-42). Under Alternative E, the increase would be slightly higher in the short term (1,236 acres) and long term (4,288 acres). The slight difference in large tree habitat development would occur in PVG 7, and would be the result of a high degree of retention of large trees in Douglas-fir and sub-alpine fir with the 18-inch diameter limit applied to Alternative E.

Equally important, however, would be the increasing rate and overall development of large tree habitat under the action alternatives compared to under Alternative A. All action alternatives would result in a roughly 3%–6% increase in large tree habitat compared to Alternative A for PVGs 1, 2, 3, and 4 (Table 3-42). PVG 7, however, would actually see reduced acres of large tree habitat under the action alternatives compared to under Alternative A.

For all action alternatives, old forest habitat, as defined in the Forest Plan (USDA Forest Service 2010a, Appendix E), would not develop in the short or long term. As with Alternative A, deficiencies in large snags and CWD, would limit habitats from meeting those definitions. Trends towards old forest habitat would be more complicated under the action alternatives. Outcomes from actions proposed would have mixed short-term and long-term effects on specific habitat features and components, including snag densities of medium and large size class snags and the density and size distribution of CWD. Those trends would be in indirect response to actions proposed under each alternative.

Cumulative Effects

The project area was used as the analysis area for cumulative effects. Past management is reflected in the current or baseline conditions described above. Past management activities include numerous timber sales, salvage sales, fire suppression, wildfire, road-building, road maintenance and use, trail maintenance, fuelwood gathering, and recreational site development. All of these activities have affected large tree and old forest habitats to some degree.

Ongoing activities within the analysis area that could potentially impact old forest habitat are listed below. No foreseeable future actions were identified that would affect large tree size class or old forest stands. See Appendix B for a complete list of activities considered for this analysis.

Alternative A

This alternative would not result in cumulative effects to old forest and large tree habitat features and conditions since it would have no direct or indirect effects to those features.

Action Alternatives

Roads that are maintained on the system continue to represent a long-term commitment of land area dedicated to human uses and preclude the areas from becoming either large tree size class forests or old forest any time in the near future. Road maintenance would continue to preclude those habitats and contribute to the loss of specific habitat features, namely snags and CWD that comprise old forest habitats. The action alternatives would incrementally improve the cumulative effects of road infrastructure by reducing that infrastructure across ML 1 and 2 roads. Over the long term, this reduction would improve large tree and old forest habitats, although such actions wouldn't necessarily contribute in substantial acres of said habitats.

Firewood gathering would continue to reduce snags and logs near roads. These dead wood structural components serve essential roles in large tree and old forest communities and their removal inhibits development of old forest conditions. As noted above, the action alternatives would reduce the miles of roads open to public access, thus improving cumulatively the long-term effects of roads on large tree and old forest habitat conditions.

3.5.1.2 Snag and Down Log Habitat Common to All Habitat Families

Snags and logs are valuable components of healthy and functional ecosystems (Bull et al. 1997, pp. 21–23 and 35–38). These structures are used by wildlife for a wide variety of purposes and are an important component of habitat for many species.

Primary cavity nesters excavate nest cavities in decaying wood of standing dead trees. These cavities are subsequently used by other species, or secondary cavity nesters. Many cavity nesters feed on insects and help regulate local insect populations. The space behind loose bark provides nesting sites for some birds and roosts for bat species. Broken-topped snags also provide suitable nesting platforms for some species. Large diameter snags are particularly important in that they provide nest habitat for the greatest variety of cavity nesters and stand longer than smaller snags (Bull et al. 1997, p. 31).

CWD is also important within forest ecosystems. The decay process of dead trees contributes to nutrient reserves and physical and chemical characteristics of forest soils (Bull et al. 1997, p. 35). Large logs are particularly important as they may persist for several decades. During this time, logs are a source of nutrients and chemical components, aiding in soil development. They increase the water holding capacity of a site and provide microhabitat for a variety of plants, vertebrates, and invertebrates. Logs in or near streams provide habitat structure within riparian areas. Logs serve a variety of functional roles for wildlife, including hiding cover and protection, foraging areas, nesting, denning, food storage sites, sunning, runways, lookout posts, and breeding display walkways.

Several focal wildlife species analyzed in this document utilize snags or logs (Table 3-44).

Table 3-44. Becker Integrated Resource Project focal species that utilize snags and logs

Focal Specie	Source Habitat Family	Snags	Logs/ Coarse Woody Debris	Use
White-headed Woodpecker	Family 1	X		Nesting
Black-backed Woodpecker	Family 2	X		Nesting, foraging
Great Gray Owl	Family 2	X		Nesting
Flammulated Owl	Family 2	X		Nesting
Northern Goshawk	Family 2		X	Resting, observation posts
Pileated Woodpecker	Family 2	X	X	Nesting, foraging
Canada Lynx	Family 3		X	Denning, cover
Gray Wolf	Family 5		X	Denning
Rocky Mountain Elk	Family 5		X	Hiding cover for calves
Columbia Spotted Frog	Family 13		X	Create habitat (ponds/pools), sunning, cover

The Forest Plan describes the desired condition for snags and coarse woody debris (USDA Forest Service 2010a, Appendix A). These conditions are within the range of what would have been expected under historical disturbances and fire regimes. The sustainability of desired wildlife species on the Forest is tied to vegetation characteristics, including snag and CWD components, and with maintaining or moving vegetation toward desired conditions described in the Forest Plan.

Affected Environment

The analysis area for snags and down logs includes the project area stands that have been inventoried or have data assigned through the most similar neighbor process (see "Vegetation" section). The project area totals 19,327 acres. Stand examination data and the Forest Vegetation Simulator (FVS) were used to project existing and future density and trends for snags and down logs.

Snags are currently within or exceed desired conditions for all considered PVGs (Table 3-45). Medium size class snags across all but PVGs 1 and 2 exceed expected density ranges, while large size class snags are within expected ranges, with the exception of PVG 4, which exceeds. Endemic insect and disease disturbances may, in part, be contributing to current snag densities, especially given that stand conditions (particularly in the nonlethal fire regimes) are outside of desired conditions for density and canopy complexity. Mixed1 and mixed2 fire regimes are likely expressing the effects of insect and disease disturbances.

Table 3-45. Existing snag densities by Potential Vegetation Group (PVG) relative to desired condition (DC) (USDA Forest Service 2010a, p. A-11)

	Diameter Group (in inches)	Nonlethal		Mixed1		Mixed1-Mixed2
		PVG 1	PVG 2	PVG 3	PVG 4	PVG 7
		11,470 ac		2,366 ac	957 ac	3,786 ac
Desired Condition (DC)	10–19.9	0.4–0.5	1.8–2.7	1.8–4.1	1.8–2.7	1.8–5.5
	≥20	0.4–2.3	0.4–3.0	0.2–2.8	0.2–2.1	0.2–3.5
	Total	0.8–2.8	2.2–5.7	2.0–6.9	2.0–4.8	2.0–9.0
Existing Condition-2012	10–19.9	2.4		5.7	4.6	6.8
	≥20	1.0		1.7	3.0	2.7
	Total	3.4		7.4	7.6	9.5
	Status based on DC	Within or Exceeds DC		Within or Exceeds DC	Exceeds DC	Within or Exceeds DC

CWD is within the desired ranges for each PVG (Table 3-46). In most cases, however, existing conditions are within the lower end of the range identified in the Forest Plan (USDA Forest Service 2010a, Appendix A, p. A-11). The size distribution of CWD is also below desired conditions (Table 3-46). Modeled data may have substantially underestimated existing conditions of CWD (forested vegetation technical report [project record].

Table 3-46. Existing condition for coarse woody debris by Potential Vegetation Group (PVG) relative to desired condition (USDA Forest Service 2010a, p. A-11)

	Indicator	Nonlethal		Mixed1		Mixed2
		PVG 1	PVG 2	PVG 3	PVG 4	PVG 7
		11,470 ac		2,366 ac	957 ac	3,786 ac
Desired Condition (DC)[a]	Tons/acres in Decay Classes I and II	3–10	4–14	4–14	4–14	5–19
	Distribution ≥15 inches	>75%	>75%	>65%	>65%	>50%
Existing Condition (2012)	Tons/acres in Decay Classes I and II	5.3		5.9	6.2	8.2
	Distribution ≥12 inches	5.2%		7.2%	9.4%	11.6%
	Status relative to DC	Within Range for Density; Below for Distribution		Within Range for Density; Below for Distribution	Within Range for Density; Below for Distribution	Within Range for Density; Below for Distribution

[a] USDA Forest Service 2010a, Appendix A, Table A-7 assesses distribution of large wood as a percent of total tonnage ≥15 inches dia. However, data used for this analysis only analyzes coarse woody debris ≥12 inches diameter. The data set is adapted for this analysis, recognizing that difference, and what would end up being an over estimation of percent distribution of large coarse wood when considering those additional pieces between 12 and 14.9 inches diameter.

Roads open for firewood collection can affect the amount and distribution of snags and logs. Road densities provide additional insight into PVGs that may be affected by reduced snags and logs due to fuelwood program. Road density is an indicator of risks to species conservation, including those species that use snags and logs. For species at risk to snag and log reduction, low road densities are described as the desired condition. Road densities are low (<0.7 mi/mi2) in PVG 1, moderate (≥0.7 and < 1.7 mi/mi2) in PVGs 2 and 4, and high (≥1.7 mi/mi2) in PVGs 3 and 7. Roads are likely contributing to snag and log reduction in portions of the project area, although they do not appear to constraining meeting desired range of conditions, which would likely be a function of the location of roads as they relate forested habitats. Topography has largely limited roads to either drainage bottoms or along steeper slopes, which would likely limit access for firewood cutters or other sources of removal.

Environmental Effects

Direct and Indirect Effects

Alternative A

Since no actions are proposed under Alternative A, this alternative would have no direct effects to snag or CWD in the project area.

Under Alternative A, snags densities would increase in the short and long term (Table 3-47). All PVGs would be within or above the desired ranges, with the exception of PVGs 2 and 4 where medium size (10–19.9 inches diameter) snags would remain below desired levels in the short term but exceed desired conditions in the long term. Snags would be available across the landscape and would provide habitat for wildlife and future recruitment of large logs. These changes would be from the continued development of stands into later seral conditions. The expected increases in stand density would lead to periodic insect and disease disturbances, which would contribute additional snag habitats.

Total CWD would be within desired conditions for all PVGs (Table 3-48). Large logs (pieces ≥15 inches diameter) would remain below desired conditions for all PVGs (Table 3-48). Generally, CWD and large logs would increase relative to the existing condition. This increase would represent an improving trend for wildlife that use the down woody component. Similar to snags, this increase would occur in conjunction with the development of forested stands and the increasing stand densities that would occur in the absence of large scale disturbances. With those changes, periodic insect and disease disturbances would contribute to future CWD recruitment.

Road-associated risks would remain unchanged under Alternative A for down logs.

Table 3-47. Snag density status relative to desired condition (USDA Forest Service 2010a, p. A-11) and total density trends relative to existing condition, by Potential Vegetation Group (PVG), year, and alternative

	Diameter Group (in inches)	Nonlethal		Mixed1		Mixed2
		PVG 1	PVG 2	PVG 3	PVG 4	PVG 7
		11,470 ac		2,366 ac	957 ac	3,786 ac
Desired Condition (DC)	10–19.9 (medium)	0.4-0.5	1.8-2.7	1.8-4.1	1.8-2.7	1.8-5.5
	≥20 (large)	0.4-2.3	0.4-3.0	0.2-2.8	0.2-2.1	0.2-3.5
	Total	0.8-2.8	2.2-5.7	2.0-6.9	2.0-4.8	2.0-9.0
Existing (2012)						
Existing Condition	Status based on Desired Condition	Within or Exceeds DC		Within or Exceeds DC	Exceeds DC	Within or Exceeds DC
Short-term (2024)						
Alternative A	Status	Within or Exceeds DC		Within or Exceeds DC	Exceeds DC	Within or Exceeds DC
	Trend	++/+		+/++	+/+	++/+
Alternative B, C, F	Status	Within or Exceeds DC		Within or Exceeds DC	Exceeds DC	Exceeds DC
	Trend	+++/++		+/++	+/+	+++/++
Alternative D	Status	Within or Exceeds DC		Within or Exceeds DC	Exceeds DC	Exceeds DC
	Trend	+++/++		+/+	+/+	+++/++
Alternative E	Status	Within or Exceeds DC		Within or Exceeds DC	Exceeds DC	Exceeds DC
	Trend	+++/++		+/+	+/+	+++/++
Long-term (2044)						
Alternative A	Status	Within or Exceeds DC		Exceeds DC	Exceeds DC	Within or Exceeds DC
	Trend	+++/++		+/+++	+/+	++/++
Alternative B, C, F	Status	Within DC		Within DC	Exceeds DC	Within DC
	Trend	+/+		--/++	-/-	-/+
Alternative D	Status	Within DC		Within DC	Exceeds DC	Within DC
	Trend	+/+		--/++	-/-	-/+
Alternative E	Status	Within DC		Within or Exceeds DC	Exceeds DC	Within DC
	Trend	+/+		-/+++	-/-	-/+

Trend Assess as follows – Medium Snags/Large Snags

Trend Symbols are as follows - . if the change from existing condition is less than 1% = 0, if change >1% up to 33% = "-" or "=+"; if >33 up to 66 % = "—" or "++"; if >66% = "---" or "+++"

Table 3-48. Coarse woody debris status relative to desired condition (USDA Forest Service 2010a, p. A-11) and total density/large log trends relative to existing condition, by Potential Vegetation Group (PVG), year, and alternative

	Diameter Group	Nonlethal		Mixed1		Mixed2
		PVG 1	PVG 2	PVG 3	PVG 4	PVG 7
		11,470 ac		2,366 ac	957 ac	3,786 ac
Desired Condition (DC)[a]	Tons/acre in Decay Classes I and II	3–10	4–14	4–14	4–14	5–19
	Distribution ≥15 inches	>75%	>75%	>65%	>65%	>50%
Existing (2012)						
Existing Condition	Status based on Desired Condition	Within Tons/Acre; Below for Distribution		Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution
Short-term (2024)						
Alternative A	Status	Within Tons/Acre; Below for Distribution		Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution
	Trend	+/+++		+/+++	+/++	+/+++
Alternative B, C, F	Status	Below Tons/Acre and Distribution		Below Tons/Acre and Distribution	Below Tons/Acre and Distribution	Below Tons/Acre and Distribution
	Trend	--/+++		--/+++	--/+++	--/+++
Alternative D	Status	Below Tons/Acre and Distribution		Below Tons/Acre and Distribution	Below Tons/Acre and Distribution	Below Tons/Acre and Distribution
	Trend	--/+++		--/+++	--/+++	--/+++
Alternative E	Status	Below Tons/Acre and Distribution		Below Tons/Acre and Distribution	Below Tons/Acre and Distribution	Below Tons/Acre and Distribution
	Trend	--/+++		--/+++	--/+++	--/+++

	Diameter Group	Nonlethal		Mixed1		Mixed2
		PVG 1	PVG 2	PVG 3	PVG 4	PVG 7
		11,470 ac		2,366 ac	957 ac	3,786 ac
Long-term (2044)						
Alternative A	Status	Within Tons/Acre; Below for Distribution		Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution
	Trend	+/+++		++/+++	++/+++	+++/+++
Alternative B, C, F	Status	Within Tons/Acre; Below for Distribution		Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution
	Trend	-/+++		+/+++	+/+++	++/+++
Alternative D	Status	Within Tons/Acre; Below for Distribution		Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution
	Trend	-/+++		+/+++	+/+++	++/+++
Alternative E	Status	Within Tons/Acre; Below for Distribution		Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution	Within Tons/Acre; Below for Distribution
	Trend	-/+++		+/+++	+/+++	++/+++

Note: Trend assessed as follows—Tons per acre/percent distribution ≥15 inches diameter
Trend symbols are as follows —If the change from existing condition is less than 1% = 0, if change >1% up to 33% = "-" or "=+"; if >33 up to 66 % = "—" or "++"; if >66% = "---" or "+++"
[a]USDA Forest Service 2010, Appendix A, Table A-7

All Action Alternatives

Proposed vegetation and fuels treatments for each action alternative are largely the same across all action alternatives with two minor exceptions. Alternative D would treat an additional 182 acres. Alternative E would implement an upper diameter restriction of ≥18 inches dbh. However, there is functionally no difference in trend regarding snags and CWD between the different action alternatives (Table 3-47 and Table 3-48). As such, all alternatives are discussed together in this section.

The following actions would be expected to affect snag and CWD habitats under theM action alternatives:

- OSHA mitigations around mechanical vegetation treatments
- Secondary effects associated with logging systems
- Secondary effects associated with temporary road construction, temporary opening of ML 1 roads in support of mechanical treatments, and use of skid trails and other harvest infrastructure
- Implementation of fuels and natural fuels treatments
- Recreational trail maintenance and development

Each of these actions would result in some level of modification or loss of snag and CWD habitats in areas where such activities would occur. Mechanical treatment would primarily modify snags and CWD as they relate to safety issues and meeting OSHA requirements for a safe working environment. Impacts would be focused around roads, landings, and skid trials or other harvest infrastructure.

Implementing natural fuels prescriptions and actions would also directly affect snag and CWD habitats by both consuming and creating those habitats across the project area. Of particular interest and concern would be changes to the types of individual habitats lost and gained through that process. A net loss of older decay class habitats and a net gain of harder, recently killed snags would be expected. Given existing conditions and a relatively limited number of large trees compared to historic conditions (vegetation technical report [project record]), a net loss of large snags and net gain in small and medium sized snags may also occur.

The following design features would be implemented with each action alternative to help mitigate some of those effects: WR-5 (flammulated owl nest site buffering), WR-7 (prescribed fire implementation coordination), WR-9 (snag retention guidelines), WR-10 (snag sign placement along open road corridors), and WR-15 (public access limitation to temporary and ML 1 roads during harvest implementation). These design features would work to limit to the extent practicable effects to these habitat features.

In the short term, models indicate snags in both size classes would increase post implementation. This increase would likely be a function of primary and secondary effects of activity and natural fuels treatments, particularly for medium size class snags. In the long term, that trend would continue at a reduced rate for both size classes in PVGs 1 and 2 and large sized snags in PVGs 3, 4, and 7. Medium sized snags would see a negative trend in those PVGs, mostly due to reduced secondary effects of endemic insects and disease related mortality, which would reduce density of the medium tree size class. Snags would continue

to be within or exceeding desired conditions as described in the Forest Plan (USDA Forest Service 2010a, Appendix A).

For CWD, the short term indirect effects would be expected to be negative, in large part because of the effects of the activity and natural fuels treatments proposed. These features would be expected to be consumed in the short term with limited immediate replacement, particularly with the smaller size class habitats. In the long term, that negative trend would continue at a reduced level in PVGs 1 and 2, but improve in PVGs 3, 4, and 7. In all cases, the distribution towards larger individual habitats would be positive over the short and long term. In the short term, CWD densities and size class distribution would be below desired conditions. In the long term, densities would be within desired ranges for all PVGs but still below desired conditions for size class distribution.

Road-related risk of loss of snag and CWD habitats would be reduced with all action alternatives, as each reduces miles of open roads that would be otherwise available for woodcutters to remove those habitats. Alternatives B and E would have the greatest reduction in risk, followed by C and F, and then D which would have the greatest number of miles of open roads.

Cumulative Effects

The analysis area for cumulative effects on snags and CWD is at the project area scale. Past management is reflected in the current or baseline conditions described above. Past management activities include numerous timber sales, salvage sales, fire suppression, wildfire, road building, road maintenance and use, trail maintenance, fuelwood gathering, and recreational site development. All of these activities have affected the snag and log components to some degree.

Ongoing activities within the analysis area that could potentially impact snag and log components in conjunction with the alternatives considered in this analysis are listed below. No foreseeable future activity was identified that could potentially impact snag and log habitat components. See Appendix B for a full list of activities considered in this analysis.

Alternative A

Because Alternative A would have no direct or indirect effects, it would have no cumulative effects to snag and coarse woody debris.

Action Alternatives

Road maintenance indirectly affects snags and logs by maintaining access for campers and firewood gatherers who remove snags and logs from areas adjacent to roads. In conjunction with past road development actions that have created the existing road infrastructure and the vector for snag and CWD removal, Alternative B, C, D, E, and F would reduce the miles of routes open to public access, thereby positively affecting the cumulative effects of access (and road maintenance actions) on those habitat features. Of the action alternatives, Alternatives B and E would have the greatest beneficial effect, followed by Alternatives C and F, and lastly D. This ranking reflects the slight variation in seasonal access of two routes, NFS roads 362F and 394B.

Fuelwood gathering reduces snag and down log densities in habitats adjacent to roads. Impacts are somewhat limited in the project area due to the steepness of the terrain which

prevents off-road travel. Most firewood is removed from the slopes above roads and probably within 150 feet of the road. As described above, changes to open road access under all action alternatives would result in positive cumulative effects to these habitat features by reducing access to those habitats.

Fire suppression disrupts historical fire disturbance patterns resulting in different distributions, both spatially and temporally, of snags and CWD across the landscape than would have occurred historically. Fire starts have been documented across all elevations within the project area and are likely to occur in the future. Implementing each of the action alternatives would result in incremental improvements to the risk of uncharacteristic wildfire events, which would allow for a more natural and desirable function of those habitat features on the landscape.

3.5.2 Source Habitat Families and Associated Wildlife Species

This section includes the documentation for wildlife species identified in Table 1. Species are grouped by their associated source habitat family.

Detailed analysis focuses on species from six source habitat families: 1-Low Elevation Old Forest; 2-Broad Elevation Old Forest; 3-Forest Mosaic; 5-Forest and Range Mosaic; 7-Forests, Woodlands, and Sagebrush; and 13-Riverine Riparian and Wetland. These are the source habitat families potentially affected by the action alternatives.

The Forest Plan (USDA Forest Service 2010a, Appendix E) states that the desired condition for wildlife habitats is to remain within, or move toward, the range of variability that was present under historical disturbance regimes. The risk of losing species, processes, or genetic diversity within populations is thought to increase as the departure from the historical range of variability increases. In addition, if all conditions across the range are represented then it is more likely that the components needed by a broad array of species will be retained.

A forest-wide assessment of source habitat conditions has been conducted for Families 1 through 4[38]. The assessment compared current source habitat to historical conditions using the macrovegetation characteristics described in the Forest Plan Appendix A. Additional risk factors, including road density, range suitability, and noxious weed susceptibility, were also considered. Management concerns and strategies identified during the assessment provided context for evaluation of the Becker Integrated Resources Project. Families 1 and 3 (Suite 1) have been identified as the families of greatest concern for the Boise National Forest (NF).

3.5.2.1 Family 1—Low Elevation Old Forest

All species within Family 1 depend on late seral multi- and single-storied lower montane forests as source habitat; as well as requiring large-diameter (>21 inches) snags or trees with cavities for nesting or foraging (Wisdom et al. 2000). Habitat is generally depicted as relatively homogeneous patches of predominantly large trees in lower canopy cover conditions dominated by ponderosa pine. Family 1 source habitat occurs in PVGs 1, 2, and 5 and those portions of PVGs 3 and 6 where ponderosa pine is a major seral species.

[38] The Wildlife Conservation Strategy is being completed incrementally. Assessments are currently available for families and WCS focal species in Suite 1.

Historically, these types were maintained in a relatively open condition by frequent, nonlethal fire.

The Wildlife Conservation Strategy assessed the condition of source habitats for Family 1 on the Forest (Nutt et al. 2010). Watersheds show a strong decreasing trend from historical to current conditions with 98% of source habitat watersheds having declines of greater than 60%. Declines are attributed primarily to past timber harvest, high road densities, and fire exclusion. Past timber harvest often selectively removed large ponderosa pines and snags, replacing old forest with mid-seral conditions. Roads built to access and remove timber degrade habitat through direct loss and fragmentation, in addition to facilitating the continued removal of large snags for firewood. Roads also facilitate the introduction and spread of noxious weeds. While noxious weeds are not a substantial threat to Family 1 species, these plants contribute to degradation of habitat by affecting fire behavior. Fire exclusion has disrupted the natural disturbance regime within the ponderosa pine dominated forests and resulted in a shift in species composition from ponderosa pine to more shade tolerant species. This shift, in conjunction with timber harvest practices, has increased the risk from uncharacteristic fire events, and affected patch size and distribution on the landscape.

Family 1 has been identified as a family of greatest conservation concern on the Forest this planning period (Nutt et al. 2010). The Becker Integrated Resources Project falls within a watershed identified as high passive priority for vegetation restoration. The project area also lies between two watersheds with documented occurrences of white-headed woodpecker that are high priority for restoration of Family 1 habitat (Figure 2). Opportunities for restoration of Family 1 habitat were identified during planning for the Becker Integrated Resources Project. Purpose and Need 1 (Section 1.2) is directly related to improving source habitat abundance and condition for Family 1.

Two potential habitat blocks were identified during planning for Clear Creek. These ‘blocks’ were believed to offer the best opportunities for improving Family 1 habitat within the project area. They were selected based on a combination of factors including existing mature forested stands, an existing ponderosa pine component, a minimum size equal to or greater than documented home ranges for white-headed woodpecker in mixed conifer forests, and adjacency to mature ponderosa pine habitat outside the project area (Project Record, CC_WL_Planning_Family1_9Oct2012nh.docx).

White-headed woodpecker was identified as the focal species for Family 1. White-headed woodpeckers are a species of concern that utilizes the vegetation types proposed for restoration in the action alternatives. The species is also tied to vegetative characteristics that are lacking on the landscape and are desired components of restored low elevation forests. These characteristics include mature forests dominated by ponderosa pine with abundant large trees and snags.

White-headed Woodpecker (Focal, Sensitive, and Management Indicator Species)

White-headed woodpecker is a Sensitive species and a Forest Plan management indicator species on the Forest. White-headed woodpecker serves a variety of functional roles within low-elevation forested communities and is associated with habitat elements used by other species in Family 1.

Across the Forest, the quantity and distribution of source habitat for the white-headed woodpecker is the most departed from historic and desired conditions (Nutt et al. 2010). As such, it serves as a priority focal species for which the Forest Plan (USDA Forest Service 2010a) sets priorities for management actions. The project area lies between two short-term priority watersheds that represent historically abundant habitat but now contain only remnant patches of white headed woodpecker habitat. While the project area does not reside in a short-term priority watershed, it is in an area that historically contained suitable habitat and is a moderate priority for active restoration. Restoring vegetative conditions within the project and analysis areas would provide connectivity between these short-term high priority watersheds.

White-headed woodpeckers are associated with late seral ponderosa pine forests. They prefer open-canopied stands of mature and older ponderosa pine, but will also use mixed ponderosa pine and Douglas-fir stands. Nest sites are usually associated with large-diameter (≥20 inches dbh) standing dead trees with moderate-to-extensive decayed wood. White-headed woodpeckers forage on insects throughout the summer. During fall and early winter, conifer seeds supplement the diet of insects and may comprise up to 60% of the woodpecker's annual diet (Nutt et al. 2008e). In west-central Idaho, white-headed woodpeckers prefer to forage in mature ponderosa pine averaging 28.0 inches dbh. Fire can benefit white-headed woodpeckers by creating open canopy habitat with dead standing trees.

Across the Forest, vegetative communities that could provide source habitat conditions for white-headed woodpeckers include PVGs 1, 2, 3, 5, and 6 (Nutt et al. 2010, p. 186). While PVGs 3 and 6 can develop cover types with ponderosa pine in the larger tree size classes and more open canopies, these conditions are not found as commonly as in PVGs 1, 2, and 5. Large diameter snags are an essential habitat feature for white-headed woodpecker.

Indicators and Measures

Multiple indicators and associated measures were selected to assess effects of the actions proposed and to describe changes to source habitats over time (Table 3-49). The indicators and measures are adapted from those utilized in Nutt el al. (2010), which was used to support assessment of the 2010 Forest Plan (USDA Forest Service 2010a).

Table 3-49. Indicators and measures for the white-headed woodpecker analysis for the project

Indicator	Measure
Source Habitat Function	Total source habitat, acres and percentage of project area
	Average patch size source habitat, acres
	Range of patch size source habitat, acres
	Number of patches
Source Habitat Quality	Source habitat within 300 feet of open road, acres and percentage of project area
	Qualitative snag assessment

Affected Environment

The analysis area for white-headed woodpecker includes all stands within the 19,327-acre project area that have stand examination data or that have been assigned data through the most similar neighbor process (see vegetation resources technical report). All stands with proposed vegetation treatments under the action alternatives are included in the analysis area.

Species-specific concerns within the project area are (1) the loss of large live and dead ponderosa pine (food and nest sites), (2) trend from late- to mid-seral ponderosa pine forest conditions, (3) reduction in source habitat abundance and patch size, (4) fragmentation of source habitat and reduced connectivity between patches, (5) reduction of ponderosa pine and increase of less fire resistant, more shade tolerant species (altered forest structure and fire effects), and (6) disruption of natural disturbance regimes that maintain source habitat over time.

No occurrences of white-headed woodpeckers have been documented in the project area (field survey data available in project record). Specific white-headed woodpecker surveys have not been conducted, partly because of limited and highly fragmented source habitat in the project area. Field surveys for other species located suitable nest snags for flammulated owls, which also serve as white-headed woodpecker habitat.

Source Habitat

Source habitat for this analysis is considered in the context of the project area's ability to provide source habitat (source habitat capacity) for white-headed woodpeckers as well as source habitat available now or in the future in response to proposed management actions. Three PVGs capable of developing source habitat for white-headed woodpeckers are present in the project area: PVGs 1, 2, and 3. PVGs 1, 2, and 3 comprise 14,560 acres or 75% of the analysis area. As expected, stands contributing to source habitat capacity are distributed primarily across the nonlethal and mixed1 fire regime patches, considered at the landscape scale (Figure 3-28). Because of the predominance of PVG 2, as well as the way in which those stands are distributed, the project area has a well-distributed capacity to provide source habitat with the larger blocks located in the western and southern portions.

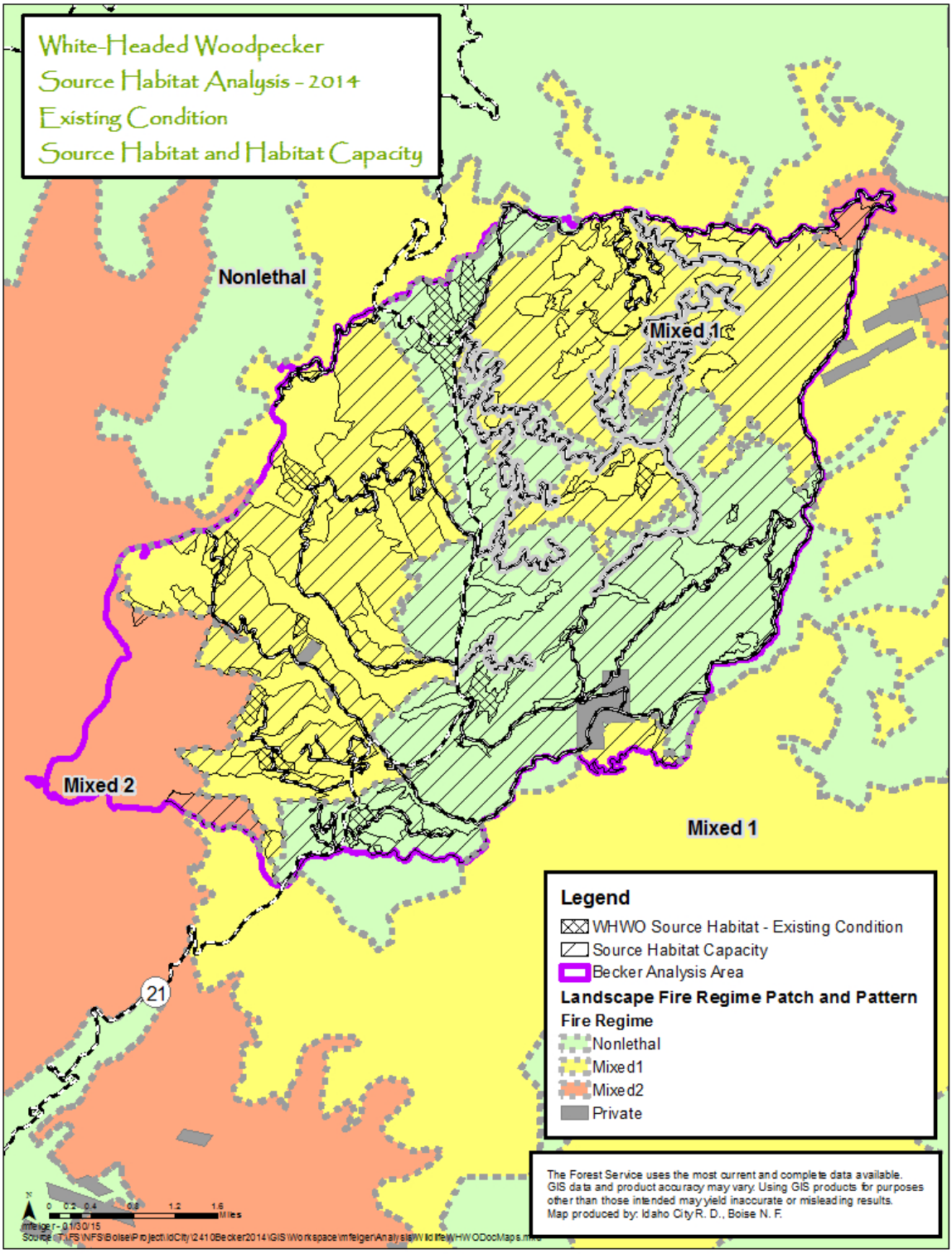


Figure 3-28. White-headed woodpecker existing condition

The project area contains 550 acres of source habitat (Table 3-50), which is not sufficient to support reproducing pairs of white-headed woodpeckers. Source habitat in the project area is heavily fragmented and scattered (Figure 3-28). Patches of late-seral ponderosa pine forests are small and fragmented; no patches are large enough to provide for a single home range, which is estimated to be 845 acres in fragmented mixed conifer forests (Nutt et al. 2008e).

Table 3-50. Becker integrated resources analysis area (19,327 acres) habitat current condition summary for white-headed woodpecker

Source Habitat Capacity (acres)	Source Habitat (acres)	Source Habitat Patch Characteristics			
		No. Patches	Ave. Patch Size (acres)	Patch Size Range (acres)	No. Patches ≥845 acres (Home Range)
14,560	550	13	42	7–236	0

Under historic nonlethal and mixed1 fire regimes, forests in PVGs 1 and 2, as well as a portion of PVG 3, would have been dominated by stands of large, ponderosa pine with open canopies. These conditions were maintained over time by frequent low-intensity fire (USDA Forest Service 2010a, Appendix A) and nonlethal and mixed1 patches within the project area would have been large enough to provide for many white-headed woodpecker home ranges. Currently, a low percentage of PVGs 1 and 2 within the project area are in the large tree size class as compared with what would have been expected historically. The decline is the result of a combination of factors, including uncharacteristic wildfire effects (1989 Gold Fork, Lowman, and Sawmill fires; 1994 Rabbit Creek Fire), past timber practices (removal of large ponderosa pine trees and snags), and fire suppression (allowed shade tolerant species and stand densities to increase).

Source Habitat Quality

Source habitat quality can be described using large snags, late seral and old forest habitat (source habitat), and road density and distribution. Large snags provide nesting sites, and, if not present, would limit the use of an area by white-headed woodpeckers. Road density can be used to define a variety of risks to the species and habitat.

Snag abundance was assessed by PVG for the project area in section 3.5.1. Across PVGs 1, 2, and 3, snag densities of both medium and large size classes are within or exceed desired conditions. White-headed woodpeckers select for snags in the large size classes as described in the 2010 Forest Plan (USDA Forest Service 2010a, Appendix A). Medium size class snags, however, may be used in the absence of larger snags. In addition to modeling source habitat features, snag habitats were surveyed across portions of the project area in association with modeled source habitat for flammulated owls, specifically targeting occupied and potential source habitat in the project area. White-headed woodpeckers often select for similar snag habitats as those selected by flammulated owls. Often, flammulated owls will use abandoned white-headed woodpecker cavities. A strong overlap in source habitat capacity for both species also occurs, and as such, flammulated owl source habitat could provide white-headed woodpecker source habitat. These snags were georeferenced with GPS equipment and marked on the ground. In total, 295 snags were found that would meet requirements for nesting flammulated owls (Figure 3-29). These snags included a wide variety of decay conditions, from recently dead to well decayed, with all being larger than

15.0 inches dbh. Species represented include ponderosa pine and Douglas-fir. Snags were located on the upper 1/3 slope of stands. While not a comprehensive look at potential snag habitat for white-headed woodpeckers, that assessment provides an indicator of potential future nesting habitat opportunities as source habitat develops.

Road density and distribution was assessed for source habitat in the project area. Open roads contribute to habitat degradation through the continual loss of snags due to removal for fuelwood. An assessment of the percent of source habitat within 300 feet of open roads found that 31% of existing source habitat was susceptible to firewood gathering that impacts snag densities and recruitment from removing dead trees.

Old forest habitat conditions were assessed in section 3.5.1. Old forest habitat in PVGs 1, 2, or 3 is also an indicator of white-headed woodpecker habitat quality. Forests that exhibit the desired conditions described for old forest habitat are more likely to contain habitat elements important to white-headed woodpeckers (large live and standing dead ponderosa pine trees). Currently, no stands within PVGs 1, 2, or 3 meet all of the desired conditions for old forest habitat (see vegetation section).

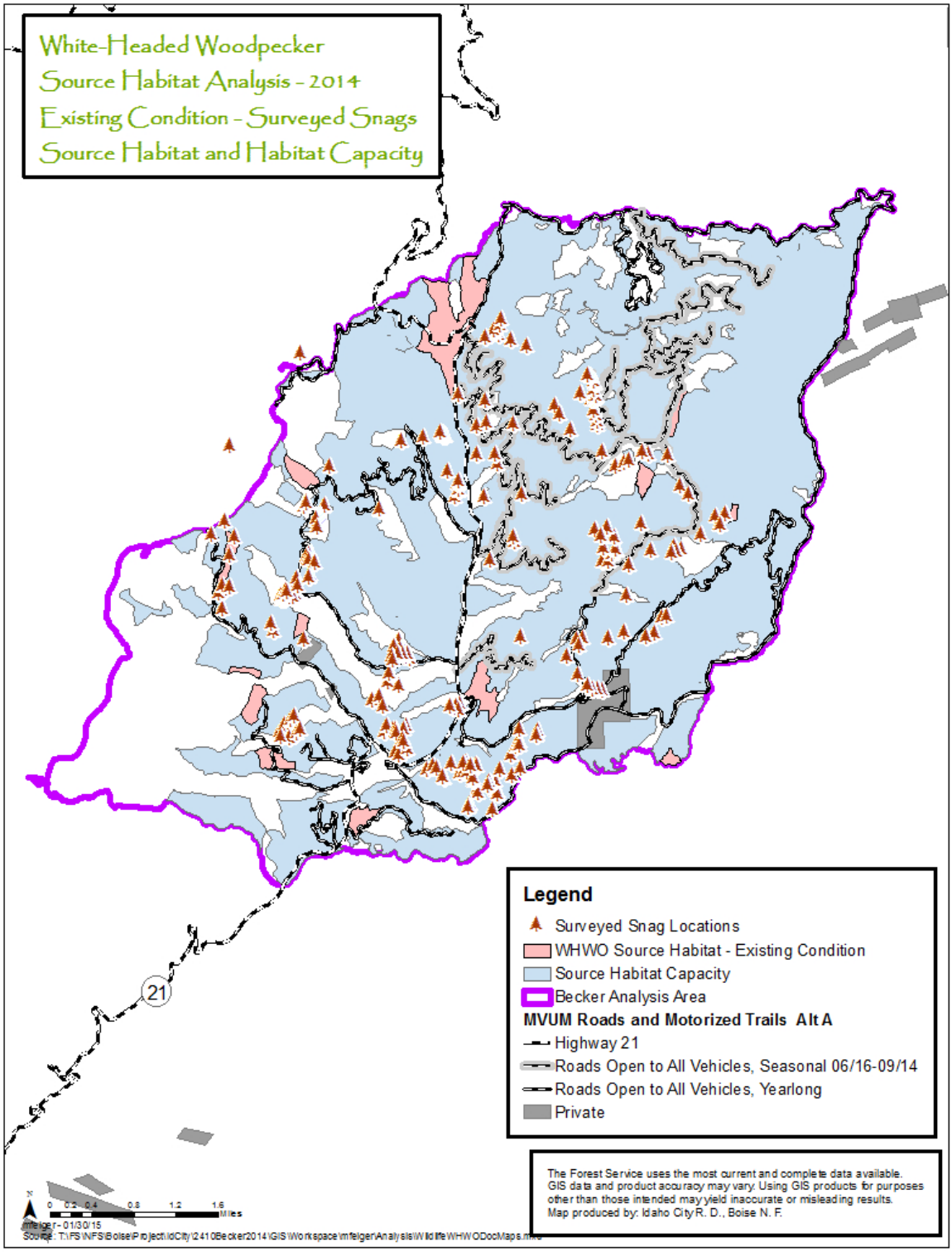


Figure 3-29. White-headed woodpecker existing condition and snag habitats

Environmental Effects

Changes in source habitat quantity and patch characteristics were used to assess effects for white-headed woodpecker. Old forest habitat and large snag abundance were used as additional indicators of habitat quality. Road and motorized trail density helped define additional risks associated with habitat loss and degradation. Some indicators could be quantified and others were be discussed qualitatively.

Direct and Indirect Effects

Alternative A

This alternative would not implement actions that would result in disturbance or displacement effects.

Over time, Alternative A would incrementally increase source habitat for white-headed woodpecker during the 30-year analysis period. That incremental increase would continue into the extreme long term (80 years). Patch-size range and average patch size would similarly increase incrementally (Figure 3-30). As noted, through the extreme long-term, source habitat does not develop larger contiguous patch characteristics that would otherwise provide effective territories for the species. Source habitat quality would remain degraded due to the loss of snags associated with firewood gathering adjacent to open roads. While an incremental increase in habitat would occur, this increase would be from a continued trend of departure from historical desired vegetation composition and historical structure.

Habitat would not likely be maintained through time, particularly in forests with historically nonlethal and mixed1 historical fire regimes. The more dissimilar departed vegetation composition and structure becomes, relative to desired historic conditions, the greater the risk of losing habitat to uncharacteristic (large, stand-replacing) wildfire events. This trend represents a continued and increasing departure of stand conditions for low- to mid-elevation forests with historical nonlethal and mixed1 fire regimes. Continued increases in density and distribution of later seral and climax species (Douglas-fir, subalpine fir, lodgepole pine), particularly in the middle and upper layers of forest canopies would be indicative of those changes. These changes would create volatile fuels conditions and increase ladder connections from the forest floor to the upper canopies. These departures increase the risk of loss of habitat due to uncharacteristic large, stand-replacing fire events (fire and fuels technical report [project record]). Recent events that have affected a large portion of the Crooked River Watershed affirm that risk.

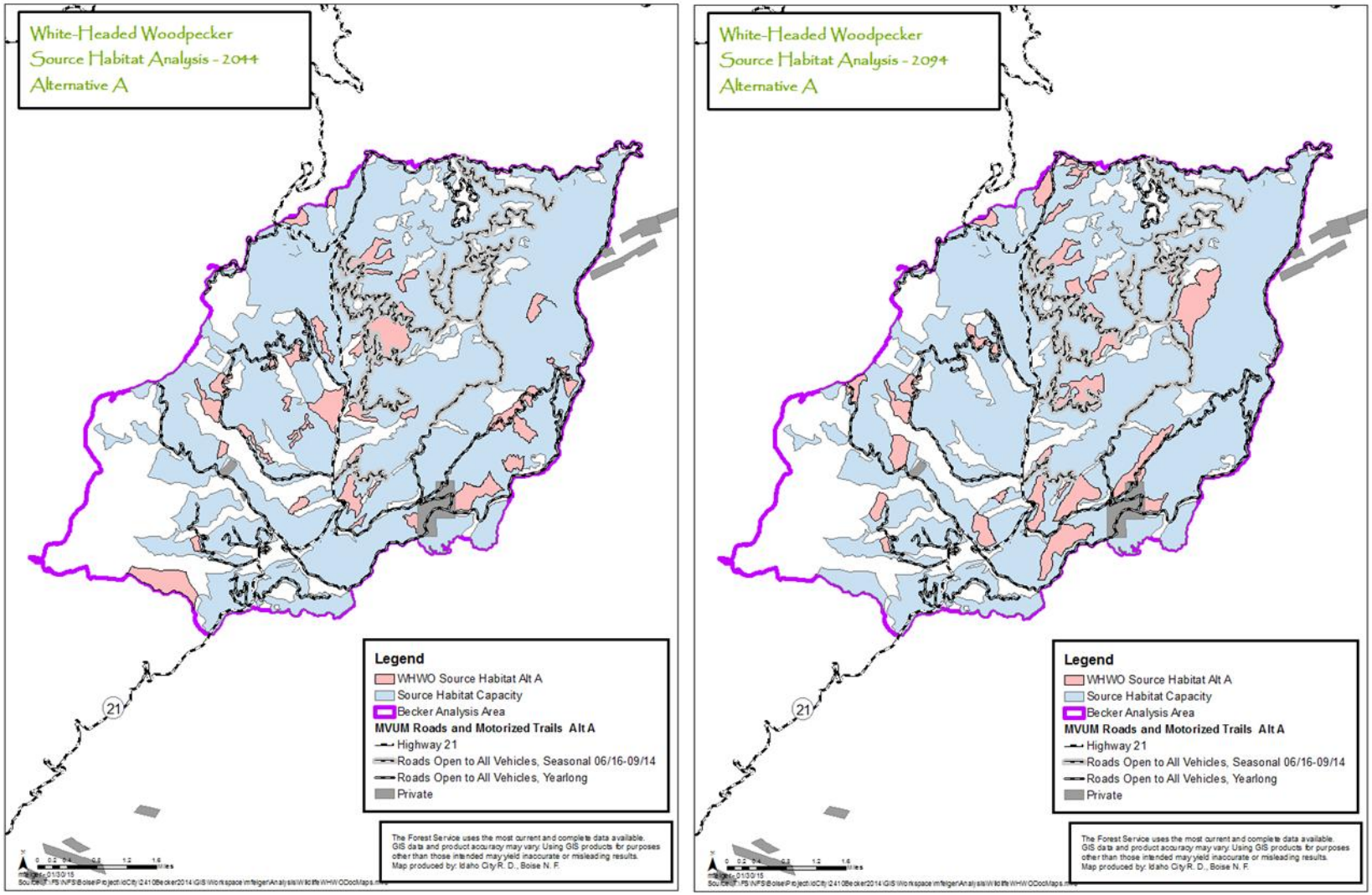


Figure 3-30. Alternative A (2044 and 2094) for white-headed woodpecker

Alternatives B, C, D, and F

White-headed woodpeckers are noted as being tolerant of human activity as long as the disturbance does not impact nest trees and the activity is not prolonged. Due to the insufficient quantities of source habitat and fragmented distribution patterns, white-headed woodpecker occupancy and reproduction is not suspected to occur in the project area. Therefore, the likelihood of direct impacts from disturbance or displacement from implementing actions proposed under these alternatives would be low. While no white-headed woodpecker nests are known to occur within the project area at this time, the project would be implemented over several years. Design Feature WR-1 has been included to protect any active white-headed woodpecker nest site discovered during implementation. The design feature would prohibit removing nest trees and would prevent or minimize disturbance at active nest sites, thereby reducing impacts to breeding birds and reproduction.

The mechanical vegetation and natural fuels treatments proposed in PVGs 1, 2, and 3 were designed to maintain existing source habitat and improve habitat conditions and abundance for white-headed woodpeckers over the long term and extreme long term. Maintaining existing habitat would be accomplished in multiple ways. First, by changing species composition through favoring the retention and development of ponderosa pine over Douglas-fir, lodgepole pine, and subalpine fire, which currently reside in treated stands. Second, by retaining existing and developing large tree structure, primarily with ponderosa pine, which would provide a more open source habitat condition for this species. Third, by reducing densities of sapling, pole, and small trees, primarily of Douglas-fir, lodgepole pine, and subalpine fir, to reduce canopy structure complexity and increase stand resiliency to wildfire disturbances. And finally, by imparting a more natural and desired distribution of large trees within the stands, including with-in stand patchy distribution of tree clumps, openings, and widely spaced trees, which would more closely represent historic conditions. All of the above would work to provide sufficient snag habitat and insect and cone seed foraging opportunities for white-headed woodpeckers. Source habitat would increase over the long term and extreme long term (Table 3-51, Figure 3-31). Alternatives B, C, D, and F would develop approximately twice as much source habitat by 2044 as Alternative A and approximately three times more habitat by 2094 as Alternative A. While these alternatives would begin restoring low elevation forests, additional treatments will likely be needed in the future to continue the trend. Low elevation old forest habitat would still be lacking during the first 30 years post-implementation but some old forest habitat would be expected to develop 30 years post implementation.

Table 3-51. Source habitat indicators for white-headed woodpecker by alternative and year

Indicator	Reference Condition	Year	Alt A	Alt B, C,D, F	Alt E
Source Habitat Quantity in Acres (long-term trend)	Source Habitat Capacity is 14,560 acres. At the watershed scale, an estimated 48.7% of capacity would have been in a suitable condition for white-headed woodpeckers under historical conditions[a].	2014	550	494	682
		2044	1330	3216	3089
		2094	1433	4389	4543
Patch Size-Range in Acres (long-term trend)	Patch size-range provides context to the range of sizes of individual patches, particularly when compared to the average patch size for an analysis unit. This also identifies the size of the largest and smallest patches.	2014	7–236	10–67	10–236
		2044	7–233	2–440	2–263
		2094	7–191	2–1266	2–1266
Average Patch Size	Average patch size serves as an indicator of trend in quantity and quality of source habitat patches and the ability to provide for breeding territories.	2014	42	33	45
		2044	43	68	65
		2094	51	90	95
Percent of Source Habitat within 300 feet of Open Road	Authorized and unauthorized removal of snag habitats for personal use firewood has the greatest impact on availability and future recruitment of this habitat feature. The smaller the proportion of source habitat affected by this activity, the greater the availability of this feature.	2014	31%	15 - 23%	15%
		2044	31%	13%	13%

[a]The reference for historical abundance at the watershed scale is based on the midpoint of the HRV range for the vegetation conditions (PVG, tree size class, and canopy cover) that provide source habitat for white-headed woodpecker (Nutt et al. 2010).

Patch size would decrease immediately after harvest (Table 3-51) and the largest patch size of 236 acres would be reduced to 67 acres. In the long term, the largest patch size would increase to 440 acres, which would be almost twice as large as under Alternative A. This trend would continue: by 2094 the largest patch size would be 1,266 acres, a six-fold increase over the expected largest patch size under Alternative A in 2094. Patches would remain smaller than expected under historical conditions but, overall, would be improved and moved toward desired conditions. The largest patch (Table 3-51) would remain smaller than the estimated home range in mixed conifer habitats, but again, would be an improvement over the current condition and larger than patches expected under Alternative A. The juxtaposition of unconnected patches would be close enough that over-all, suitable reproductive habitat would occur for multiple pairs of white-headed woodpeckers in the long and extreme long term (Figure 3-31 and Figure 3-32).

Proposed vegetation and natural fuels treatments would also reduce the risk of uncharacteristic wildfire, which would have detrimental impacts to future white-headed woodpecker habitat through the loss of large-diameter, live ponderosa pine trees. Fire disturbances have substantially impacted source habitat availability within and surrounding the project area. Reducing that risk of such disturbances would increase likelihood of achieving long-term desired conditions in the nonlethal and mixed1 fire regimes (fire and fuels technical report [project record]) for which white-headed woodpecker habitat relies upon.

As previously stated, in 2094, a trend of much larger patch sizes would be anticipated as a result of the treatments proposed (Table 3-51, Figure 3-32). Because of the existing fragmented nature of source habitat, coupled with a general absence of large-sized trees in the bulk of habitat capable of producing source habitat (Figure 3-28), an extended period of time would be needed to achieve desired large tree and old forest habitat conditions in PVGs 1, 2, and 3. Assuming that management actions over the next 80 years are centered on achieving desired conditions as outlined in the 2010 Forest Plan (USDA Forest Service 2010a), more source habitat would be anticipated; individual patch size would increase; interconnectedness of habitat patches would increase; and the distribution of patches would be such that multiple territories could be provided for (Figure 3-31 and Figure 3-32).

Because of existing source habitat conditions, and the extended time-frame for which source habitat would be of sufficient abundance and distribution to support reproducing white-headed woodpeckers, snags as a habitat feature would have limited utility to the species in the short term. Implementing Alternatives B, C, D or F could result in direct loss of snags during harvest activities, post-harvest fuel treatment activities, or road construction. Such effects, however, would not affect white-headed woodpecker due to the lack of sufficient source habitat and the likely lack of occupancy within the project area.

In the long term, Design Features WR-9, WR-10, and VM-6 would minimize impacts to existing snags and potentially provide at least some snag habitats that would be available in the future as source habitat develops. Snags would not be felled unless they pose a safety hazard under timber sale OSHA requirements. Roads that are reopened for implementation would remain closed to public travel and, therefore, closed to fuelwood gathering, which would further reduce the risk of snag loss. While the loss of large snags cannot be totally avoided due to OSHA safety requirements and uncertainties associated with broadcast burning and enforcement of the fuelwood permits, the number of snags in PVGs 1, 2, and 3 would be expected to be maintained or increase relative to current abundance over the long term. Fewer open roads would also mean less area at risk from firewood gathering and otherwise removal from future source habitat. As large tree habitat develops in the long term (as indicated by the increase in source habitat), more large trees would be available for large snag recruitment. Endemic disturbance processes, including fire and insects and disease effects, would continue to function at some level, and would likely result in replacement of existing snags, and presumably an incremental long-term increase.

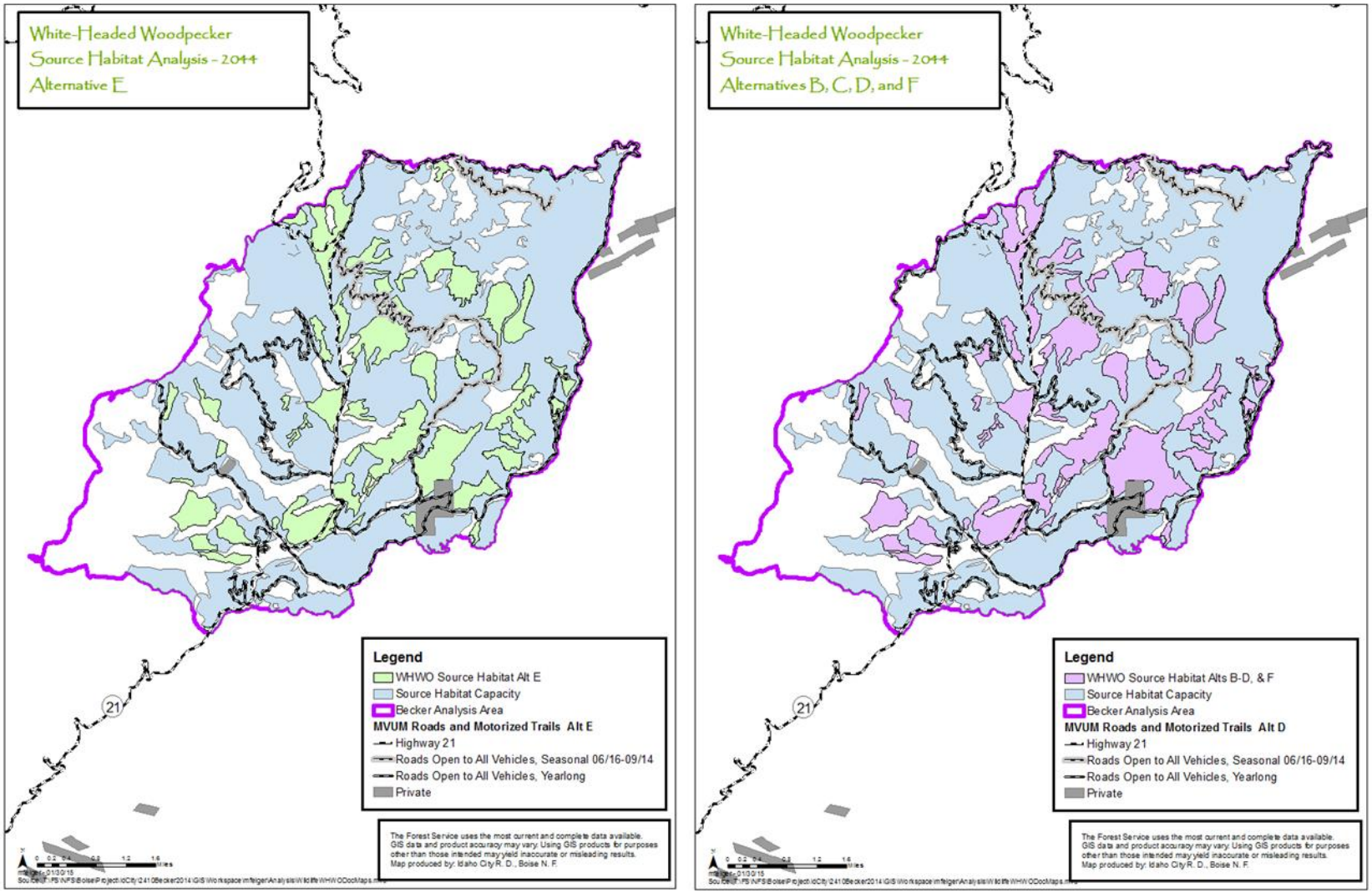
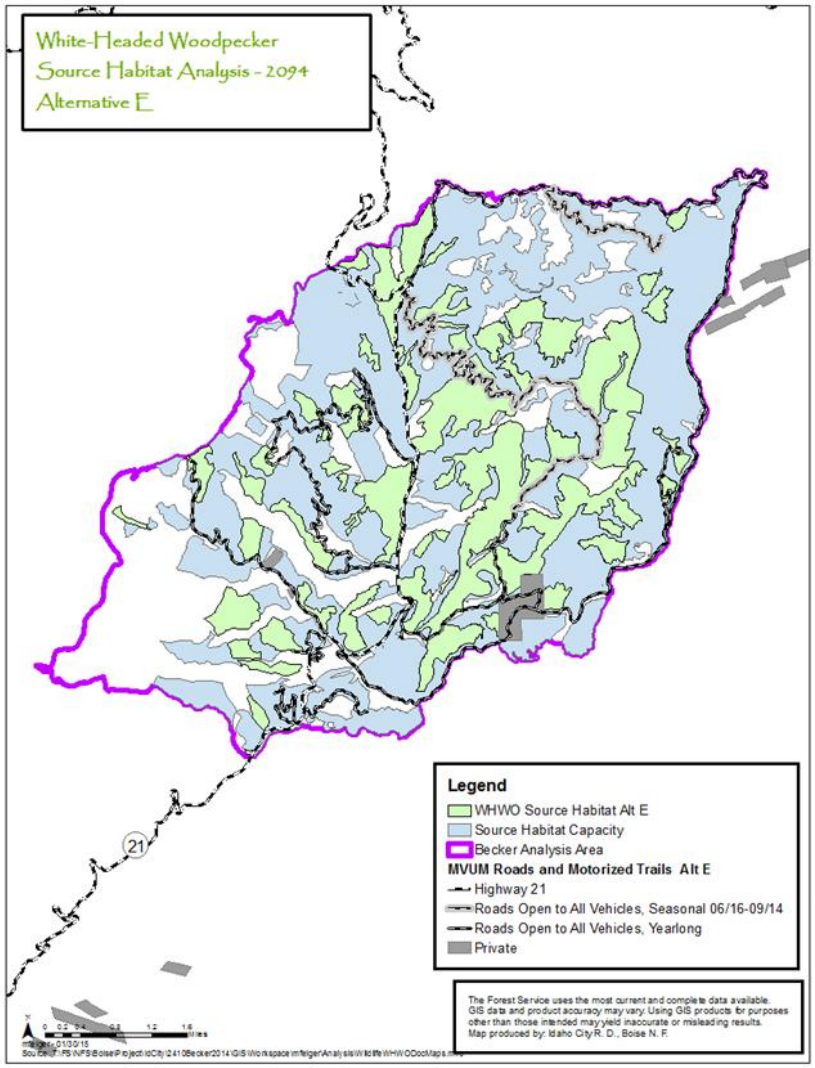


Figure 3-31. Action alternative maps (2044) for white-headed woodpecker



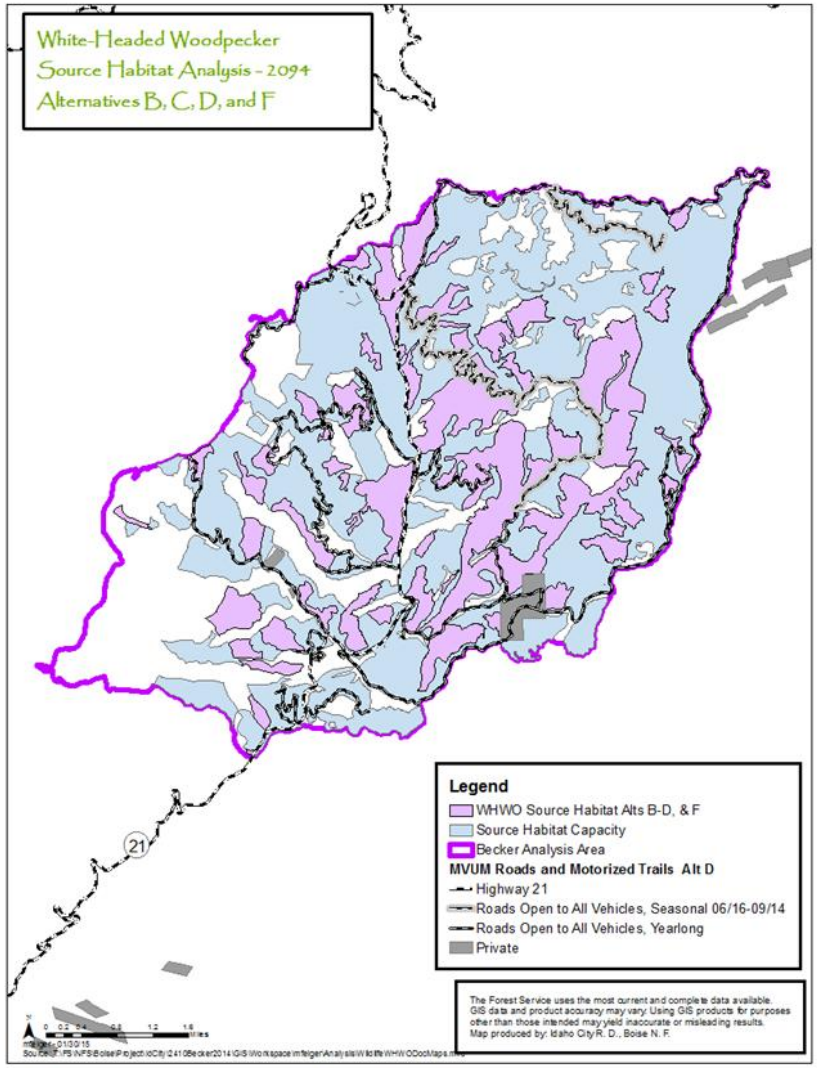


Figure 3-32. Action alternative maps (2094) for white-headed woodpecker

Alternative E

The direct impacts associated with Alternative E are the same as Alternatives B, C, D, and F. Design Feature WR-1 is included in Alternative E and would minimize any risk of disturbance or displacement from implementing activities to newly discovered nesting white-headed woodpeckers.

Impacts to habitat abundance and patch characteristics would be largely the same as the other action alternatives. The mechanical and prescribed burning treatments were designed to maintain existing source habitat and improve habitat conditions and habitat quantity for white-headed woodpeckers over the long term just as under Alternatives B, C, D, and F. Design Features WR-9, WR-10, and VM-6 are also included in Alternative E and further support conservation and restoration of this species' habitat. Unlike the other alternatives, Alternative E has a diameter limitation for harvesting trees greater than 18.0 inches dbh. This limitation would result in slightly different outcomes in the total amount of source habitat and largest patch size indicators. Immediately post-harvest (2014), source habitat would increase by 132 acres more than under Alternative A and 188 acres more than under Alternatives B, C, D, and F (Table 3-51). This increase would be from a combination of retaining current source habitat and manipulating stands to reduce canopy closure and bring them into source habitat conditions. By 2044, a substantial increase in source habitat would occur compared to Alternative A; however, Alternative E would result in slightly less (127 acres) source habitat than the other action alternatives (Table 3-51). This latter difference would be from the diameter limitation to retain greater numbers of trees 18 inches or larger in some stands, creating a higher canopy closure than those preferred by white-headed woodpeckers. Finally, in 2094, Alternative E would be expected to have slightly more source habitat (154 acres) than the other action alternatives (Table 3-51).

The diameter limitation difference proposed under Alternative E affects patch size similar to how it affects total source habitat. Short-term benefits would be illustrated by retaining an existing large patch (236 acres), followed by a decline in the largest patch size as stands with a higher tree retention (due to the diameter limit prescription) exhibiting an increase in canopy closure and movement out of white-headed woodpecker conditions. This trend is later followed by a return to a large patch size equal to Alternatives B, C, D, or F (Table 3-51).

A consequence of the diameter limitation would be a change in distribution of trees targeted for removal. Prescriptions to be implemented under this alternative would shift from an emphasis in removing large trees of less-desirable tree species (Douglas-fir and subalpine fire) to a greater emphasis of removing small and medium diameter trees of the same species. The net result would be a more open and list complex under- and middle-story habitat condition. Over the long term, this shift would likely lead to a more desirable habitat condition for white-headed woodpecker.

No anticipated differences in effects to snags would be expected between Alternative E and the other action alternatives. Design Features WR-9, WR-10, and VM-6 are included under Alternative E and would minimize risk of direct snag loss and provide for future recruitment and retention of large snags.

Cumulative Effects

Cumulative effects were assessed at the watershed scale (Crooked River 5th HUC [1705011102]); however, the analysis area includes only the portion administered by the Forest Service (excludes private land) (Figure 3-33). The Crooked River watershed was selected based on the WCS (Nutt et al. 2010) completed for the 2010 Forest Plan (USDA Forest Service 2010a), which uses the watershed scale as a mid-scale comparison for effects to white-headed woodpecker. This area was chosen to display how the project does or does not contribute to maintenance or restoration of habitat within the watershed, which was the smallest unit assessed for the WCS.

Source habitat in the Crooked River watershed has declined by 91% from historical levels (Table 3-52; Nutt et al. 2010). The causes of the decline are similar to those described at the Forest scale and include timber harvest, fire exclusion, and road impacts. Species-specific concerns within the watershed are the same as those for the Forest.

Table 3-52. Crooked River 5th HUC (1705012007) habitat condition summary for white-headed woodpecker

Source Habitat Capacity (acres)	Historic Source Habitat (acres)	Current Source Habitat (acres)	Relative Change (historic to current)	Open Road Density (SHC) (mi/mi2)
36,041[a]	19,831[a]	1,662	–91%	6.10

[a]The Wildlife Conservation Strategy used a different data set for vegetation conditions than used at the site scale, resulting in fewer acres of source habitat at the watershed than at the project level even though the entire project falls within the larger watershed.

Past activities have contributed to the existing condition. These activities include several timber and sanitation/salvage sales (88,363 acres), reforestation (229 acres), timber stand improvement (5,099 acres), the firewood program, construction and maintenance of roads and motorized trails, and fire suppression. Several large wildfires have recently occurred. The 1989 Gold Fork and Sawmill fires (2,082 acres) affected portions of the analysis area (Figure 3-33). The 1994 Rabbit Creek Fire further impacted 14,215 acres of analysis area, some of which provided source and potential source habitat utilized by white-headed woodpecker. The fires burned with moderate-to-high intensity and resulted in stand-replacement with most ponderosa pine forests converted to an early seral habitat. The 2007 Trapper Flat Fire (42 acres) occurred at higher elevations and had no effect on forests that provide source habitat for white-headed woodpeckers.

Ongoing activities within the cumulative effects area that could potentially impact white-headed woodpeckers are discussed below. No foreseeable future activity, potentially impacting white-headed woodpecker, was identified.

See Appendix B for a comprehensive list of activities considered in this analysis.

Alternative A

The cumulative effects of this alternative in conjunction with past and ongoing actions would be one of continued decline of white-headed woodpecker habitat. Vegetation conditions in low-elevation forests would remain departed from historical and desired conditions, increasing the risk of losing existing habitat as well as potential recruitment habitat to uncharacteristic fire events. Past vegetation management actions would continue a trend of

less desirable forest structure development and densities and maintain a high degree of risk of uncharacteristic wildfire disturbances and further decline and degradation of source habitat for this species.

Alternative A would not result in short, long, or extreme long term development of source habitat for white-headed woodpeckers.

Action Alternatives

Vegetation management and natural fuels actions proposed udner Alternatives B, C, D, E, and F would add cumulatively to some past vegetation actions, resulting in a cumulative modification of source habitat for white-headed woodpeckers. However, those effects would only be experienced in the long and extreme long term due to the lack of sufficient source habitat in the short and mid-term.

Fuelwood cutting for personal use is expected to continue. Although quantities of material removed annually is not known, such activities occur primarily adjacent to open roads. Changes in motorized transportation proposed under Alternatives B, C, D, E, or F would not cumulatively add to this ongoing risk of snag loss because the proportion of acres within 300 feet of an open road decreases from 31% to 13% in the long term (Table 3-51). Cumulatively, this reduction would result reduce effects to snag habitats.

Maintenance and use of roads and trails would continue. Maintenance of roads also encourages use and indirectly affects impacts from firewood cutting and motorized recreation. Actions proposed under Alternatives B, C, D, E, or F would cumulatively add to noxious weed spread; however, design features would minimize this effect. Transportation actions proposed under the action alternatives would not cumulatively add to the risk of snag loss because the proportion of acres within 300 feet of an open road would decrease (Table 3-51).

Determination

Alternatives B, C, D, E, or F **may impact individual white-headed woodpeckers but would not cause a trend to federal listing or loss of viability.**

Rationale—Actions proposed under Alternatives B, C, D, E, and F would not likely result in disturbance and displacement effects due to insufficient source habitat conditions and a lack of occupancy. Design features discussed in this analysis would work to limit those effects. Source habitat would change little in the short term from proposed activities. While snag habitats would be sufficiently mitigated from loss, again, the lack of source habitat would largely make those snags inconsequential. In the long term and extreme long term, source habitats would develop such that the project area would provide suitable reproductive habitat for multiple territories. Snag habitat features would be expected to be available and provide nesting structures for occupying pairs. Source habitat would have an enhanced condition by having a greater density of large tree structure and a greater resiliency to uncharacteristic wildfire disturbances, which would result in a much more stable and sustainable long-term source habitat and associated population condition than under Alternative A.

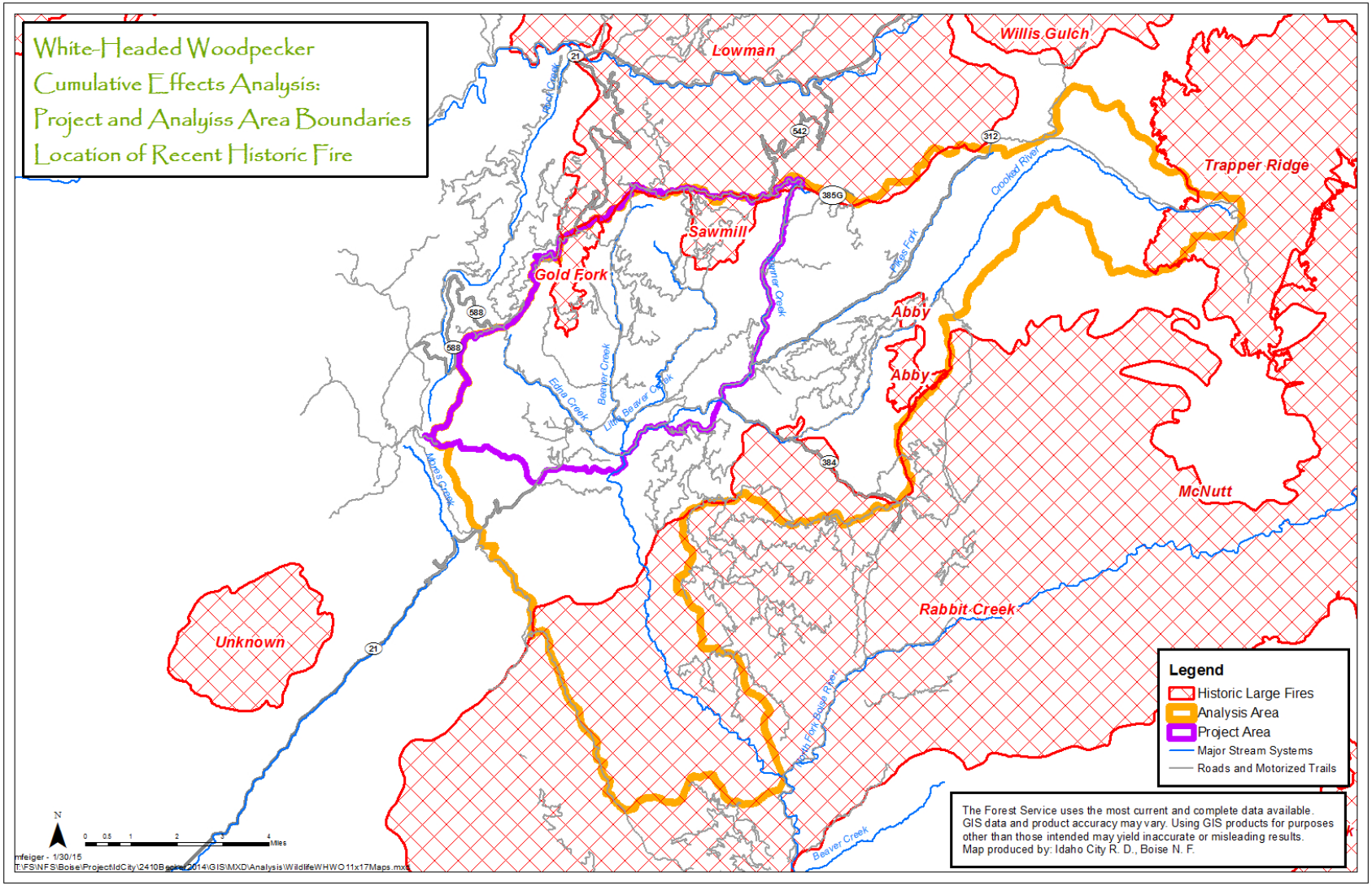


Figure 3-33. Cumulative effects analysis area for white-headed woodpecker

3.5.2.2 Family 2—Broad Elevation Old Forest

All species in Family 2 use late-seral multi- and single layered stages of the montane community as source habitats (Wisdom et al. 2000). Source habitats for some species also include late-seral stages of the subalpine community or the lower montane community, or both. Source habitat for Family 2 overlaps those of Family 1 but encompass a broader array of cover types and elevations than habitats for Family 1 (Wisdom et al. 2000). Family 2 source habitat occurs primarily in PVGs 3 through 11 (Nutt et al. 2010), although some species use lower elevation types. Historical fire regimes vary by PVG, but are dominated by mixed severity and lethal regimes. Many species within the family are able to take advantage of departed conditions.

The WCS assessed the condition of source habitats for Family 2 on the Forest. Watersheds have a dominant decreasing trend of source habitats from historical to current conditions. Of 61 watersheds with Family 2 source habitats, 71% show a decreasing trend, 19% an increasing trend, and 10% neutral trends. Decreasing trends are tied primarily to the reduction in forests dominated by large trees. Increasing trends are typically the result of increased stand densities. The lower elevation forest types (PVGs 1, 2, and 5) have experienced the greatest departure from historical conditions and ecological processes.

Six sensitive and two management indicator species are associated with Family 2: American three-toed woodpecker, black-backed woodpecker, boreal owl, fisher, flammulated owl, great gray owl, northern goshawk, and pileated woodpecker. Five species within the family were selected as focal species.

Black-backed Woodpecker (Management Indicator Species, Focal Species)

Black-backed woodpecker, a Forest Plan management indicator species (MIS), is included in this analysis to facilitate Forest Plan MIS monitoring. In addition, the species serves a variety of functional roles within the community and is associated with habitat elements used by other species in the family.

Black-backed woodpeckers are associated with mature, late-seral boreal and montane coniferous forests (NatureServe 2012a). It is a year-round resident in the Interior Columbia Basin (Wisdom et al. 2000). Source habitats of the black-backed woodpecker include old forest stages of subalpine, montane, and lower montane forest and riparian woodlands (Wisdom et al. 2000). Both managed and unmanaged young-forest stages of lodgepole pine also provide source habitat (Wisdom et al. 2000). Burned conifer forests (Saab and Dudley 1998; Hoffman 1997; Caton 1996; Hutto 1995; Marshall 1992) and other insect-infested forests (Goggans et al. 1988) provide key conditions necessary for nesting and foraging. Habitat requirements for nesting include mature and old trees affected by disease and heart rot or trees in early stages of decay (Goggans et al. 1988). This species forages almost exclusively on the larvae of bark and wood-boring beetles (Marshall 1992).

PVGs 3, 4, 6, 7, 8, 9, and 10 could provide source habitat conditions on the Forest (Nutt et al. 2010). Historic fire regimes within these PVGs range from mixed1 to lethal, creating a variety of patch sizes, depending on the fire regime. Source habitat can also occur in recently burned areas (≤5 years). Snags are a special habitat feature for black-backed woodpecker.

Affected Environment

The analysis area for black-backed woodpecker includes all stands within the project area that have stand examination data or have been assigned data through the most similar neighbor process. All stands with proposed vegetation treatments under the action alternatives are included in the 8,745-acre analysis area.

Black-backed woodpecker have not been documented in the analysis area. The species was not detected during project surveys (field survey data, available in the project record); however, they were not specifically targeted so a lack of detections does not mean the species is absent. Based on the extent of modeled source habitat and active insect infestations, the species is likely present but undetected.

Source Habitat

Source habitat capacity consists of PVGs 3, 4, 7, and 8. PVGs 6, 9, and 10 are not represented, nor are they included in the following discussion. Source habitat capacity PVGs comprise 5,646 acres or 29% of the project area (Table 3-53). Source habitat capacity is distributed through the mid-to-upper elevation areas of the project area and consistently within the larger landscape scale of mixed1 and mixed2 fire regime patches (Figure 3-34).

An estimated 2,178 acres of source habitat occurs within the project area (Table 3-53). Source habitat consists of patches of mature forest up to 454 acres. Current patch sizes average 59 acres, which is below or on the low end of the expected range for the historical fire regimes (mixed1 and mixed2) for PVGs that would be occupied by black-backed woodpeckers. Source habitat is highly fragmented, in part because of the distribution of source habitat types and because of recent fire disturbances and past vegetation management actions (Figure 3-34).

Home range size can provide another index for describing patch size. Most home range descriptions found in the literature are for burned or insect-infested areas and may not be applicable to the analysis area where source habitat consists primarily of mature forests. Reported home range sizes are highly variable, ranging from 178 acres to over 800 acres, depending on the quality of the habitat. Using 178 acres as a minimum size required in high-quality habitat, the largest patch (454 acres) would support 2 exclusive, non-overlapping home ranges (Table 3-53). One additional patch, 243 acres, would support one additional non-overlapping home range. In addition, smaller patches are located in close enough to one another, particularly in the northern portion, to provide for additional home ranges.

Table 3-53. Project area (19,327 acres) habitat condition summary for black-backed woodpecker

Source Habitat Capacity (acres)	Source Habitat (acres)	Source Habitat Patch Characteristics			
		No. of Patches	Avg. Patch Size (acres)	Patch Size Range (acres)	No. of Patches ≥178 acres (Home Range)
5,646	2,178	37	59	3–454	3

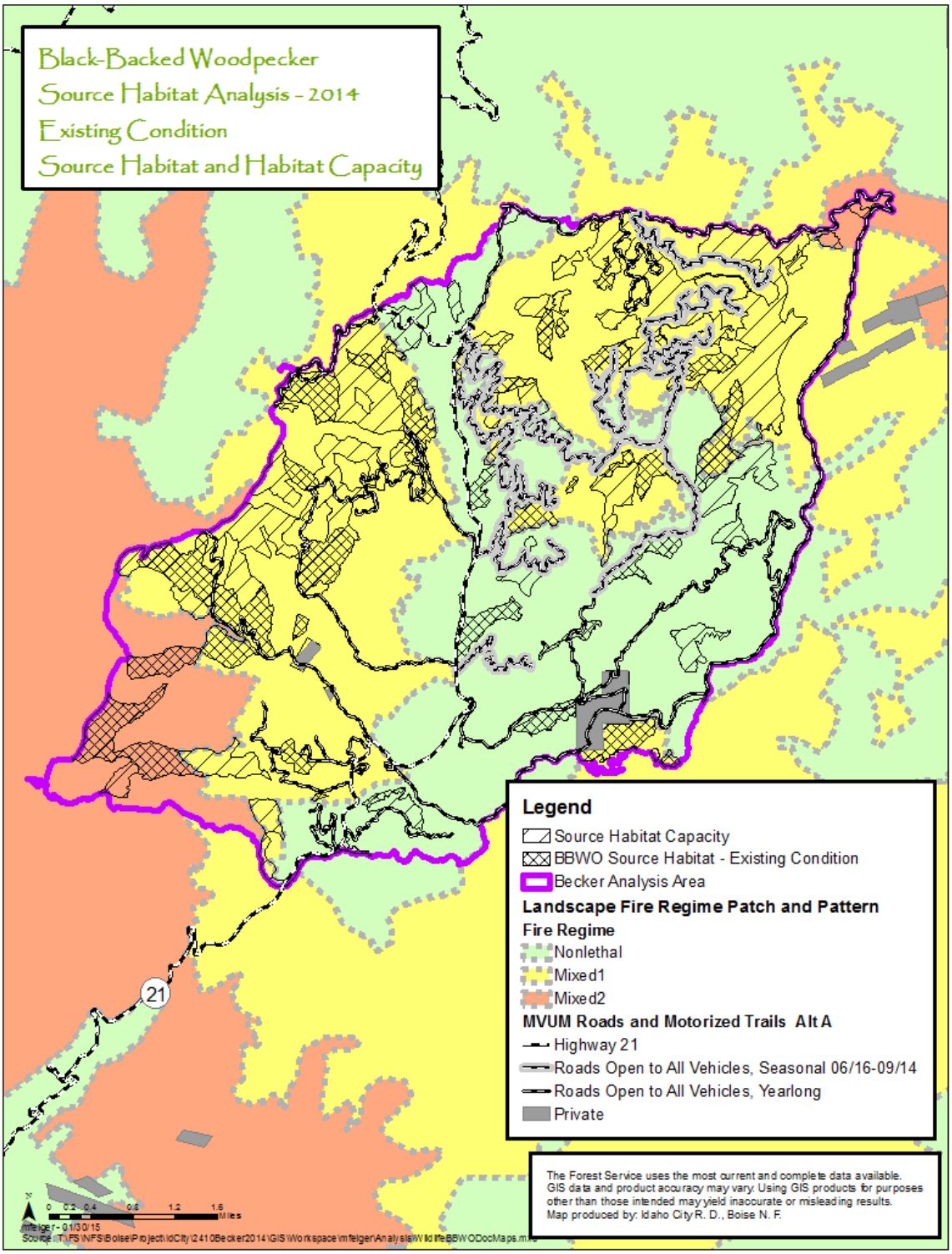


Figure 3-34. Black-backed woodpecker existing condition

Source Habitat Quality

Source habitat quality can be further described in terms of key habitat component abundance, current insect and disease mortality, and road density. Key habitat components include snags and logs that provide nesting or foraging opportunities. These opportunities increase in areas of tree mortality caused by insects and disease. Road densities indicate potential management impacts, including loss of snags to firewood gathering, changes in forest structure, and altered fire regimes. Old forest is more likely to exhibit characteristics important to black-backed woodpecker, including snags, logs, and susceptibility to insect infestations.

Black-backed woodpeckers typically use trees <20 inches dbh for nesting and foraging; therefore, only the snag density of the medium size class (10–20 inches dbh) was used as a habitat quality indicator for the species (Table 3-54). Nesting and foraging opportunities are presumed to be more abundant at higher densities. Current densities vary by PVG, although the dominant PVGs (3 and 7) exceed desired ranges (Table 3-54).

Table 3-54. Snag abundance for source habitat capacity Potential Vegetation Groups compared with desired ranges

Snags	Potential Vegetation Group		
	3 (2,366 acres)	4 (957 acres)	7 (3,786 acres)
Desired range (USDA Forest Service 2010a, Appendix A, Table A-6)	1.8–4.1	1.8–2.7	1.8–5.5
Snag [10–19.9-in diameter] Abundance relative to desired ranges	Exceeds (5.7)	Exceeds (4.6)	Exceeds (6.8)

CWD was assessed in the wildlife technical report (available in the project record) and is described by both the dry weight (tons per acre) and the proportion that is represented by *large logs* (distribution >15 inches). The large log component provides foraging opportunities for black-backed woodpeckers; foraging opportunities increase with greater representation of logs. Large logs are below desired abundance for the majority of source habitat capacity PVGs (Table 3-55).

Table 3-55. Coarse woody debris abundance for source habitat capacity by Potential Vegetation Groups compared with desired ranges

Coarse Woody Debris	Potential Vegetation Group		
	3 (2,565 acres)	4 (230 acres)	7 (3,067 acres)
Desired range: tons/acre in Decay Classes I and II Distribution >15 inches (USDA Forest Service 2010a, Appendix A, Table A-7)	4–14 >65%	4–14 >65%	5–19 >50%
Current condition: abundance relative to desired ranges	Large logs below	Large logs below	Large logs below

Open roads impact black-backed woodpeckers through snag reduction, habitat loss and fragmentation, and negative edge effects. Within the project area, open road density exceeds 2.9 mi/mi^2. The existing open road network generally skirts the edge of the fragmented source habitat as well as habitat contributing to source habitat capacity (Figure 3-34). While the location of the open road network somewhat reduces the risk of snag habitat loss, particularly in more desirable interior habitats of the larger patches, this condition does impart a risk of loss of foraging and nesting habitats.

Old forest abundance is also a habitat quality indicator. Old forests are most likely to contain habitat components (snags, logs) and conditions (susceptibility to insect outbreaks) that result in foraging and nesting opportunities for black-backed woodpeckers. Old forest conditions were assessed in section 3.5.1, showing that no stand currently exhibits the full array of desired conditions.

Environmental Effects

Source habitat quantity and patch characteristics are used as effects indicators for black-backed woodpecker. Medium-size snag, large log, and old forest abundance are all indicators of habitat quality. Road density is used to define risks associated with habitat loss and degradation.

Direct and Indirect Effects

Alternative A

This alternative would not implement actions resulting in disturbance or displacement effects.

Over time, Alternative A would increase source habitat for this species. Additional stands would be recruited into the medium and large tree size classes. Densities would increase, resulting in competition between trees for resources. Stressed trees would be susceptible to insect attack and subsequent mortality, a condition favorable for black-backed woodpeckers. Patch size would also increase with at least four patches reaching the minimum size needed for a home range by 2044. Exclusive home ranges increase to 9 by year 30 (Figure 3-35 and Table 3-56). These large blocks of habitat would increase effectiveness of patch size, as daily food and cover requirements would be found in larger patches. However, source habitat would continue to be fragmented and scattered across the project area. It would also increase in abundance and provide habitat for black-backed woodpeckers.

Two of the four habitat quality indicators would improve in both the short and long term. Snag and large log abundance would increase. The current insect activity would continue to recruit snags in the smaller size class (10–20 inches dbh) used by black-backed woodpeckers. While coarse woody debris would increase as snags fall, large logs are expected to remain below desired levels for many of the PVGs providing source habitat for black-backed woodpeckers. Snags and log recruitment would continue to be affected in areas adjacent to roads, as no change in road density would occur with this alternative.

Table 3-56. Source habitat indicators for black-backed woodpecker by alternative and year

Indicator	Reference Condition	Year	Alt A	Alt B, C, F	Alt D	Alt E
Source habitat (acres)	Source habitat capacity is 5,646 acres. At the watershed scale, an estimated 40% of capacity would have been in a suitable condition for black-backed woodpecker under historical conditions.[a]	2014	2,178	1,542	1,526	1,621
		2024	2.330	1.835	1,769	1,900
		2044	3,453	2,268	2,218	2,382
Patch size-range (acres)	Patch size-range provides context to the range of sizes of individual patches, particularly when compared to the average patch size for an analysis unit. This also identifies the size of the largest and smallest patches.	2014	3–454	3–243	3–243	3–243
		2044	3–658	3–401	3–400	3–400
Average patch size	Average patch size serves as an indicator of trend in quantity and quality of source habitat patches and the ability to provide for breeding territories.	2014	59	45	48	51
		2044	75	60	58	61
No. of non-overlapping home ranges	Estimated home range size is 178 acres. While home ranges can consist of both source habitat and non-habitat, patches in contiguous blocks are better than fragmented habitat.	2014	3	1	1	1
		2044	9	3	3	3

[a]The reference for historical abundance at the watershed scale is based on the midpoint of the historical range of variability for the vegetation conditions (PVG, tree size class, and canopy cover) that provide source habitat for black-backed woodpecker (Nutt et al. 2010).

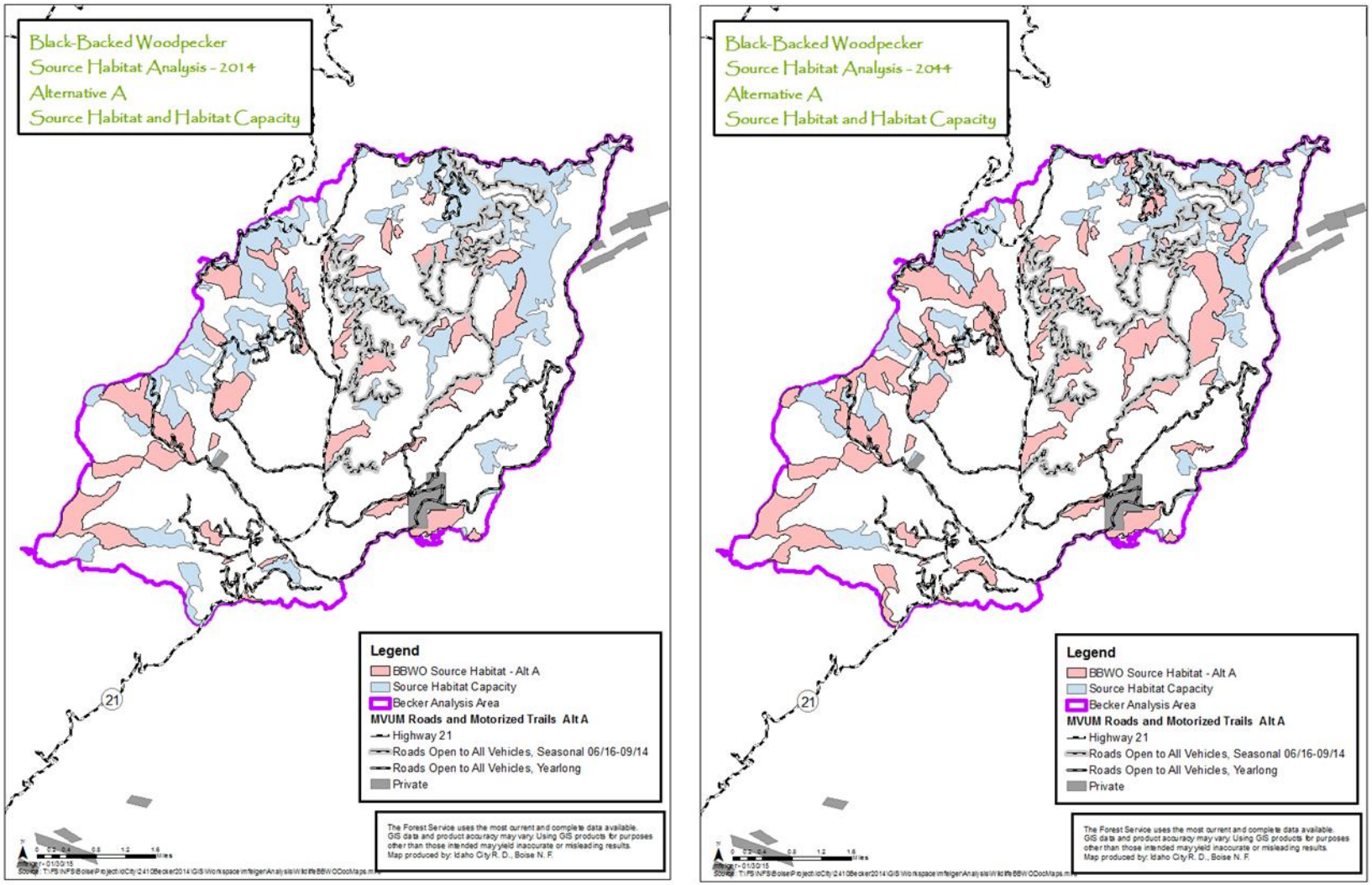


Figure 3-35. Alternative A maps (2014 and 2044) for black-backed woodpecker

Action Alternatives

Direct and indirect effects from all action alternatives are displayed together since limited differences exist between the alternatives (e.g., the additional acres of harvest under Alternative D and limitation on harvesting trees >18 inches dbh under Alternative E). The differences in outcomes of source habitat between action alternatives is less than 2% through all timeframes and result in little-to-no differences in regards to patches of sufficient source habitat (Table 3-56).

Actions described in Chapter 2—mechanical thinning of all types, prescribed fire application, and road management actions (temp and permanent road construction, realignment, closure, decommissioning, and resurfacing/maintenance)—would directly affect nesting black-backed woodpeckers.

While black-backed woodpeckers may be tolerant of humans, any activity that occurs within the vicinity of an active nest site may disrupt parental care if the adult becomes agitated and distracted. This distraction may impact survival of young and productivity of the pair. In addition, nests, eggs, or nestlings could be directly affected if a nesting snag is felled for safety reasons or is consumed or falls during prescribed burning activities. Activities that overlap with the nesting period (May through mid-July) could impact black-backed woodpecker productivity and directly affect habitat features.

Modeled source habitat abundance would decrease in the short term by roughly 3% for all source habitats under all action alternatives with proposed mechanical treatments, fuels treatments, and prescribed fire (Figure 3-36). This decrease would be caused by treated stands dropping below canopy cover thresholds (40%) post-treatment. Species composition would also change, particularly in departed PVG 3 habitats currently functioning as source habitat because the proportion of ponderosa pine, Douglas-fir, and possibly subalpine fir would shift toward ponderosa pine in order to move toward the desired conditions (see vegetation section).

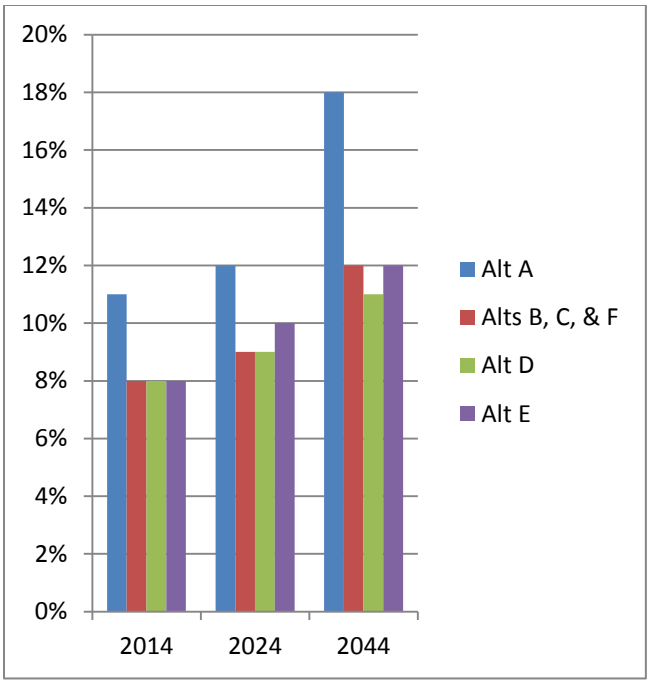


Figure 3-36. Black-backed woodpecker source habitat (percent analysis area), comparison of alternatives over time

Canopy covers in treated stands—and subsequently modeled source habitat—would increase over the mid to long term. By 2044, modeled source habitat in the project area would exceed current conditions, as would the largest patch size in both habitats functioning in PVGs (Figure 3-37 and Table 3-56).

With proposed treatments, stand canopy complexity would likely be less complex in the mid to long term than what currently exists or what would be developed under Alternative A in the long term. This reduction in complexity would further reduce habitat quality for black-backed woodpeckers, as they use highly complex canopies to avoid predators.

Road density and distribution, as an indicator of susceptibility of snag and down log loss to firewood cutters, would be reduced under all action alternatives. Thus, risk of snag and down log habitat loss to that activity would be reduced and would incrementally improve habitat conditions for the species in the mid to long term.

Snag habitats would improve incrementally over the short and long term (Table 3-57). The rate of improvement would be less than that of Alternative A. Changes in stand density and complexity as a result of proposed vegetation and fuels treatments would reduce the rate of new snag creation in the short and long term, as endemic levels of insects and disease activity would likely reduce in frequency and distribution. However, suitable snag conditions would likely be maintained.

Existing large CWD habitats are below desired conditions and would, in the short term, further decline from implementing natural fuels treatments. Over the long term, an improving trend would occur; however, because of the poor existing densities of large pieces of CWD, these habitat features would likely still be below desired conditions.

Little or no change would occur to old forest habitat conditions in the project area (see vegetation section).

Overall, action alternatives would improve trends for habitat features (Table 3-57). In the short term, this overall trend would be apparent in 2 of the 4 measures considered, while in the long term, 3 of the 4 measures would improve (Table 3-57).

Table 3-57. Quality trends for black-backed woodpecker habitat

Alternative	Year	Open Road Density[a] (mi/mi^2)	Medium Snag Density[b] (snags/acre)	Large Log Abundance[b]	Old Forest Abundance (acres)	No. of Indicators that Improve (out of 4 indicators)
Alternative A—2014 (Existing)		2.9	2.8	1.1 tons/acre	0	
Alternative B	2014	1.9	Within or exceeds DC +	Below DC --	0	2
	2044	1.9	+	+++	0	2
Alternative C	2014	2.1	Within or exceeds DC +	Below DC --	0	2
	2044	2.1	+	+++	0	3
Alternative D	2014	2.1	Within or exceeds DC +	Below DC --	0	2
	2044	2.1	+	+++	0	3
Alternative E	2014	1.9	Within or exceeds DC +	Below DC --	0	2
	2044	1.9	+	+++	0	3
Alternative F	2014	2.1	Within or exceeds DC +	Below DC --	0	2
	2044	201	+	+++	0	3

Note: DC = desired condition
[a]Derived from GIS data
[b]Quality trends: (short term/long term) ‘0’ = no change; ‘+’ = quality improves; ‘-‘ = quality declines. Trends use the existing condition as baseline.

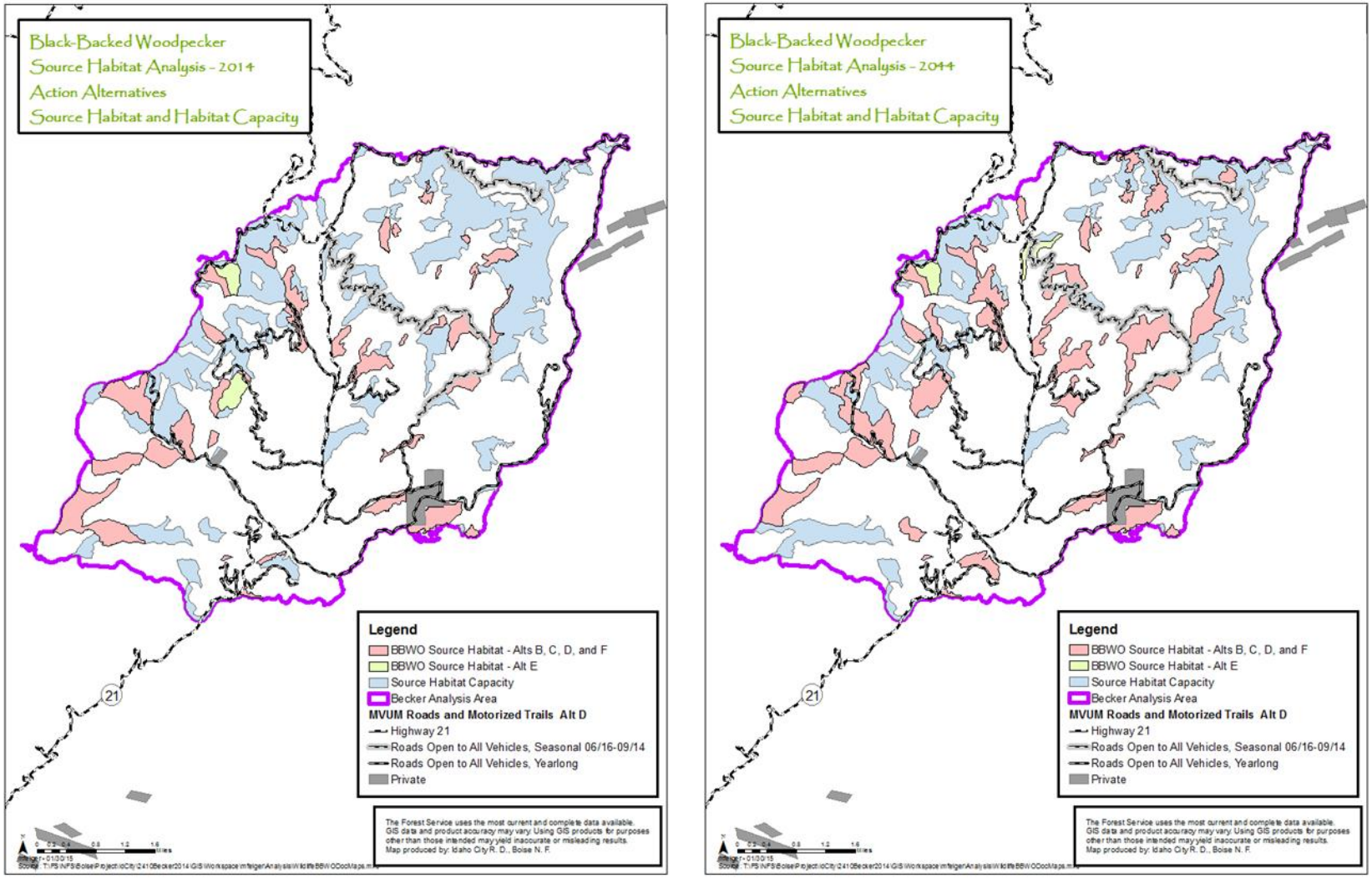


Figure 3-37. Action alternative maps (2014 and 2044) for black-backed woodpecker (Alternative E includes all source habitat identified for Alternatives B, C, D, and F plus the source habitat highlighted in green)

Cumulative Effects

Cumulative effects were assessed at the watershed scale (Crooked River 5th HU [1705011102]); however, assessments included only that portion administered by the Forest Service (private land was excluded). The Crooked River watershed was selected because it was the smallest unit assessed during the WCS analysis completed for the 2010 Forest Plan (USDA Forest Service 2010a). The area was selected to analyze how the Project contributes to maintenance or restoration of habitat within the watershed.

Source habitat in the watershed has decreased by 40% (Table 3-58; Nutt et al. 2010). Roads and motorized trails also impact source habitat quality and fall within the high category ($\geq$1.7 mi/mi^2).

Table 3-58. Crooked River 5th Hydrologic Unit (1705011102) habitat condition summary for black-backed woodpecker

Source Habitat Capacity (acres)	Historic Source Habitat (acres)	Current Source Habitat (acres)	Relative Change (historic to current)	Total Road Density (SHC)[a] (mi/mi^2)
30,791	15,209	9,087	–40%	2.7

[a]SHC = Source Habitat Capacity

Source habitat capacity presented in Table 3-58 includes those PVGs that historically had the capacity to develop source habitat conditions under historical fire regimes. Capacity is concentrated in the higher elevation areas of the Crooked River and associated tributaries, including the tributaries in the analysis areas. Across the watershed, habitat capacity is fairly fragmented where it occurs in cool air drainages or northern aspects.

Source habitat at the cumulative effects analysis area has declined for many of the same reasons as it has in the direct and indirect effects analysis area. Factors include past forest management actions, historic minerals exploration and operations, and recent large-scale wildfire disturbances.

Past activities have contributed to the existing condition. These activities include several timber and sanitation/salvage sales (88,363 acres), reforestation (229 acres), timber stand improvement (5,099 acres), the firewood program, construction and maintenance of roads and motorized trails, and fire suppression. Several large wildfires have recently occurred. The 1989 Gold Fork and Sawmill fires (2,082 acres) affected portions of the analysis area. The 1994 Rabbit Creek Fire further impacted 14,215 acres of analysis area, some of which provided source and potential source habitat utilized by pileated woodpecker. The fires burned with moderate-to-high intensity and resulted in stand-replacement with most ponderosa pine forests converted to an early-seral habitat. The 2007 Trapper Flat Fire (42 acres) occurred at higher elevations and had no effect on forests that provide source habitat for black-backed woodpeckers.

Alternative A

Alternative A proposes no actions; therefore, no cumulative effects would be associated with this alternative. A trend of increasing habitat, habitat patch size, and habitat quality would occur under Alternative A. This trend would result in continued development of source

habitat, much of which would occur in PVGs outside of the HRV. The increase in source habitat abundance would be the result of an increasing departure from historical conditions in the low-elevation forests.

Action Alternatives

Appendix A contains a comprehensive list of activities considered in this analysis.

Vegetation management and natural fuels actions proposed under Alternatives B, C, D, E, and F would add cumulatively to some of the past vegetation management, salvage, and natural fuels actions, thus modifying source habitat for black-backed woodpeckers. In the short term, those effects would reduce source habitat. However, over time, increases in source habitat would occur within the project area, as well as the cumulative effects analysis area, as adjacent stands with the potential to provide source habitat affected by past actions develop source habitat conditions. Over the long term, source habitat would likely meet or exceed historic levels for the analysis area.

Fuelwood cutting for personal use is expected to continue into the future. Although quantities of material removed annually is not known, such activities occur primarily adjacent to open roads. Changes in motorized transportation proposed under Alternatives B, C, D, E, or F would not cumulatively add to ongoing snag loss. The miles of roads open for public access, and thus access to snags and down logs for firewood cutting, would be reduced under each of the action alternatives. Cumulatively, this reduction would minimize effects to snag habitats as they function as nesting habitat across the analysis area.

No foreseeable future activity potentially impacting black-backed woodpeckers was identified.

Fisher (Sensitive)

A mix of forest habitat types is required to provide optimal foraging conditions for the diverse diet of the fisher (Arthur et al. 1989). In the Rocky Mountains, fishers show a preference for late-seral coniferous forests during summer months (Jones and Garton 1994), while early- or late-seral forests may be used in winter (Jones 1991). In Idaho and Montana, mesic forest habitats at low or mid elevations are important fisher habitat (Heinemeyer 1993, Jones 1991). Fisher tend to select forested stands with relatively high canopy cover, although tree cover may be discontinuous (Aubry and Houston 1992, Buskirk and Powell 1994). Riparian corridors provide important travel routes and prey patches for fisher, and the high canopy cover and structural complexity of riparian habitat support relatively abundant and diverse populations of prey (small mammals and birds). The denning period for this species typically occurs from March through early to mid-June, during which the kits are moved from the natal to a maternal den site (Powell and Zielinski 1994). Home ranges in Idaho averaged 20,400 acres for males (range of 7,140 to 29,500 acres) and 10,100 acres for females (range of 1,260 to 10,100 acres) (Jones 1991, Heinemeyer 1993).

On the Forest, vegetative communities that could provide source habitat conditions include PVGs 3, 6, 8, 9, and 10 in medium and large tree size classes and moderate or high canopy cover classes (Nutt et al. 2010). These PVGs have the capability to develop mesic, old forest, multi-layer conditions with moderate and high canopy closures that would provide for the structural diversity that is characteristic of fisher source habitat. Special habitat features

include riparian corridors (travel, prey patches), down logs (resting and den sites), and snags (resting and den sites).

Affected Environment

Hair snare surveys for fisher were conducted in November 2009 per Rocky Mountain Fisher Hair Snare Survey Protocol (Schwartz et al 2006) on Grids 616 and 617, which overlay the western half of the project area. Hair snare surveys are a non-invasive genetic sampling technique that collects hair samples to identify species and even individuals within a species. Additional hair snare surveys were completed approximately 13 miles east of the project area in Grid 858 in September 2008 (two wolverines detected) and 8 miles east in August 2008 (chipmunk and marten detected). In August 2009, an additional hair snare survey was conducted in 5 miles east of the project area in Grid 777 (woodrat and black bear detected). No fishers were detected during any of these efforts.

The project area has a source habitat capacity of approximately 3,542 acres distributed in a patchy, disconnected mosaic. Approximately 1,042 acres of source habitat occurs within the analysis area. These patches of habitat are widely scattered and range in size from 3 to 222 acres. Patch size is likely similar to historic sizes as the majority of capacity is within the mixed1 fire regimes where a broad range of patch sizes could result from fire disturbances. Also, the capacity is naturally fragmented and there is a low likelihood that source habitat within the analysis area could contribute to a home range if fisher source habitat occurs in adjacent watersheds.

Fisher are potentially affected by road- and trail-associated factors, such as snag reduction, down log reduction, habitat fragmentation, and degradation or loss of prey habitat due to invasive plants. Large snags, large live trees, and logs provide important resting and denning sites but are vulnerable to harvest or fuelwood cutting when adjacent to motorized routes. Even though fisher cannot legally be trapped in Idaho, the species is susceptible to trapping and may be inadvertently captured in traps set for other species. Roads and trails facilitate trapper access and increase the potential for injury or mortality from inadvertent capture. For these reasons, areas with high road and trail density are indicative of lower habitat quality. The current road and trail density in the project area is greater than 1.7 miles per square mile (mi/mi^2).

Stream and riparian corridors are used extensively by fisher. These wetter, cooler sites are generally more diverse and structurally complex than upland habitats. Denning, resting, and foraging opportunities are typically more abundant due to site conditions and structural diversity. RCAs are common in the analysis area and overlap with some source habitat and capacity. RCAs increase the structural complexity and diversity within the analysis area and can improve the connectivity between the fragmented source habitat patches. However, stream and riparian components of source habitat remain highly fragmented and disconnected, which may further reduce habitat suitability.

In summary, several indicators suggest that source habitat capacity and available source habitat may be limited in the project area. Habitat quality has been negatively affected by past management activities, further limiting the suitability of the project area for fisher. An extensive road and trail system was built to accommodate human uses, such as past timber and mining activities, and may have affected down log habitats in some of the source habitat present.

Environmental Effects

Direct and Indirect and Cumulative Effects

Alternative A

Alternative A would have no direct, indirect, or cumulative effects to fisher or fisher habitat because no activities are proposed with this alternative.

Action Alternatives

The 1,042 acres of existing modeled source habitat within the project area are oriented in patches across the project area that range from 3 to 222 acres with an average size of 47 acres. Altogether, these patches are not large enough to provide a potential home range for the fisher. In addition, the highly fragmented and disconnected nature of the habitat, in particular components associated with riparian areas, further reduces the suitability of this habitat for fisher and reduces the likelihood of occupancy and reproduction.

All action alternatives propose mechanical vegetation and natural fuels treatments within source habitat and stands capable of providing source habitat. Habitat quality could be reduced at the stand scale, as proposed treatments result in reduced stand density, canopy complexity, and coarse woody debris, including within riparian areas. Existing source habitats would be impacted by these actions, and in the short-term, some of those habitats would no longer meet source habitat descriptions.

However, no direct effects to fisher would likely occur from the proposed activities due to the low likelihood of fisher occupying or reproducing within the project area. Indirect and cumulative effects to individual patches of source habitat in the project area could occur, primarily from proposed vegetation and natural fuels treatments. However, because insufficient source habitat for reproducing fisher occurs in the project area, no indirect or cumulative effects would be anticipated with any of the action alternatives.

Determination

Determination—Implementing the action alternatives would have *No Impact* upon fisher or fisher habitat that could contribute to reproductive habitat.

Flammulated Owl (Sensitive and Project Focal Species)

Flammulated owl is a Sensitive species on the Forest. It was a selected focal species for this analysis because it relies on vegetative communities potentially affected by the action alternatives. This species also serves a variety of functional roles within the community and is associated with habitat elements used by other species in the family.

Breeding habitat for flammulated owls combines open, mature montane pine forests for nesting, scattered thickets of saplings or shrubs for roosting and calling, and grassland edge habitat for foraging (IDFG 2005; Reynolds and Linkhart 1987; Goggans 1986)—all of which are necessary across multiple spatial scales (i.e., microhabitat, home range, and landscape) (Wright 1996). In Idaho, flammulated owls were documented as occupying mid-elevation, old growth or mature stands of open ponderosa pine, Douglas-fir, or stands co-dominated by both species (Groves et al. 1997). Old forests of ponderosa pine and Douglas-fir are key components of home ranges for flammulated owl (Reynolds and Linkhart 1992) as these

forest types apparently support a particular abundance of favored lepidopteran prey (McCallum 1994). Flammulated owls nest in cavities that have been previously excavated in snags and live, large-diameter trees (Bull et al. 1990, McCallum and Gehlback 1988). Habitat for flammulated owls is strongly associated with upper slopes or ridges (Groves et al. 1997; Bull et al. 1990; Barnes 2007). Flammulated owls are obligate cavity nesters (IDFG 2005) and can take advantage of insect irruptions such as spruce budworm outbreaks (McCallum 1994, O'Neil et al. 2001).

On the Forest, vegetative communities that could provide source habitat conditions include PVGs 2, 3, 5, and 6 (Nutt et al. 2010, p. 333). These communities are most likely to have the habitat types that develop late-seral stages of open forest with stands dominated by ponderosa pine or Douglas-fir, or co-dominated by both. Historical fire regimes in these PVGs include nonlethal, mixed1, and mixed2 (USDA Forest Service 2010a, Appendix A). Snags are a special habitat feature for flammulated owls, providing nesting sites.

Indicators and Measures

Multiple indicators and associated measures were selected to assess effects of the actions proposed and to describe changes to source habitats over time (Table 3-59). The indicators and measures are adapted from those utilized in Nutt el al. (2010), which was used to support assessment of the 2010 Forest Plan (USDA Forest Service 2010a).

Table 3-59. Indicators and measures for the flammulated owl analysis for the Becker Integrated Resource Project

Indicator	Measure
Source habitat function	Total source habitat, acres and percent of project area
	Average patch size source habitat, acres
	Range of patch size source habitat, acres
	Number of patches
Source habitat quality	Source habitat within 300 feet of open road, acres and percentage of project area
	Qualitative snag assessment

Affected Environment

The direct and indirect effects analysis area includes all stands within the 19,327-acre project area that have stand examination data or have been assigned data through the most similar neighbor process (see vegetation section).

Flammulated owl surveys were conducted in the project area in 2008, 2009, 2013, and 2014 (Figure 3-38). Surveys were conducted using the Northern Region Landbird Monitoring Program: Flammulated Owl Protocol (Cilimburg 2007) and used the existing road network to access much of the project area. A total of 109 points were surveyed, resulting in 161 flammulated owl detections over the 4 years (Figure 3-38; field survey data available in the project record). Not all 161 detections represent individual birds; some the detections are repeats of individuals detected at prior year survey points. Not all points were surveyed each year. Detection locations are based on the measured azimuth from the survey point to the calling owl and an estimated distance to the owl's position. This approximate position was used to identify occupied stands.

Detections at survey points may not represent all occupied habitat in the project area. Survey routes were located only on roads that could be traveled by vehicle. While the routes generally provided good coverage of modeled source habitat across the analysis area, some source habitat between Gold Fork and China Fork of Beaver Creek did not receive adequate survey coverage. Based on results from elsewhere, source habitat in this area is likely occupied.

Based upon survey results, flammulated owls are well-distributed across the project area.

Source Habitat

Source habitat for this analysis is considered in the context of the project area's ability to provide source habitat (source habitat capacity) for flammulated owls as well as source habitat currently available or that would be available in the future in response to proposed management actions. Stands in PVGs 2 and 3 comprise 13,300 (Table 3-60) acres or 69% of the project area and are capable of developing source habitat for this species. The project area does not contain stands in PVGs 5 or 6. Stands contributing to source habitat capacity are distributed primarily across the nonlethal and mixed1 fire regimes (Figure 3-39), which is consistent with expected fire regimes for PVGs 2 and 3. Because of the predominance of PVG 2, as well as the way in which those stands are distributed, the project area has a well-distributed capacity to provide source habitat.

The source habitat modeled for this analysis identified 5,190 acres (39% of source habitat capacity) of source habitat for flammulated owls (Table 3-60). Source habitat is distributed in fragmented patches across the project area. As with source habitat capacity, source habitat is distributed across both the nonlethal and mixed1 fire regime landscape patches (Figure 3-39).

Source habitat patches vary in several characteristics. The model indicates 35 total patches of source habitat. Individual patch size ranges from 4 to 1,521 acres and 19 of the patches are large enough to provide for one or more home ranges (Table 3-60). Several patches are large enough to provide for several non-overlapping home ranges based on a 31-acre estimated home range size (Barnes 2007). The largest patch potentially represents 49 non-overlapping home ranges. However, this number does not consider flammulated owl preference for mid-to-upper slopes. Within the project area, smaller patches are often located close to large patches and may also be used by flammulated owls.

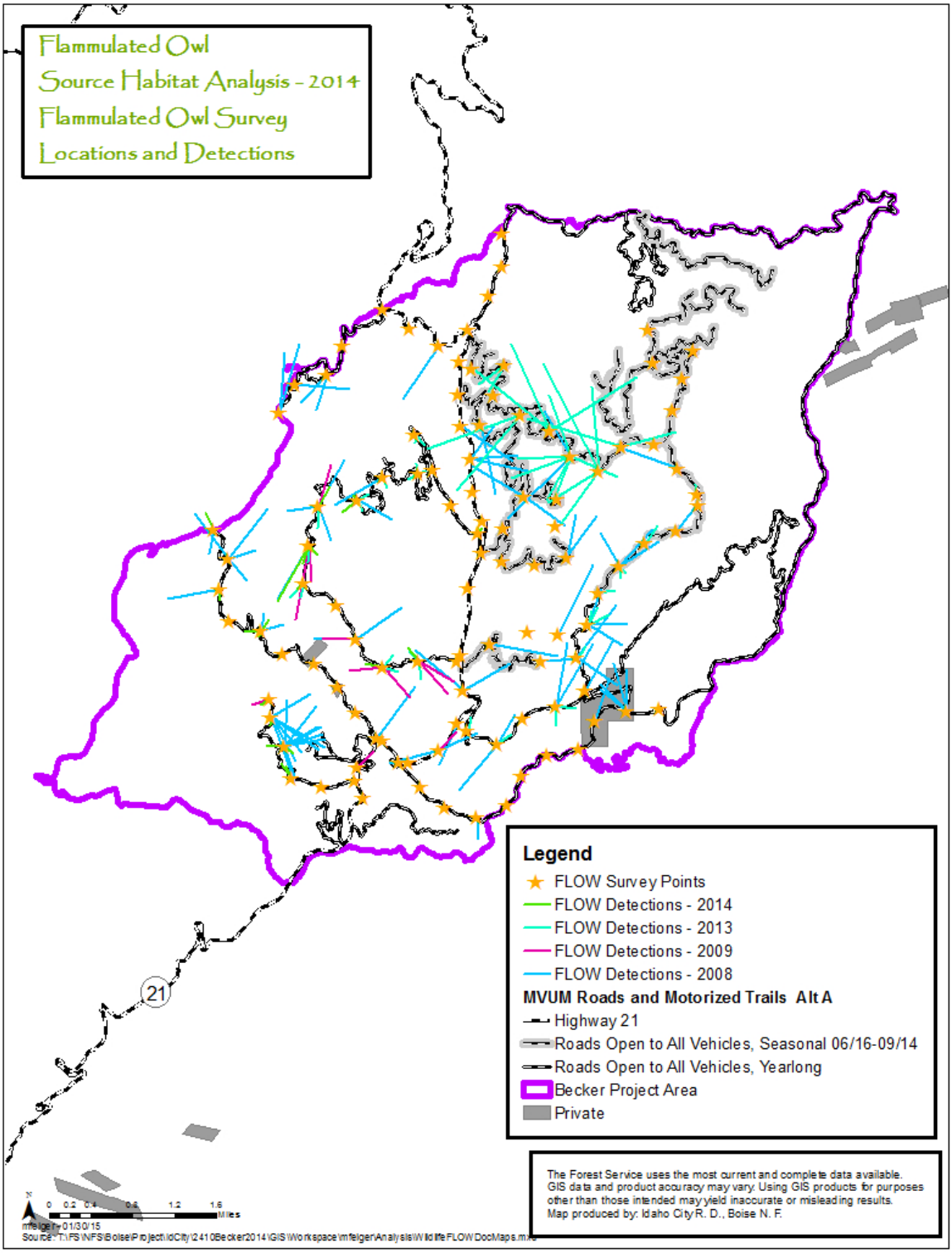


Figure 3-38. Flammulated owl survey points and detections (2008, 2009, 2013, 2014)

Table 3-60. Becker Integrated Resources Project area (19,327 acres) habitat condition summary for flammulated owl

Source Habitat Capacity (acres)	Source Habitat (acres)	Source Habitat Patch Characteristics					
		No. of Patches	Avg. Patch Size (acres)	Patch Size Range (acres)	No. of Patches >31-acre (Home Range)	No. of Non-overlapping Home Ranges (31 acres) Contained within Patches	No. of Non-overlapping Home Ranges within Largest Patch
13,300	5,190	35	148	4–1,521	19	163	49

Source habitat capacity is split evenly between landscape scale nonlethal and mixed1 fire regimes (Figure 3-39). The large tree size class would have dominated the landscape in the nonlethal fire regime; however, forests with moderate canopy cover class would not have been as prevalent as those with low canopy cover class. So while large tree size class patches would have been extensive, flammulated owl habitat would have occurred in conjunction with smaller patches of moderate canopy cover class within the large tree size class. The mixed1 fire regime would have had a highly variable patch size due to more intense fire effects. At any given point in time, the ‘all’ and ‘nothing’ scenarios would not have occurred historically, and variable size patches would have occurred within the analysis area.

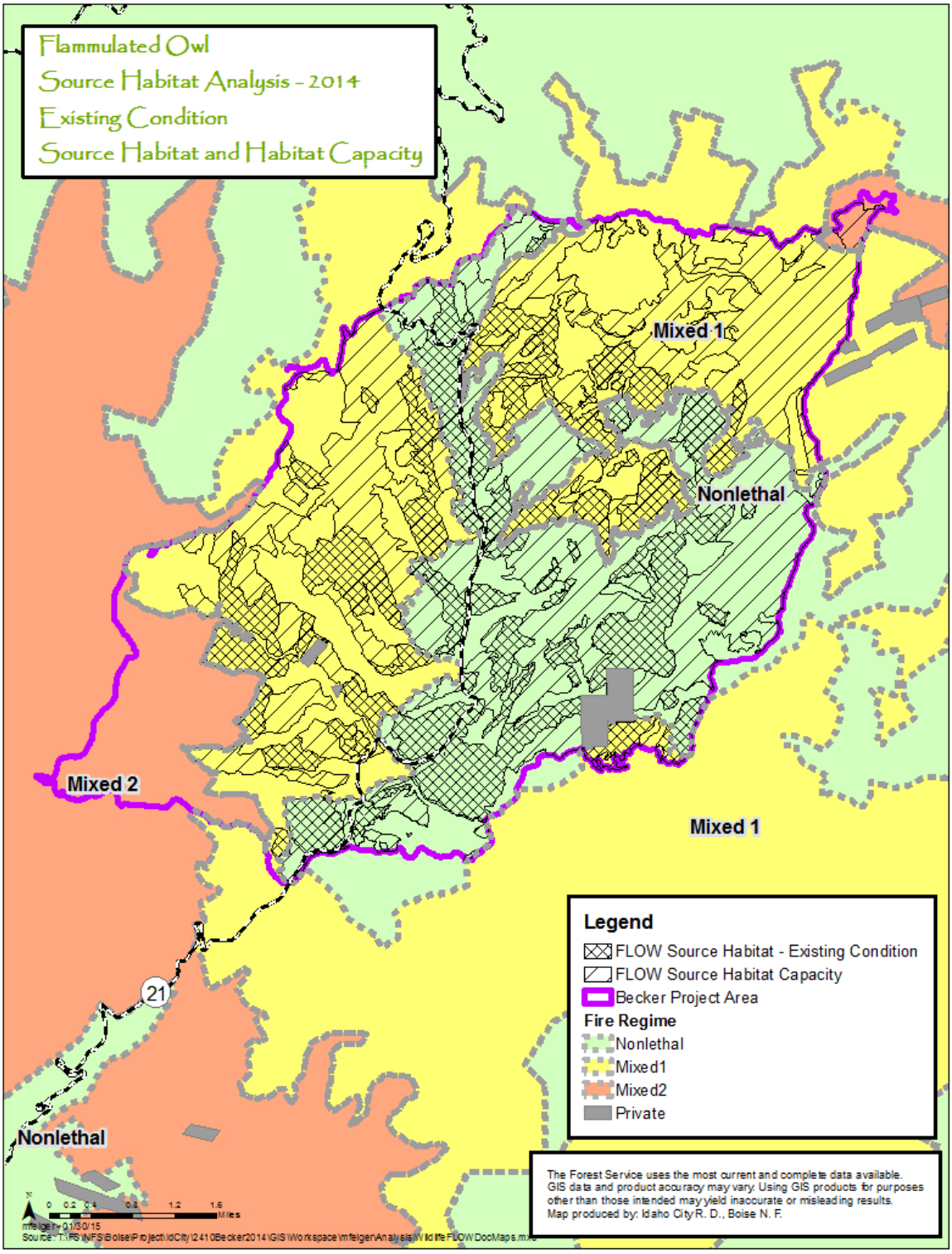


Figure 3-39. Flammulated owl source habitat capacity and relationship to fire regime patch and pattern

Comparing detections to modeled source habitat shows a strong correlation between occupancy of breeding males (and assuming associated breeding females) and modeled source habitat. Figure 3-40 overlays the survey detections described above over modeled source habitat and the portion of the project area providing source habitat capacity. These habitats, as modeled, would appear to provide sufficient stand density, structural diversity, and tree-species composition to provide for quality reproductive habitat.

Additional detections of individuals did occur in habitat that did not model as source habitat. However these areas were identified as being capable of developing source habitat (Figure 3-40). Subsequent follow-up snag surveys in those areas of detection found suitable snag habitats; and it is assumed source habitat conditions likely exist at a site-specific scale (i.e., within stand). As a whole, such habitats were not modeled as source habitats due to stand-level canopy closure conditions. The model uses stand-level information, which allows it to query some structural characteristics but does not allow for querying finer, within-stand microsite characteristics. This limitation more often results in an overestimation of modeled habitat and less often in an under representation.

Habitat relationship models are a useful tool to indicate areas of likely habitat over a broad area but are unable to completely replace field surveys since they are limited by their ability to address specific habitat needs of the species. These models indirectly infer a species is present, based on an assumed relationship between the species and its habitat. Models must also be biased in querying parameters that are measurable with the available data; so sometimes those parameters are a surrogate for an actual parameter of interest (i.e., PVG, stand density, and tree size class can infer information on structural diversity). In the project area, flammulated owl surveys for presence and field assessment of specific habitat features served to demonstrate a strong correlation between model habitat and functional, occupied source habitat.

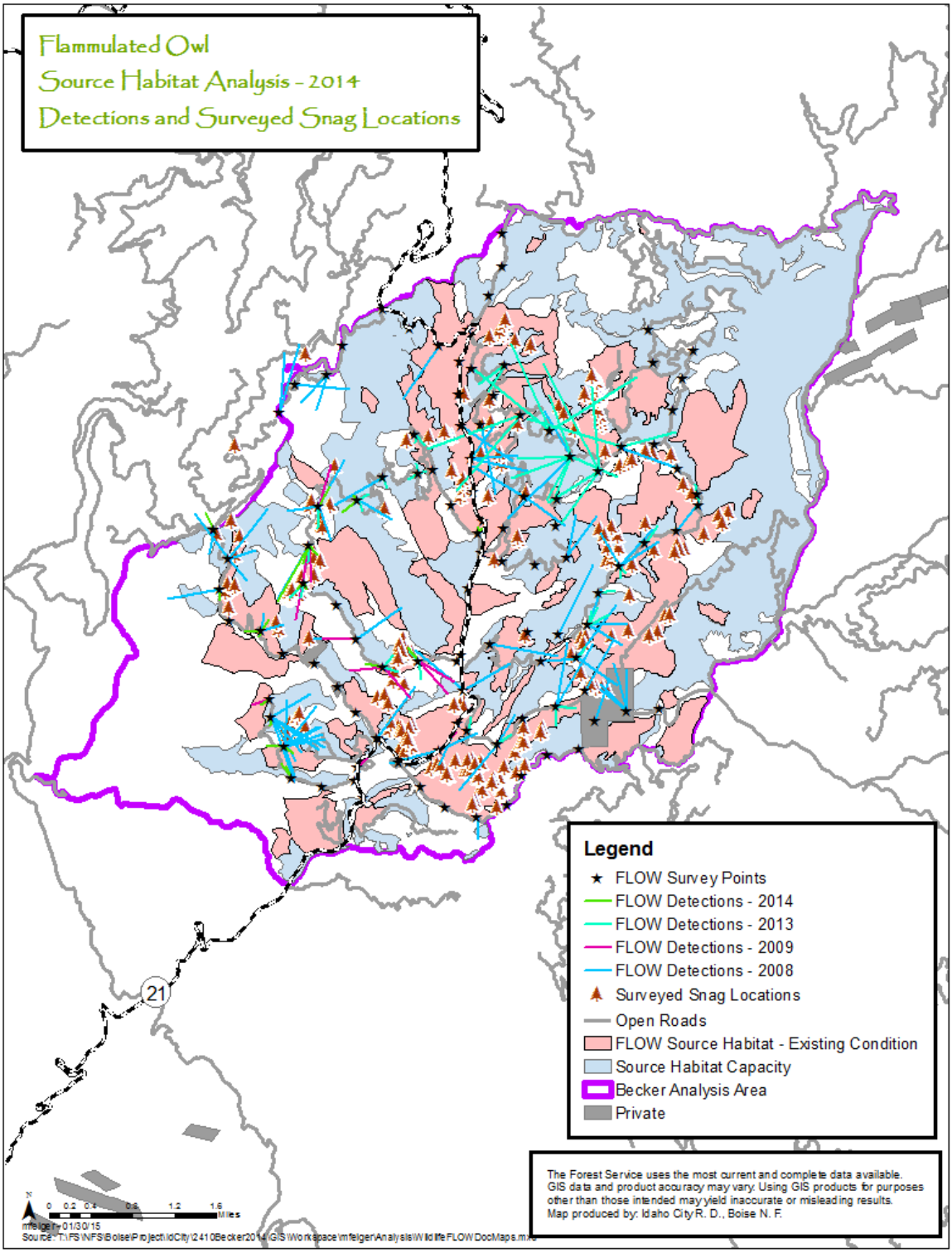


Figure 3-40. Flammulated owl source habitat and habitat capacity with survey detections (2008, 2009, 2013, and 2014) and surveyed snag locations

Source Habitat Quality

Source habitat quality can be further described in terms of key habitat component abundance and road density. Snags are a key habitat component, providing nest sites for this cavity-dependent owl, and are therefore an important component of source habitat. Snags, and other key structural components such as large, live trees, including those with dead tops, are more common in old forest habitats. Road density and distribution can be used to define the risks to snag habitat features, including disturbance during breeding season, loss of snags to firewood gathering, modification or loss of habitat from management activities such as timber harvest, and altered fire regimes from fire suppression.

Snag abundance was assessed by PVG for the project area (see wildlife technical report, available in the project record). Snag habitat densities are within desired conditions for both medium and large size class snags for PVGs 1, 2, and 3. Flammulated owls use snags in the medium and large size classes described in the 2010 Forest Plan (USDA Forest Service 2010a, Appendix A). In addition to modeling source habitat features, snag habitats were surveyed, specifically targeting occupied and potential source habitat in the project area (Figure 3-40). These snags were georeferenced with GPS equipment and marked on the ground to help implement a design feature that would retain nest structure in managed stands. In total, 295 snags were found that would meet requirements for nesting flammulated owls. These snags included a wide variety of decay conditions, from recently dead to well decayed, with all being larger than 15.0 inches dbh. Species represented included ponderosa pine and Douglas-fir. Snags were located on the upper 1/3 slope of stands. Use of the upper slope is consistent with published research (Bull et al. 1990; Moore and Frederick 1991; Reynolds and Linkhart 1992; Groves et al. 1997; Barnes 2007).

Roads and associated impacts to source habitat were assessed based upon their potential to enable access for firewood removal. Assessment of the percent of source habitat within 300 feet of an open road found 27% (1,409 acres) of source habitat within that area. Therefore, more than a quarter of source habitat is susceptible to undesirable effects to snag habitat and habitat recruitment.

Old forest habitat was also assessed by PVG for the project area (see wildlife technical report, available in the project record and vegetation section). No individual stand exhibits the full array of desired characteristics defining old forest habitat, likely due to past management practices.

In summary, the project area provides sufficient source habitat for a productive population. Snags appear well-distributed and reasonably abundant to meet the species' reproductive needs. However, old forest habitat is not present. In stands capable of developing source habitat, past timber sales and other silvicultural treatments have resulted in evenly spaced trees versus a more natural and variable distribution of trees that provides the microsite diversity that flammulated owls need. Road densities are high, with their distribution resulting in a relatively high degree of risk to snag habitat from firewood gathering. Fire suppression has also altered vegetation composition and structure, which has, in part, enhanced the quantity and distribution of source habitat in the analysis area, particularly in PVG 2 and other habitat types on the dryer end of the PVG spectrum. Changes in species composition in the upper and lower canopy levels (for example, increases in Douglas-fir in over and middle stories of the canopy, and increases in density and distribution in subalpine

fir and lodgepole pine in the lower and middle stories) and increases in stand density have improved source habitat in PVGs 2 and 3, particularly in those stands residing in the nonlethal landscape fire regime patch (Figure 3-39).

Environmental Effects

Changes to source habitat quantity and patch characteristics are used as effects indicators for flammulated owl. Snag and old forest habitat abundance are indicators of trends in habitat quality. The effect of road distribution in source habitat is an indicator of risks to the species and provides another indicator for habitat quality.

Direct and Indirect Effects

Alternative A

This alternative would not implement actions that would result in disturbance or displacement effects.

Alternative A would increase source habitat and patch size for flammulated owl over the 30-year analysis period (Table 3-61). Source habitat quality would remain generally degraded due to the loss of snags associated with firewood gathering adjacent to open roads. While habitat would increase (due to a continued departure trend from historical desired vegetation composition and structure), it is unlikely to be maintained through time, particularly in forests with historical nonlethal and mixed1 fire regimes. The more dissimilar departed vegetation composition and structure becomes, relative to desired historic conditions, the greater the risk of losing habitat to uncharacteristic (large, stand-replacing) wildfire events. Recent events, affecting a large portion of the Crooked River watershed, affirm that risk.

Source habitat would be maintained in the short term and increase in the long term, primarily due to increases in tree size and density within stands capable of developing source habitat (Table 3-61). This trend represents a continued and increasing departure of stand conditions for low- to mid-elevation forests with historical nonlethal and mixed1 fire regimes. Continued increases in density and distribution of later seral and climax species (Douglas-fir, subalpine fir, lodgepole pine), particular in the middle and upper layers of forest canopies, would indicate those changes. They would create volatile fuels conditions and increase ladder connections from the forest floor to the upper canopies. These departures increase the risk of habitat loss due to uncharacteristic large, stand-replacing fire events (fire and fuels technical report, available in the project record). Patch size would be unchanged in the short term and increase in the long term (Table 3-61, Figure 3-43, Figure 3-44). The trend in largest patch size would also increase. Roads would continue to degrade source habitat quality through snag loss over more than one-quarter of source habitat in the short and long term (Table 3-61).

Table 3-61. Source habitat indicators for flammulated owl by alternative and year

Indicator	Reference Condition	Year	Alt A	Alt B, C, F	Alt D	Alt E
Source habitat (acres)	Source habitat capacity is 13,300 acres. At the watershed scale, an estimated 40% of capacity would have been in a suitable condition for flammulated owl under historical conditions.a	2014	5,190	2,922	2,905	2,950
		2024	6,069	4,005	3,938	3,886
		2044	8,320	5,819	5,783	5,922
Patch size-range (acres)	Patch size-range provides context to the range of sizes of individual patches, particularly when compared to the average patch size for an analysis unit. The size of the largest and smallest patches are also identified.	2014	4–1,521	4–582	4–582	4–546
		2044	4–6,684	5–1,755	5–1,755	5–1,828
Average patch size	Average patch size serves as an indicator of trend in quantity and quality of source habitat patches and the ability to provide for breeding territories.	2014	148	75	77	82
		2044	297	166	165	169
Number of non-overlapping home ranges	Estimated home range size is 31 acres. While home ranges can consist of both source habitat and non-habitat, patches in contiguous blocks are better than fragmented habitat.	2014	163	77	77	78
		2044	254	172	172	175
Acres of source habitat within 300 feet of open road	Authorized and unauthorized removal of snag habitats for personal use firewood has the greatest impact on availability and future recruitment of this habitat feature. The smaller the proportion of source habitat affected by this activity, the greater the availability of this feature.	2014	27%	19–20%	20%	19%
		2044	28%	19–20%	20%	20%

[a] The reference for historical abundance at the watershed scale is based on the midpoint of the historical range of variability for vegetation conditions (Potential Vegetation Group, tree size class, and canopy cover) that provide source habitat for flammulated owl (Nutt et al. 2010).

All Action Alternatives

Actions described in the DEIS (Chapter 2) would result in direct effects to nesting flammulated owls through disturbance, displacement, or alteration of nesting or foraging habitat. Those actions include mechanical thinning (commercial and noncommercial); prescribed fire application; and road and recreation management actions (temporary and permanent road construction, realignment, closure, decommissioning, and resurfacing/maintenance) when they occur near active nesting flammulated owls. In addition, with the exception of Alternative E, the construction and development of OHV trails in the project area would result in direct effects when associated with active nesting flammulated owls.

Flammulated owls are noted as being tolerant of humans (Hayward and Verner 1994). However, the effects of mechanical disturbance have not been assessed (*ibid*). Based on the limited amount of data available, some activities, primarily mechanical treatment of vegetation, near active nest sites could disrupt breeding activities, reduce parental care, and increase predation risk; any of which could result in the loss of eggs or young owls. This potential effect would be minimized by providing protection at known nest sites through timing and area restrictions (Design Feature WR-6). Known sites are those treatment units where surveys confirmed flammulated owl presence (Figure 3-41). As noted in that figure, the degree of overlap is substantial.

Changes in motorized access on NFS roads and proposed motorized trails in the analysis area, as it relates to current and future source habitat, could result in disturbance effects to reproducing flammulated owls. Other actions referenced, including the adoption of non-motorized trails, culvert removal, and other similar actions that do not involve habitat modification, are unlikely to disturb or displace flammulated owls.

Actions under Alternatives B, C, D, E, and F would result in indirect effects associated with source habitat modification through changes to vegetation composition, structure, and size class, as well as impacts to snag habitats. Actions resulting in indirect effects include commercial and noncommercial mechanical thinning actions, implementing broadcast fire prescriptions, and relocating NFS road 393, which would reroute the road through previously inaccessible flammulated owl habitat and open those habitats to firewood gathering effects to snags.

Vegetation treatment actions would reduce source habitat in the short term and would return to slightly above current conditions after 30 years (Table 3-61, Figure 3-43,Figure 3-44). Existing source habitat stands are proposed for treatment to meet restoration objectives for the project. These treatments would reduce stand densities, resulting in lower canopy cover than typically used by flammulated owls. Canopy cover conditions would not decrease to the point where snags recruitment becomes limited. As trees mature, and other trees regenerate in openings, stand density would again increase, providing preferred conditions for flammulated owls. Both the mechanical treatments and post-treatment prescribed burning would result in the variability of structure within stands important for flammulated owls. Prescribed burning would also promote some snag development. In addition to proposed treatments, using variable thinning and the creation of small openings and loss of snags would be included.

Average patch size and the range of patch sizes would follow a similar trend, with a short-term reduction in that indicator (average patch size and the largest patch size) when implementing the action alternatives (Table 3-61). In the long term, each of those indicators would increase beyond the existing conditions.

Across the project area, in the short and long term, snag habitat densities would continue at levels either within or exceeding desired conditions for PVGs 1, 2, and 3. In occupied habitat, 3–5 suitable nest snags will be identified and protected with 83-foot no-treatment buffers to maintain site-specific stand conditions conducive to successful reproduction and fledging (Design Features WR-5 and WR-7). As a result, some snag microsite conditions (around snags capable of being nesting sites) would be retained to the maximum extent possible while still meeting OSHA standards.

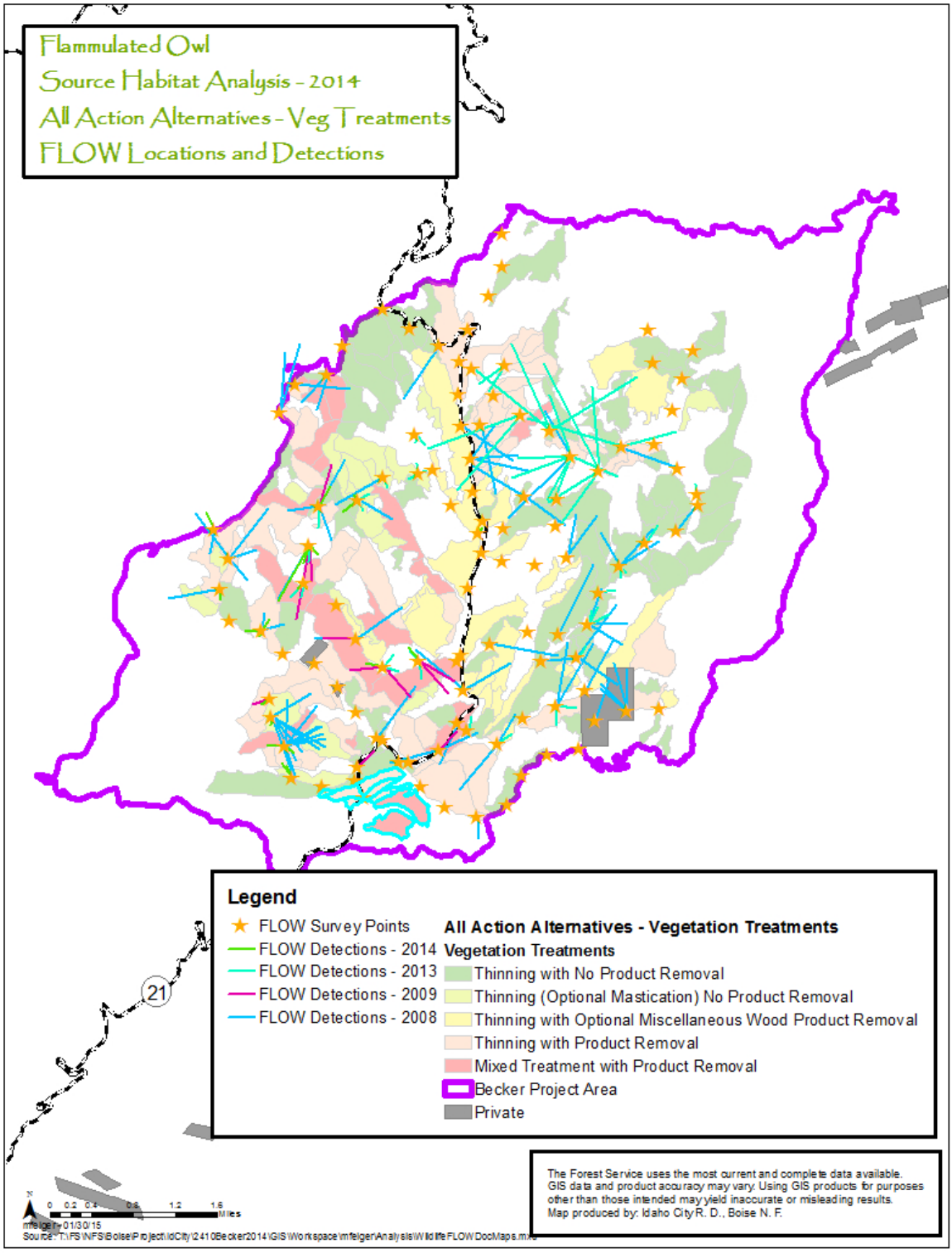


Figure 3-41. Flammulated owl detections and proposed vegetation treatments (blue highlighted treatments are unique to Alternative D)

Design Feature WR-5 would be applied to all occupied habitats treated by mechanical thinning actions, regardless of source habitat outcome, and would work to mitigate source habitat impacts with all action alternatives. The action alternatives would result in a roughly 56% reduction in source habitat across the analysis area. This reduction would impact currently occupied habitat and, in theory, reduce suitability as breeding and fledging habitat through reductions in canopy cover and stand structure complexity. However, some of those effects may be partially mitigated by implementing the snag buffer strategy highlighted in WR-5. Implementing WR-5 would help maintain site-specific habitat features around potential nesting snags, which may be sufficient enough to continue occupancy and successful reproduction, even though the stands would not meet source habitat conditions. This treatment would potentially lessen the amount of reduction in territories available post-treatment in the analysis area.

Patch size would be reduced in the short term as some treated stands would no longer provide source habitat as modeled. In the long term, as stands mature and return to suitable conditions, patch size would increase with the largest patches being greater than the current situation (Table 3-61, Figure 3-43, Figure 3-44). The number of potential non-overlapping home ranges would be reduced to 77–78 from 163 in the short term. In the long term, with increases in source habitat, total non-overlapping home ranges would increase to 172–175, depending upon the alternative (Table 3-61).

Effects associated with roads and access would decrease with the action alternatives, source habitat within 300 feet of open roads from 27% in the short term and 28% in the long term under Alternative A, to 19%–20% in the short and long term for all other action alternatives (Table 3-61). This decrease would come primarily from a reduction in open road miles due to changes in operational maintenance level and decommissioning of some segments. The 8%–9% reduction in source habitat within 300 feet of open roads would equate to a decrease in the risk of nesting snags being lost to firewood gathering, and an increase in recruitment of new snags over time.

While source habitat would be reduced in the short term, these low- to mid-elevation forests in nonlethal and mixed1 fire regimes would more closely resemble desired composition and historical structural characteristics. These forests would also be less susceptible to uncharacteristic fire events and effects (fire and fuels technical repot, available in the project record). An indirect benefit of the proposed treatments, in addition to reduced fire risk, would also be the enhancement of large tree recruitment at a rate greater than what would occur with the No Action alternative (vegetation technical report, available in the project record). In the long term, as source habitat conditions re-develop in treated stands, high-quality large tree habitat, and increased large snag recruitment potential would be realized and the species would benefit.

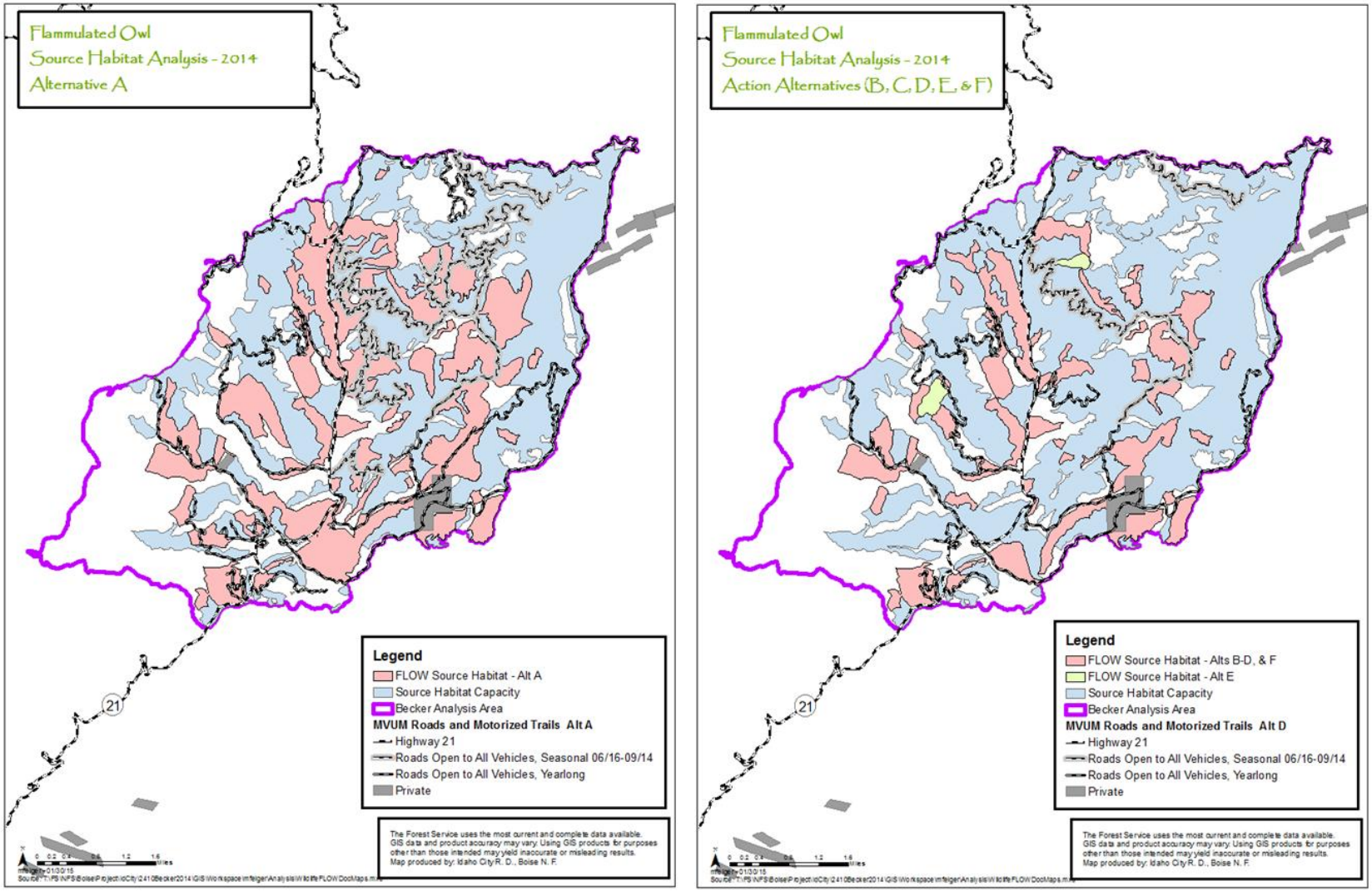


Figure 3-42. Alternative maps (2014) for flammulated owl

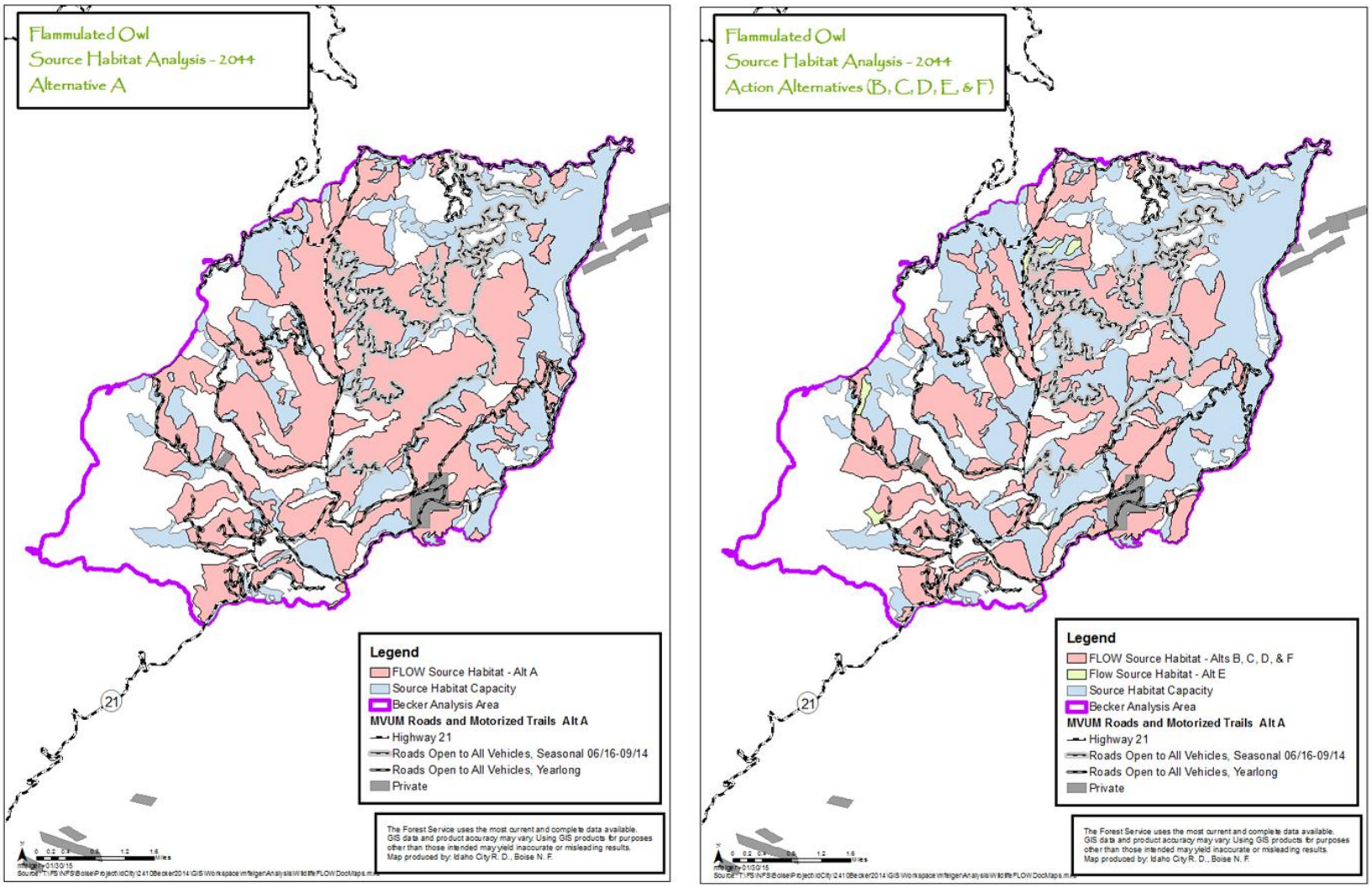


Figure 3-43. Alternative maps (2044) for flammulated owl

Cumulative Effects

Analysis Area

Cumulative effects were assessed at the watershed scale (Crooked River 5th HUC [1705011102]); however, results included only that portion administered by the Forest (private land was excluded) (Figure 3-44). The Crooked River watershed constitutes the analysis area and was selected based on the WCS (Nutt et al. 2010) completed for the 2010 Forest Plan (USDA Forest Service 2010a), which uses the watershed scale as a mid-scale comparison for effects to flammulated owls. This area was chosen to demonstrate how the project does or does not contribute to habitat maintenance or restoration within the watershed. It was the smallest unit assessed during the WCS.

Source habitat in the Crooked River watershed has decreased by 20% (Table 3-62; Nutt et al. 2010). Roads are also impacting source habitat quality and fall within the high road density classification ($\geq$1.7 mi/mi^2).

Table 3-62. Crooked River 5th HUC (1705012007) habitat condition summary for flammulated owl

Source Habitat Capacity (acres)	Historic Source Habitat (acres)	Current Source Habitat (acres)	Relative Change (historic to current)	Open Road Density (Source Habitat Capacity) (mi/mi^2)
26,608	8,460	6,748	–20%	2.12

No foreseeable future activities are identified that would potentially impact flammulated owls or their habitat. Past activities have contributed to the existing condition. These activities include several timber and sanitation/salvage sales (88,363 acres), reforestation (229 acres), timber stand improvement (5,099 acres), the firewood program, road and motorized trail construction and maintenance, and fire suppression. Several large wildfires have occurred in recent years. The 1989 Gold Fork and Sawmill fires (2,082 acres) affected portions of the analysis area. The 1994 Rabbit Creek Fire further impacted 14,215 acres of analysis area, some of which provided source and potential source habitat utilized by flammulated owls. The fires burned with moderate-to-high intensity and resulted in stand replacement with most ponderosa pine forests converting to an early seral habitat. The 2007 Trapper Flat Fire (42 acres) occurred at higher elevations and had no effect on forests that provide source habitat for flammulated owls.

However, at the same time, changes in disturbance regimes, including effects of fire suppression have allowed more source habitat to develop in PVG 2 than would have occurred with historical disturbance processes. This increase in source habitat is a result of greater stand densities and canopy complexity linked with a decrease in historically frequent low intensity fire disturbances (fire and fuels technical report and vegetation technical report, both available in the project record). While substantial suitable source habitat has been lost to recent uncharacteristic wildfires, source habitat has developed where it historically did not occur, partially mitigating the impacts of habitat loss due to wildfire.

Other changes include a reduction in the numbers of large trees and snags, particularly in the vicinity of roads, and high road densities and their associated risks (disturbance, snag loss,

altered fire regimes, and prey availability). Roads are currently concentrated in PVGs used by flammulated owls.

Alternative A

Implementing Alternative A would have no direct or indirect effects nor any cumulative effects. In the long term, the analysis area would be expected to increase in abundance and distribution of source habitat as currently unsuitable habitat develops into source habitat, in ways similar to those described for the project area above.

Action Alternatives

See Appendix B or a comprehensive list of activities considered in this analysis.

Past activities have contributed to the watershed's existing condition. Vegetation management and natural fuels actions proposed with Alternatives B, C, D, E, and F would add cumulatively to some of those past actions, resulting in a modification of source habitat for flammulated owls. In the short term, these effects would reduce source habitat. However, over time, source habitat would increase as adjacent stands with the potential to provide source habitat actually develop source habitat conditions. In the long term, source habitat would be likely meet or exceed historic levels.

Firewood cutting for personal use is expected to continue. Although quantities of material removed annually is not known, such activities occur primarily adjacent to open roads. Changes in motorized transportation proposed under Alternatives B, C, D, E, or F would not cumulatively add to the ongoing risk of snag loss because the proportion of acres within 300 feet of an open road would decrease from 27% to 19%–20% (Table 3-61). Cumulatively, the action alternatives would reduce effects to snag habitats as they function as nesting habitat across the analysis area.

Maintenance and use of roads and trails would continue, which would encourage use and indirectly affect impacts from fuelwood cutting and motorized recreation. Actions proposed under Alternatives B, C, D, E, or F would cumulatively add to noxious weed spread; however, applying Design Features IS-1 through IS-8 and IS-10 would minimize this effect. Transportation actions proposed under the action alternatives would not cumulatively add to the risk of snag loss, because the proportion of acres within 300 feet of an open road would decrease (Table 3-61).

In summary, the cumulative effects from Alternatives B, C, D, E, and F would be a short-term loss of habitat with a return to near current abundance after 30 years. Habitat would remain somewhat impacted by road access and distribution and the associated personal use fuelwood program; however, impacts would be lower than under Alternative A. While habitat would be reduced, vegetation composition and structure in forest types utilized by flammulated owls would more closely resemble historical conditions. The risk of losing habitat due to uncharacteristic wildfire events would decrease due to restoration treatments. The watershed would continue to provide suitable habitat in patch sizes large enough to support sufficient breeding pairs and contribute to well-distributed habitat and populations across the forest.

Determination

Alternatives B, C, D, E, or F **may impact individual flammulated owls, but would not lead toward a trend of federal listing or loss of viability**.

Rationale—Actions proposed under Alternatives B, C, D, E, and F would result in limited disturbance and displacement effects. Design features discussed in this analysis would limit those effects that would otherwise occur with implementation. Those design features primarily restrict activities such as mechanical treatment of vegetation, and road work within and adjacent to occupied source habitat during critical breeding periods. Source habitat would be reduced in the short term to below historic levels. However, suitable patches would be retained and are large enough to provide many home ranges within the analysis area and watershed. Furthermore, design features would be implemented to mitigate the short-term loss of source habitat by retaining site-specific source habitat features (snags and sufficient forest structure surrounding those habitats) that may allow successful reproduction in portions of stands not meeting source habitat conditions in the short term. The condition and distribution of the habitat retained would more closely emulate historical conditions, including the patch and pattern distribution as it relates to nonlethal and mixed1 fire regimes. Source habitat within the watershed would continue to contribute to the sustainability of flammulated owls and habitat on the Forest. In the long term, source habitats would return to existing conditions with a similar distribution. However, those habitats would have an enhanced condition by a) having a greater density of large tree structure, and b) a greater resiliency to uncharacteristic wildfire disturbances. This condition would result in a much more stable and sustainable long-term source habitat and associated population condition than Alternative A.

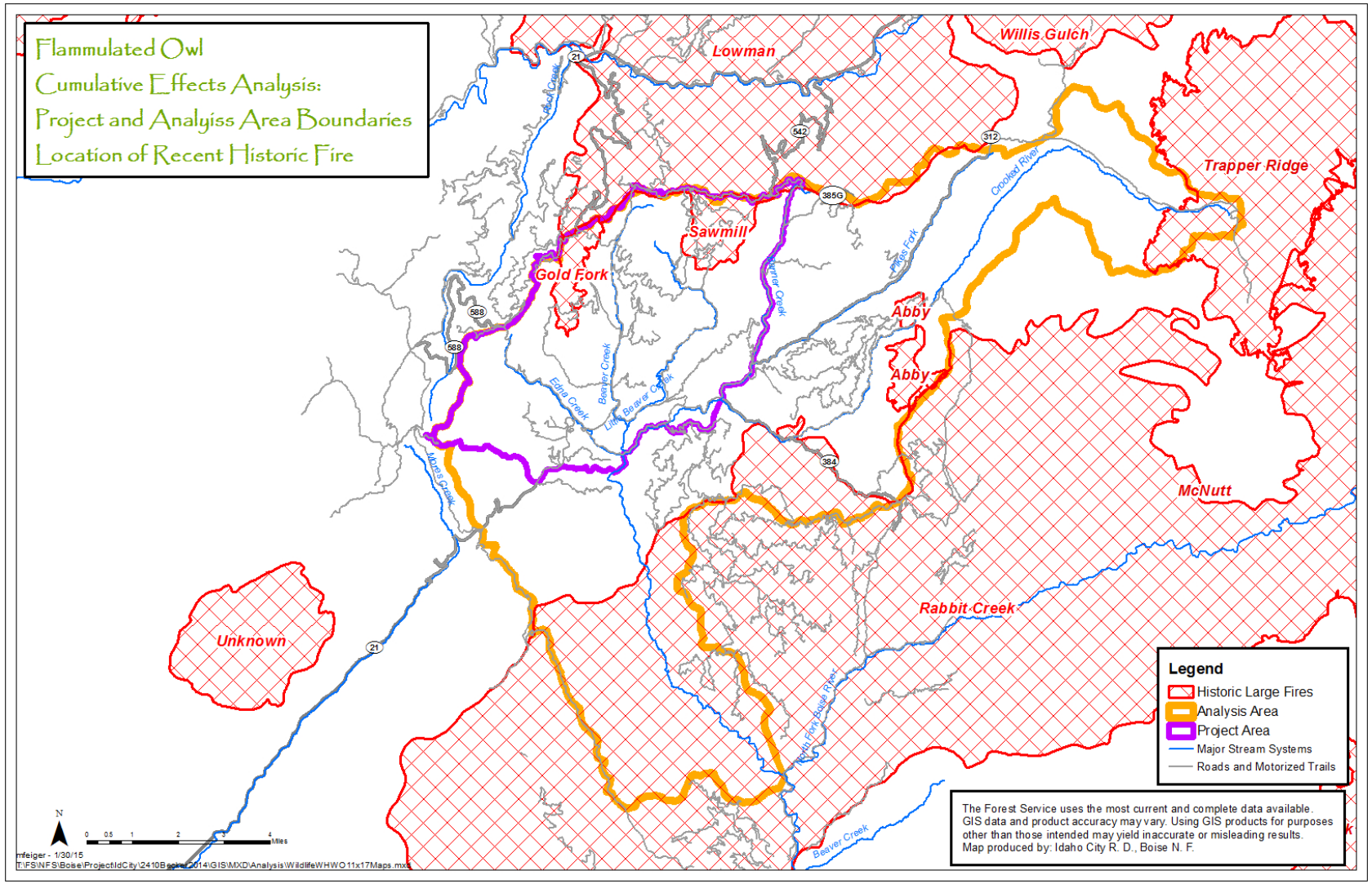


Figure 3-44. Cumulative effects area for flammulated owl

Great Gray Owl (Sensitive)

Great gray owls, recognized as sensitive species on the Forest, are year round residents of the Interior Columbia Basin and occupy source habitats in subalpine and montane forest and woodlands (Wisdom et al. 2000). The great gray owl is a contrast species that requires the juxtaposition of open habitats for foraging, with forested habitats for roosting and nesting. They are associated with forested habitats near meadows, marshes, bogs, open forests, and herbaceous habitats (Duncan and Hayward 1994). Key forested features include remnant giant- to medium-size trees and snags (15 to 30 inches dbh) (O'Neil et al. 2001, Wisdom et al. 2000). Juvenile great gray owls are flightless and depend on leaning and deformed trees to navigate from forest floors to tree canopies (Bull et al. 1988, Franklin 1988). Great gray owls rely on existing stick nests built by other large birds, natural platforms formed by dwarf mistletoe brooms, broken-topped snags, stumps, and artificial boxes for nesting (Marcot 1997, O'Neil et al. 2001, Duncan and Hayward 1994).

On the Forest, vegetative communities that could provide source habitat conditions include PVGs 3, 7, 8, 9, 10, and 11 (Nutt et al. 2010). These types can develop stand characteristics compatible with the needs of great gray owls. Historical fire regimes for these PVGs include mixed2 and lethal, which can create the juxtaposition of open and forested habitats used by the owls. Snags are a special habitat feature for the species.

Affected Environment

No occurrences of great gray owls have been documented in the analysis area (IFWIS 2014; NRIS 2014). This species is a resident owl, it breeds early, and surveys are best conducted in late winter. Surveys for great gray owls were not conducted in the Project Are based on winter staffing shortages and safety issues when conducting high-elevation, late winter surveys. However, surveys were completed for flammulated owls annually over a multi-year survey effort using call playback methodology (field survey data available in the project record) during May and June. All owl species detected during flammulated owl survey efforts were recorded. No great gray owls were heard, although great horned owls, long-eared owls, and flammulated owls were recorded during these surveys (field survey data available in the project record).

Territories for great gray owls average around 5,436 acres (Nutt et al. 2010). The project area contains disjunct patches of habitat for this species. Stands within the project area are limited in their ability to provide for great gray owl source habitat capacity. Only 3,542 acres of forested stands are of the appropriate PVG to potentially support source habitat. Approximately 1,615 acres of current source habitat occur in the project area; this source habitat is comprised of about 31 patches, averaging 31 acres in size.

Environmental Effects

Directa nd Indirect and Cumulative Effects

All Alternatives

The 1,615 acres of existing modeled source habitat within the analysis area are oriented in patches across the project area that range from 2 to 291 acres, with an average size of 31 acres. Individually, and as a group, these patches of habitat are insufficient to provide for a home range for a great gray owl pair. The species is not likely present given the lack of

sufficient source habitat. Therefore, no direct, indirect, or cumulative effects to great gray owls or their habitat are anticipated under Alternative A or the action alternatives. Source habitat would remain extremely limited within the project area, not as a result of any management actions, but due to a limited capacity for the area to develop source habitat without the appropriate PVG distribution and extent.

Determination

Determination—Implementing Alternatives B, C, D, E, or F would have *No Impact* on the great gray owl or its habitat.

Northern Goshawk (Sensitive and Project Focal Species)

Northern goshawk is a Sensitive species on the Forest. The species was selected as a focal species for this analysis because uses vegetation communities and structural components potentially affected by the action alternatives. In addition, goshawk serves a variety of functional roles within the community, including as a predator and consumer of other animals, potentially controlling their populations, and as a creator of stick nests that are used by other species.

Northern goshawks use a variety of forest ages, structural conditions, and successional stages (Griffith 1993) and are associated with shrubland and grassland habitats. Nest sites are typically located next to the trunk of large diameter trees and in older stands where trees are widely spaced (Hayward and Escano 1989). Deformities (multiple trunks and mistletoe), especially in smaller diameter trees, are used as nest site substrates. Snags are often used as plucking posts. Northern goshawks prefer transitional zones for hunting. Mosaics of forested and open areas and riparian zones are equally important (Griffith 1993). The nesting home range for northern goshawks is estimated at more than 5,900 acres and includes three components: nesting, foraging, and post fledging family areas (Reynolds et al. 1992).

On the Forest, source habitat for goshawks occurs in all PVGs except 1 and 11 (Nutt et al. 2010). PVGs 2 through 9 are capable of developing multi-layered, mature and late seral stands with a dense canopy. For some PVGs, these conditions occur under historical fire regimes, while other PVGs develop these conditions due to fire suppression and altered fire regimes. No special habitat features have been identified for goshawk.

Indicators and Measures

Multiple indicators and associated measures were selected to assess effects of the actions proposed and to describe changes to source habitats over time (Table 3-63). These indicators and measures were adapted from those utilized in Nutt el al. (2010), which was used to support assessment of the 2010 Forest Plan (USDA Forest Service 2010a).

Table 3-63. Indicators and measures for the northern goshawk analysis for the project

Indicator	Measure
Source Habitat Function	Total source habitat, acres and percentage project area
	Average patch size source habitat, acres
	Range of patch size source habitat, acres
Source Habitat Quality	Change in road density

Affected Environment

The project area for which direct and indirect effects to northern goshawk and its habitat includes within the 19,327-acre project area that have stand examination data or have been assigned data through the most similar neighbor process (see vegetation section). All stands with proposed vegetation treatments under the action alternatives are included in the project area.

Based on occurrence records, goshawks are present and believed to be reproducing in the project area. Surveys for goshawks were conducted in the project area in 2008, 2009, and 2014 in modeled source habitat in the Edna Creek and Gold Fork drainages west of Highway 21. Locations selected were based upon anecdotal reports of northern goshawks prior to 2008. A combination of walk-throughs and implementation of the northern goshawk protocol (Woodbridge and Hargis 2006) were utilized. Survey efforts in 2008 and 2009 did not detect individuals. Survey effort in 2014 did detect one adult in the upper Edna Creek drainage. A second detection in August 2008 of an adult was the result of general habitat assessment walk-throughs conducted by Forest Service staff that year.

Detections occurred within or immediately adjacent to modeled source habitat (Figure 3-45). The 2014 sighting in the headwaters of Edna Creek is the most compelling given its association with the largest contiguous blocks of source habitat in the project area.

Source Habitat

Source habitat for this analysis is considered in the context of the project area's ability to provide source habitat (source habitat capacity) for northern goshawk as well as source habitat currently available or would be available in the future in response to proposed management actions. Stands in PVGs 2, 3, 4, 7, 8, 9, and 10 comprise 17,976 acres (93%) of the project area and are capable of developing source habitat for this species (Figure 3-45). Stands contributing to source habitat capacity are distributed primarily across the nonlethal and mixed1 fire regimes, which is consistent with expected fire regimes for PVGs 2, 3, 4, and 7. PVGs 8, 9, and 10 tend more towards mixed2 fire regimes and are a minor component of source habitat capacity in the project area. Because of the predominance of PVG 2, as well as the way in which those stands are distributed, the project area has a well-distributed capacity to provide source habitat.

Currently, 6,264 acres of modeled source habitat occurs within the analysis area. Some of that habitat is relatively fragmented, particularly that which occurs east of Highway 21. Habitat west of Highway 21 and south of Gold Fork is much more contiguous, with larger intact patches. Table 3-64summarizes the range of individual patch sizes as well as average patch size for existing source habitat.

Table 3-64. Source habitat indicators summary for northern goshawk

Source Habitat Capacity (acres)	Source Habitat (acres)	Source Habitat Patch Characteristics					
		No. Patches	Ave. Patch Size (acres)	Patch Size Range (acres)	No. Patches ≥5,931-acre (Home Range)	No. Non-overlapping Home Ranges (5,931 acres) Contained within Patches	No. Non-overlapping Home Ranges within Largest Patch
17,963	6,264	32	196	3–3,946	0	0	0

Source habitat distribution, particularly the larger, more contiguous patches west of Highway 21, is consistent with the larger landscape fire regime patches within the project area (Figure 3-46). Source habitat conditions include the presence of relatively dense, multi-layered stands with an abundance of large trees to provide for nesting, foraging, and fledgling habitat (Nutt et al. 2010). Interspersed within those stands are more open, less dense, less complex habitats that provide a diversity of foraging opportunities. Such conditions are a hallmark of mixed1, and to a lesser degree, mixed2 fire regime patches (USDA Forest Service 2010a, Appendix A). The greatest abundance and distribution of large patches of modeled source habitat are located in the mixed1 and mixed2 fire regime patches (Figure 3-46). Conversely, areas with the highest degree of fragmented habitat occur within the nonlethal fire regime patch west of Highway 21. In this area, a combination of isolated patches of PVGs 4 and 7, as well as some habitat types in PVG 2 that are outside the HRV and desired conditions, provide isolated patches of source habitat. Such patches do not likely provide reproductive habitat; however, they may provide foraging habitat in association with the larger suitable habitat patches to the west of Highway 21.

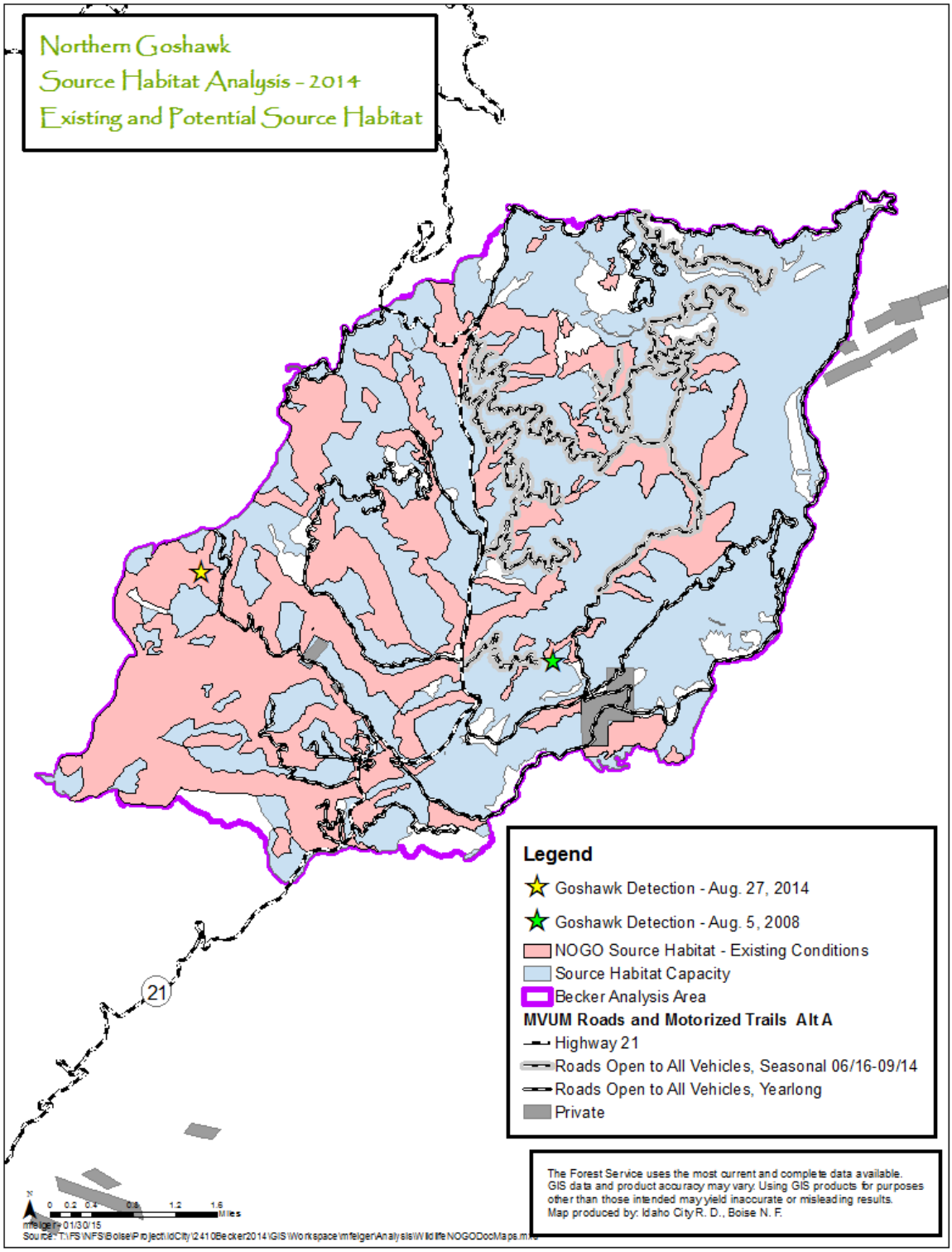


Figure 3-45. Northern goshawk existing condition

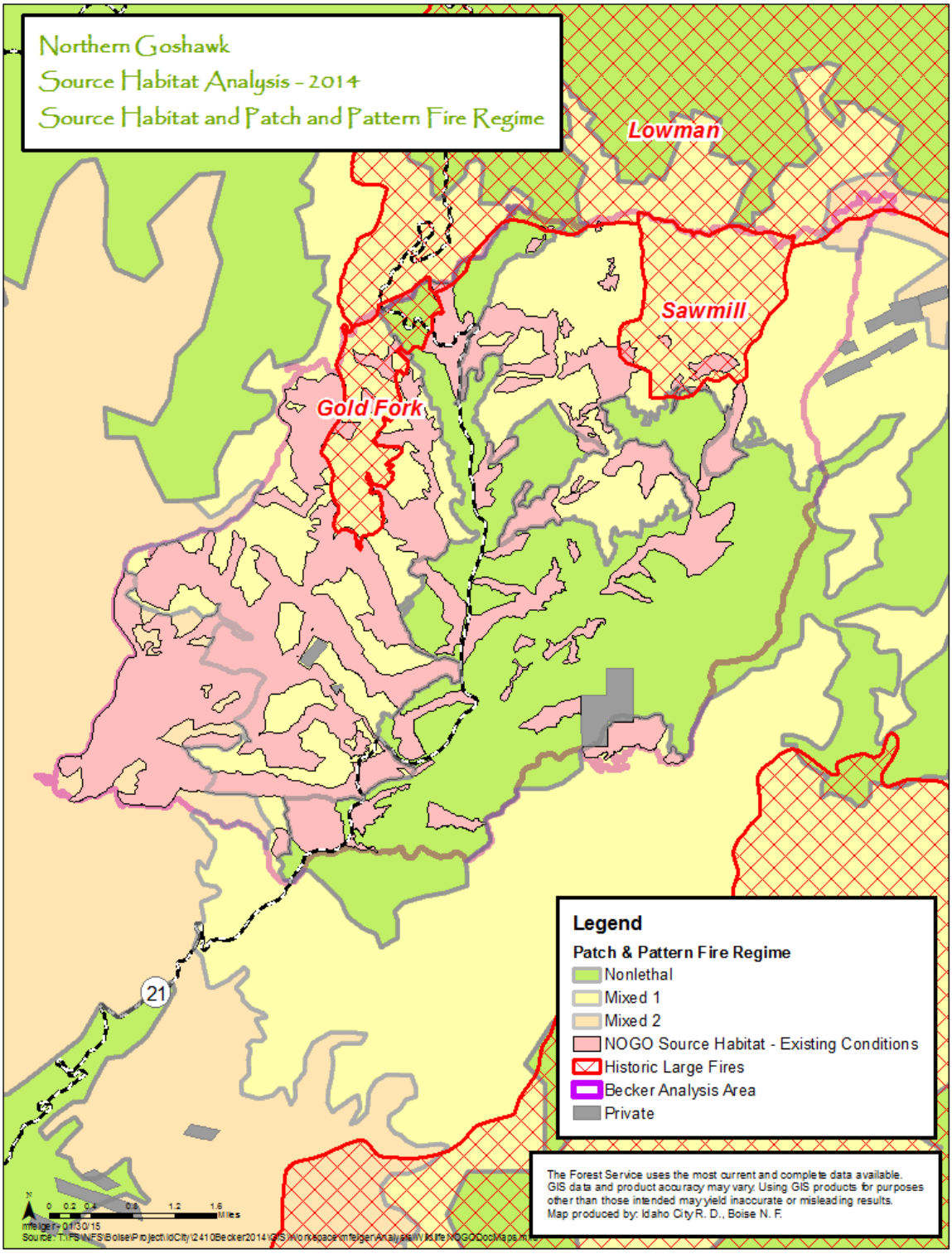


Figure 3-46. Northern goshawk existing condition

Source Habitat Quality

Source habitat quality can be further described in terms of key habitat component abundance and road density. Because goshawks build large stick nests, sites capable of supporting such nests are more likely to occur in conjunction with large trees and old forest habitats. Road density can be used to define a variety of risks to the species and their habitat. These risks include disturbance during the breeding season, modification or loss of habitat from management such as timber harvests, and alteration of prey base through vegetation management. The presence and spread of noxious weeds is often coincidental with roads and motorized trails. Noxious weeds are considered a low direct risk to goshawks because goshawk habitat does not overlap with weed susceptibility (Nutt et al. 2010, p. 398). However, weeds replace native vegetation, potentially degrading habitat for prey, thus indirectly affecting goshawk through reduced prey abundance (Nutt et al. 2010, p. 396).

Habitat quality has been degraded in part by past vegetation management and construction, maintenance, and use of roads and motorized trails. The large tree size class and old forest habitat were analyzed in section 3.5.1. For PVGs providing capacity, 3,092 acres or 49% of capacity is in the large tree size class. No stand currently exhibits all of the desired characteristics of old forest habitat (see vegetation section). The lack of old forest habitat is in part indicative of the changes resulting from past vegetation management that focused on removing large trees and snags as well as damaged and diseased trees. These stand components are some of the features that increase the suitability of forests for goshawks by providing structure for nest sites and variable conditions across the landscape for a variety of prey. Total open road density for source habitat is 1.4 mi/mi^2, which is a relatively low road density within modeled source habitat and is a reflection of the distribution of the larger patches of source habitat in the less roaded/un-roaded areas of the project area (Figure 3-45). Road construction and maintenance result in habitat loss and fragmentation.

Environmental Effects

Source habitat quantity and patch characteristics were used as effects indicators for northern goshawk. Large tree size class and old forest habitat abundance are all indicators of trends in habitat quality. Road and motorized trail density is an indicator of risks to species persistence and is also an indicator of trend in habitat quality. As density declines, impacts are reduced, and habitat quality increases.

Direct and Indirect Effects

Alternative A

Since no actions are proposed under Alternative A, no direct effects would occur from this alternative.

Indirectly, source habitat abundance would increase in both the short and long term under Alternative A (Table 3-65, Figure 3-47, Figure 3-48). Patch size would increase and exceed the size of a home range. While these trends are positive for goshawk, an increase in a portion of the source habitat would be from vegetation structure that is departed from historical conditions. In the nonlethal fire regime patch, patch size and continuity of modeled source habitat is relatively high (Figure 3-49), which is indicative of increasing departure from desired conditions in PVG 2 stands. This increased departure is not considered positive

because the greater the departure, the greater the risk to sustainability of desirable habitats within this fire regime patch.

One of three habitat quality indicators would improve in the short and long term. The amount of forest in the large tree size class would increase, indicating that potential nesting sites may be more available in the future. While no stands would exhibit the full array of desired characteristics describing old forest habitat, stands within the mixed1 and mixed2 fire regimes would move toward desired conditions.

Open road density within source habitat would increase slightly under Alternative A (Table 3-65), which would be an undesirable trend. This increase would occur from increasing source habitat development in areas where open roads currently exist. Densities would still be relatively low and would not likely contribute substantially to risk of disturbance to nesting northern goshawk pairs.

As source habitat expands, two or more active territories would occur, in whole or in part, within the project area over the long term.

Table 3-65. Source habitat indicators for northern goshawk by alternative and year

Indicator	Reference Condition	Year	Alt A	Alt B, C, F (D)	Alt E
Source Habitat Quantity in Acres (long-term trend)	Source Habitat Capacity is 17,976 acres. At the watershed scale, an estimated 23% of capacity would have been in a suitable condition for northern goshawk under historical conditions[a].	2014	6,264	4,431 (4,387)	4,615
		2024	7,304	5,403 (5,310)	5,680
		2044	10,932	7,702 (7,652)	7,526
Patch Size-Range in Acres (long-term trend)	Patch size-range provides context to the range of sizes of individual patches, particularly when compared to the average patch size for an analysis unit. This also identifies the size of the largest and smallest patches.	2014	3-3,946	3-2,908 (Same)	3-1,968
		2044	3-10,268	3-2,258 (Same)	3-2,188
Average Patch Size	Average Patch Size serves as an indicator of habitat fragmentation. While home ranges can consist of both source habitat and non-habitat, patches in contiguous blocks are better than fragmented habitat.	2014	196	114 (107)	128
		2044	497	227 (225)	215
Open Road Density	Density of Open Roads within Source Habitat serves as an indicator to disturbance risk to nesting pairs and risk of further habitat fragmentation	2014	1.4	1.2 (1.3)	1.2
		2044	1.6	1.3 (same)	1.2

[a]The reference for historical abundance at the watershed scale is based on the midpoint of the HRV range for the vegetation conditions (PVG, tree size class, and canopy cover) that provide source habitat for northern goshawk (Nutt et al. 2010).

All Action Alternatives

Proposed actions described in Chapter 2 could result in direct effects to nesting northern goshawks. Those actions include mechanical thinning of all types; prescribed fire application; and road management actions (temporary and permanent road construction, realignment, closure, decommissioning, and resurfacing/maintenance) when they occur near active nesting pairs. Source habitat in the project area would be effected by vegetation and natural fuels treatments and road management actions proposed under each action alternative.

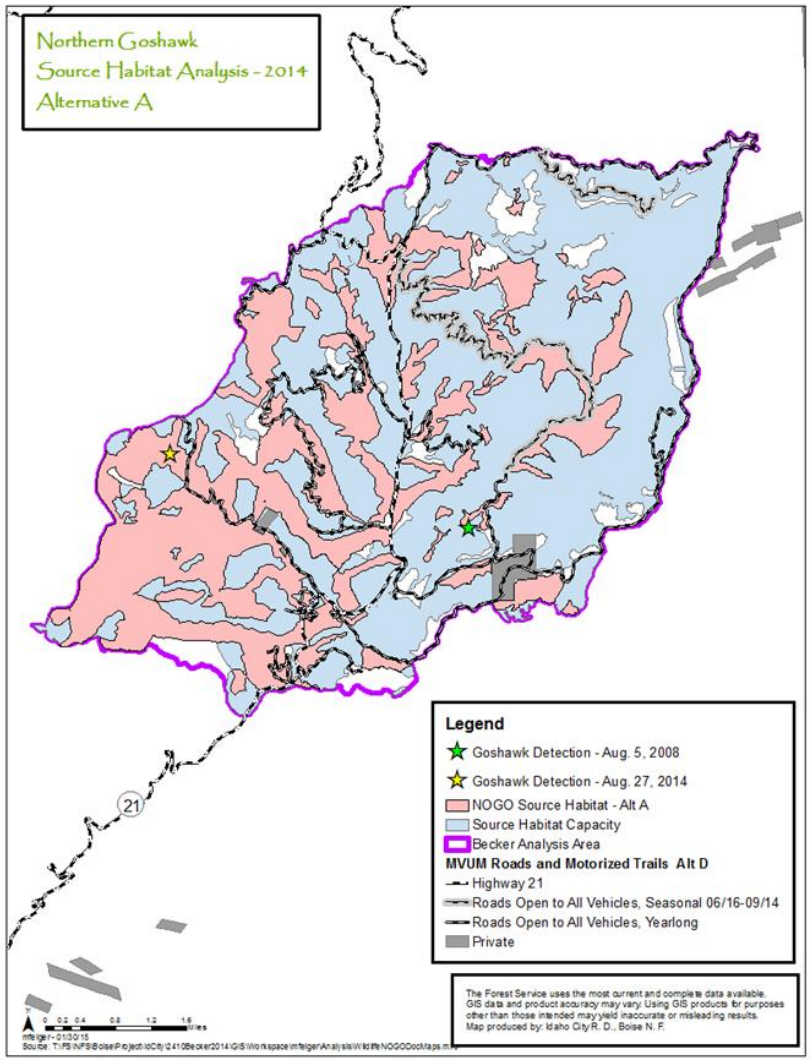
At this time, no active nesting territories are known, but at least one is assumed to occur in the Whoop ‘em Up Creek, Edna Creek, or China Fork basins. Ongoing monitoring would be conducted to continue looking for a nesting pair. If a pair were detected, Design Features WR-1 thru WR-4 would be implemented, which would protect the integrity of active nest stands and mitigate disturbance effects to nesting and fledging goshawks.

Source habitat and patch size would decrease in the short term, but would improve and expand in the long-term and exceed current conditions by 2044 (Table 3-65, Figure 3-47, Figure 3-48). This change would be from the development of large tree structure, particularly east of Highway 21 that increases source habitats. Increased canopy cover over the long term would also increase modeled source habitat. However, modeled source habitat that would develop over the mid to long term would be much more resilient to wildfire, insects, and disease disturbances because the species compositions for much of that habitat, particularly in PVGs 2 and 3, would be skewed more towards desired ponderosa pine, with less interconnected canopies that would otherwise be more susceptible to disturbances. The action alternatives would result in forests that are more resilient and function similarly to the HRV (fire and fuels technical report and vegetation technical report, available in the project record).

As noted, large tree size classes would be an increasing percentage of total source habitat (84% of modeled source habitat) for all alternatives. Again, this characteristic would reflect a much more resilient source habitat condition (as it pertains to uncharacteristic wildfire effects), with sufficient structure to support nesting habitat.

Open road density within source habitat would also decrease when compared to existing conditions and alternative A, in spite of increasing acres of source habitat, because the miles of open road would decrease under the action alternatives (Table 3-65).

The west southwest one-third of the project area would likely continue to support one territory for a breeding pair. Over time, as patches of source habitat expand east of Highway 21, an additional pair of northern goshawks would likely find sufficient source habitat for a successful territory.



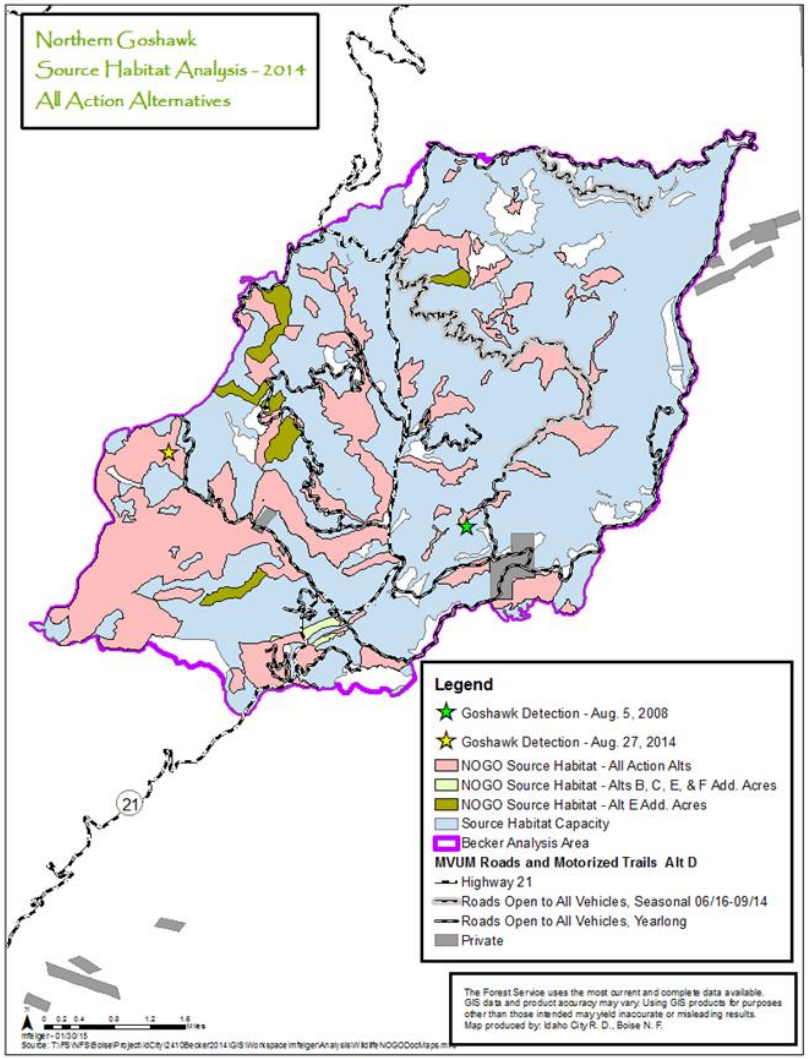


Figure 3-47. Alternative maps (2014) for northern goshawk

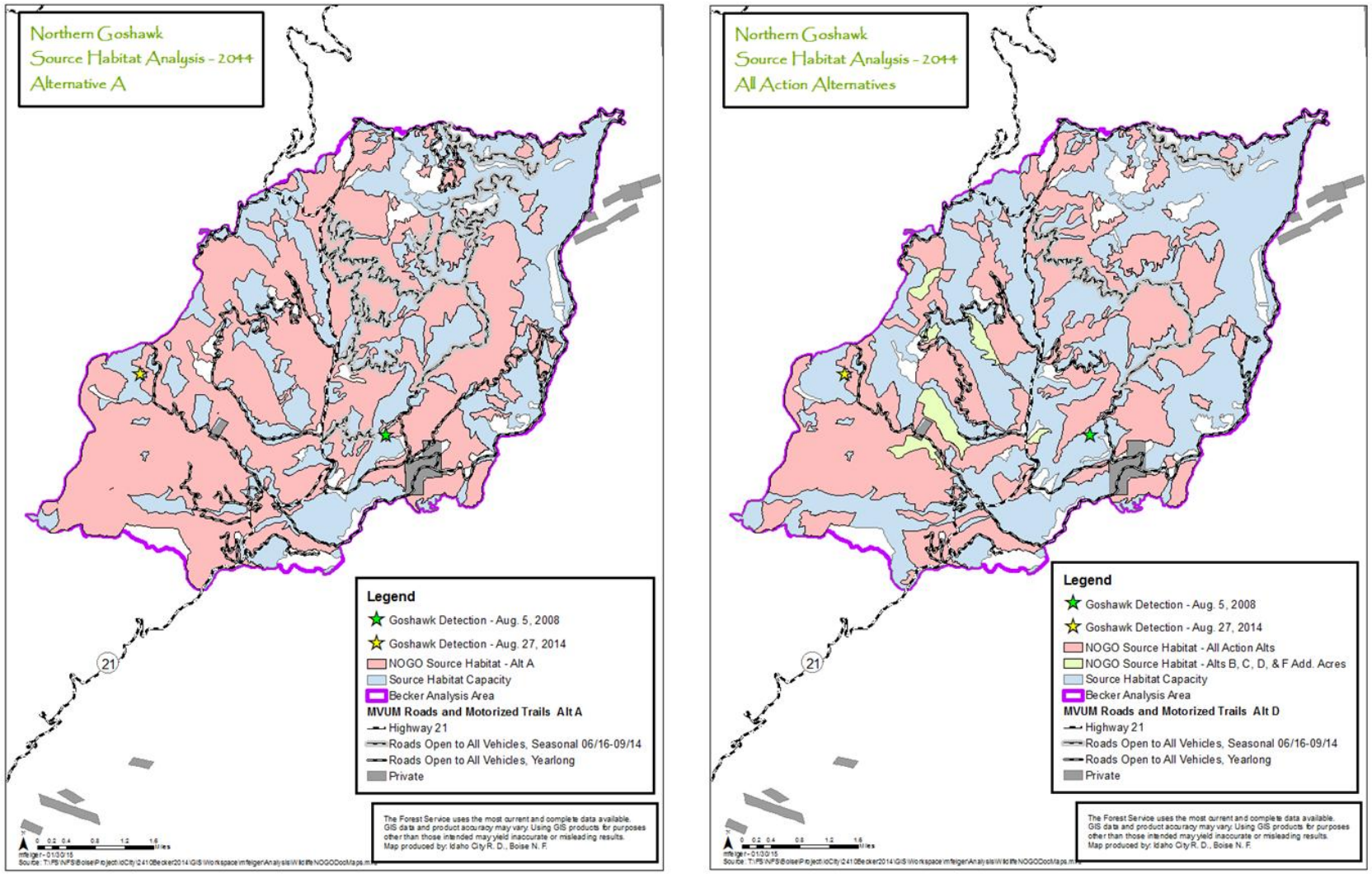


Figure 3-48. Alternative maps (2044) for northern goshawk

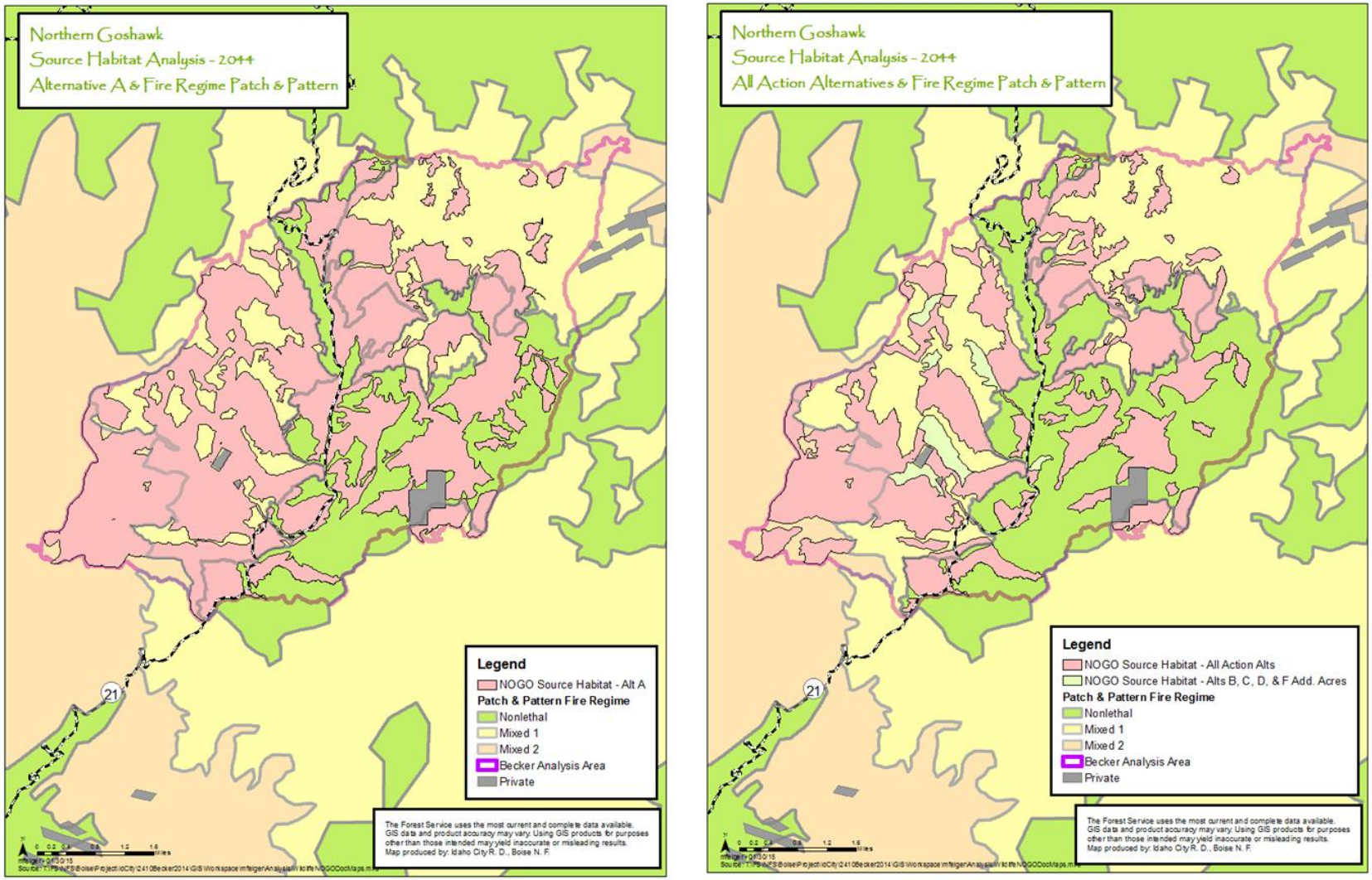


Figure 3-49. Alternative maps (2044) for northern goshawk and fire regime patch and pattern distribution

Cumulative Effects

Cumulative effects were assessed at the watershed scale (Crooked River 5th HUC [1705011102]); however, only the portion administered by the Forest was included (excludes private land) (Figure 3-50). The Crooked River watershed was selected based on the WCS (Nutt et al. 2010) completed for the 2010 Forest Plan (USDA Forest Service 2010a), which used the watershed scale as a mid-scale comparison for effects to northern goshawk. This area was chosen to display how the project does or does not contribute to maintenance or restoration of habitat within the watershed, which was the smallest scale assessed in the WCS (Nutt et al. 2010).

The analysis area was also selected to provide context to the patch and pattern distribution of source and potential source habitat for this focal species, as well as context to the impacts of large wildfire disturbances and how wildfire would affect connectivity of source habitat across patches within the larger landscape.

Source habitat in the watershed has decreased by 36% (Table 3-66; Nutt et al. 2010). Roads and motorized trails are also impacting source habitat quality and fall below the high category ($\geq$1.7 mi/mi^2).

Table 3-66. Crooked River 5th HUC (1705011102) habitat condition summary for northern goshawk

Source Habitat Capacity (acres)	Historic Source Habitat (acres)	Current Source Habitat (acres)	Relative Change (historic to current)	Open Road Density (SH) (mi/mi2)
30,791	15,209	9,694	–36%	1.7

Source habitat capacity is extensive, representing 46% of the Crooked River watershed. The majority of source habitat capacity occurs in the middle sections of the watershed, including the analysis area, where low-to-upper elevation forest types dominate.

Source habitat is estimated to have declined within the watershed based on the habitat assessment completed for the WCS (Nutt et al. 2010). The reasons for the decline include past vegetation management and recent large scale fire disturbances.

Past activities have contributed to the watershed existing condition. These activities include several timber and sanitation/salvage sales (88,363 acres), reforestation (229 acres) and timber stand improvement (5,099 acres). Vegetation management focused on removing large trees, including damaged and deformed trees that provide nesting sites. Under timber production objectives, the resulting stands were often even-aged and spaced and lacked the structural diversity that provides habitat for variable species of prey as well as suitable nest sites.

Several large wildfires have recently occurred. The 1989 Gold Fork and Sawmill fires (2,082 acres) affected portions of the analysis area. The 1994 Rabbit Creek Fire further impacted 14,215 acres of analysis area. These fires burned with moderate-to-high intensity over extensive areas and landscapes, setting forest conditions back to early seral states that largely do not support source habitat, particularly nesting habitat. Road and motorized trail density is moderate and is a factor reducing source habitat abundance and quality.

No foreseeable future actions, potentially impacting northern goshawks, were identified.

See Appendix B for a comprehensive list of activities considered in this analysis.

Alternative A

In absence of activities with Alternative A, this alternative would not add cumulatively to effects from past, present, or reasonably foreseeable future actions.

Over time, across the analysis area, Alternative A would increase source habitat and patch size. Forest conditions would continue along their current trend of departure from desired conditions. While goshawk can capitalize on the departure, departed stands are not always beneficial and carry some risk to maintaining or sustaining habitat through time. Recent wildfire disturbances have demonstrated the risk of large-scale, high-intensity wildfires that have negatively affected the distribution of source habitat across the analysis area. Continued departure, particularly in PVGs 2 and 3 would increase the risk of negative wildfire effects over a larger landscape scale, resulting in similar outcomes found from recent wildfire disturbances. Source habitat quality would continue to be affected by roads and motorized trails. The analysis area would continue to provide suitable habitat for goshawks and support a well-distributed and connected network of habitat across the forest, but at a potential risk of large- scale loss and adverse wildfire effects.

Action Alternatives

Vegetation management and natural fuels actions proposed under Alternatives B, C, D, E, and F would add cumulatively to some past vegetation actions, resulting in a cumulative modification of source habitat for northern goshawk. In the short term, those effects would reduce source habitat. However, over the long term, sustainable and resilient source habitat and patch size would increase. While a short-term decrease in source habitat is projected, the remainder of the cumulative effects analysis area would continue along successional trends and additional area would likely be recruited such that habitat abundance would be maintained or increase. The amount of source habitat within the analysis area would move toward levels anticipated under historical conditions. While general risks associated with departure from historical conditions would be reduced in both the short and the long term, goshawks may not benefit as much as other species that are not capable of taking advantage of departed conditions (i.e., white-headed woodpecker, flammulated owl). This disadvantage is because road densities and associated risks would remain moderate and continue to degrade habitat. Source habitat would remain abundant and the analysis area would continue to support goshawk and help maintain a well-distributed population of goshawks on the Forest.

Maintenance and use of roads and trails would continue. Maintenance of roads encourages use and indirectly affects the potential for disturbance of breeding goshawks that may affect productivity. Cumulatively, Alternatives B, C, D, E, and F would contribute to reduce the risk of disturbance, as road density would decrease.

Determination

Alternatives B, C, D, E, or F **may impact individual northern goshawks, but would not lead toward a trend of federal listing or loss of viability**.

Rationale—Actions proposed under Alternatives B, C, D, E, And F would result in limited disturbance and displacement effects and proposed design features would limit those effects. Indirectly, a short-term reduction in source habitat would result. Treatments would reduce canopy cover through thinning and application of prescribed fire. However, over the long term, source habitat would develop and expand to levels greater than under current conditions, and, more importantly, in conditions that would be more resilient to uncharacteristic wildfire and insect and disease disturbances.

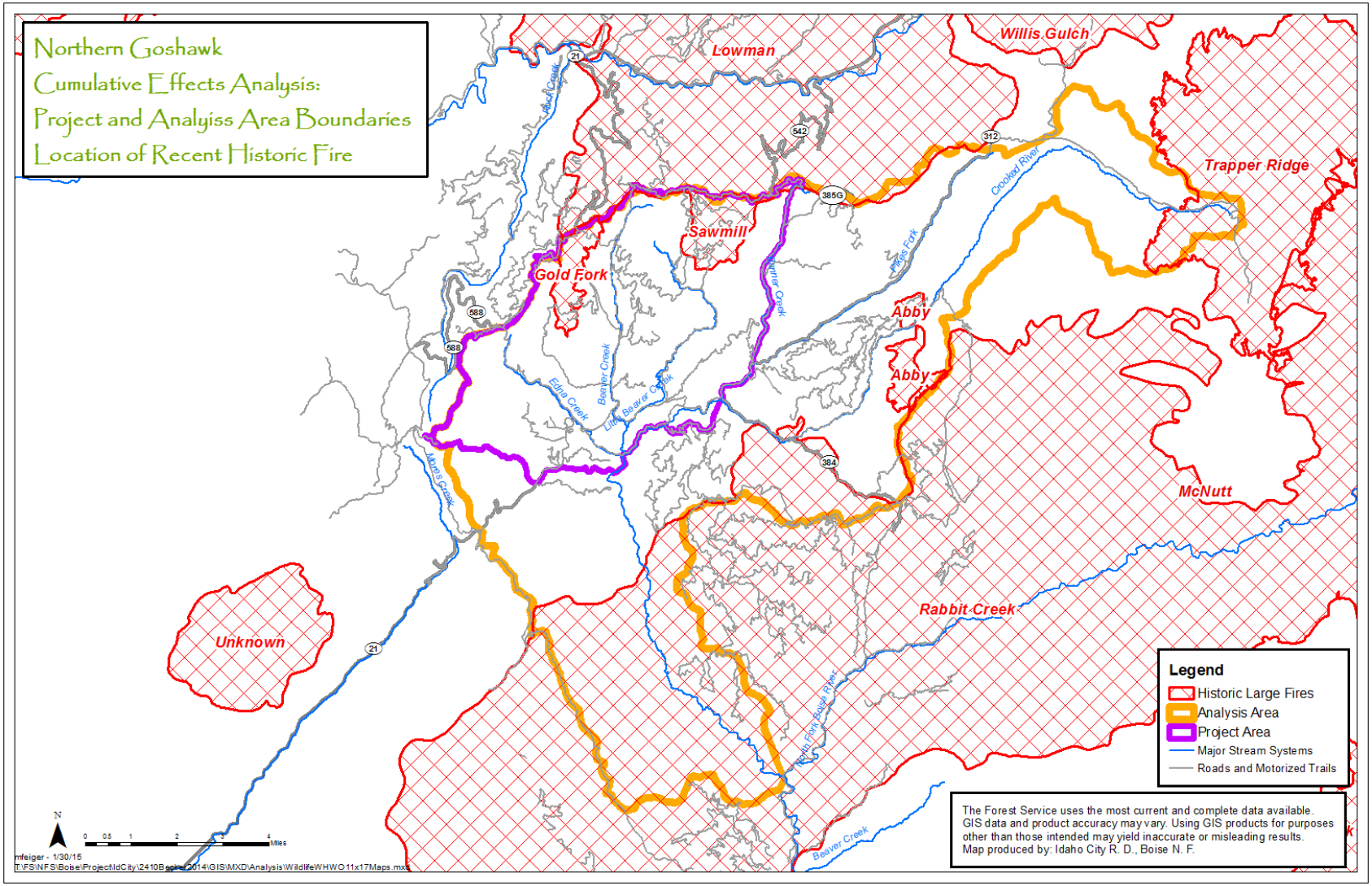


Figure 3-50. Cumulative effects area for northern goshawk

Pileated Woodpecker (Management Indicator Species, Project Focal Species)

As a management indicator species in the Forest Plan (USDA Forest Service 2010a, Appendix E), the pileated woodpecker was included in this analysis. In addition, the species serves a variety of functional roles within the community and is associated with habitat elements used by other species in the family.

Pileated woodpeckers occupy dense deciduous, coniferous, or mixed forests, open woodlands, second-growth forests, and parks and wooded residential areas of towns (NatureServe 2012b). They prefer habitats with tall closed canopies and high basal areas. Special habitat features for pileated woodpecker include opportunities for nesting, roosting and foraging. They need large-diameter (>21 inches dbh) snags and hollow live trees for nesting and roosting, and large standing dead and down trees for foraging. They also need multiple canopy layers, decaying wood on the forest floor, and a somewhat moist environment that promotes fungal decay, and ants, termites, and beetles for forage (NatureServe 2012b).

Source habitats for pileated woodpeckers are typically late-seral stages of subalpine and montane community types. On the Forest, PVGs 2, 3, 5, 6, 8, and 9 could provide source habitat conditions (Nutt et al. 2010, p. 409). Some PVGs provide source habitat conditions under historical fire regimes while others do so because of altered fire regimes.

Within the project area, existing source habitat occurs in habitat types that are functioning within and outside the HRV. As noted in Nutt et al. (2009d), in addition to habitat types that provide source habitat while functioning within HRV, habitat types within certain PVGs also provide source habitat conditions when they are outside HRV (also known as departed conditions). For the project area, those include habitat types in PVGs 2 and 3. Source habitat conditions would occur in habitat types in PVG 2 where canopy cover classes are moderate and high (>40% canopy cover) and in PVG 3 where they are high (>70% canopy cover). As noted above, when these habitat types develop conditions that function as source habitat, the resulting conditions deviate from desired conditions, often because of altered fire regimes. Under desired conditions, these habitat types would not function as source habitat for pileated woodpeckers.

Of the six PVGs that provide source habitat across the Forest, three occur within the project area. From Nutt et al. (2009d), Table 3-67 describes how source habitat for pileated woodpeckers was considered in this analysis.

Table 3-67. Summary source habitat modeling at the site scale

Potential Vegetation Group	Tree Size Class	Canopy Cover Class
Within Historical Range of Variability		
3	Large	Moderate
8	Large	Moderate and High
Outside Historical Range of Variability		
2	Large	Moderate and High
3	Large	High

Note: Multiple indicators and associated measures were selected to assess effects of the actions proposed and to describe changes to source habitat for the pileated woodpecker over time (Table 3-68). These indicators and measures were adapted from those used in Nutt el al. (2010), a document that supported the 2010 Forest Plan amendment (USDA Forest Service 2010a).

Table 3-68. Indicators and measures for analysis of effects to the pileated woodpecker

Indicator	Measure
Source habitat function	Total source habitat, acres and percentage of project area
	Average patch size source habitat, acres
	Range of patch size source habitat, acres
	Number of patches
Source habitat quality	Change in road density
	Quality of snags, qualitative

Affected Environment

The area for which direct and indirect effects to the species and its habitat were considered included all stands within the 19,327-acre project area for which stand examination data were available or for which data had been assigned via a similar neighbor process (see vegetation section). All stands with proposed vegetation treatments under the action alternatives were included in the project area.

The analysis area for cumulative effects was larger, comprising the entire Crooked River watershed. It is described in more detail later in this document.

Although no pileated woodpeckers were sighted in the project area during the analysis, excavated snags consistent with their foraging and nest cavities within source habitat patches were found during field survey work (field survey data available in the project record). Occupancy was noted primarily west of Highway 21 in the Whoop Um Up Creek, Edna Creek, and China Fork of Beaver Creek drainages.

Source Habitat Function

Source habitat capacity represents those areas, based on PVGs and associated habitat types, that may provide source habitat for pileated woodpeckers at some time during successional development. Source habitat capacity for this species consists of the PVGs 2, 3, and 8 within the project area, is concentrated in the central and northern portions of the project area, and occurs in a large, well-connected block (green and tan patches in Figure 3-51). These PVGs comprise 13,338 acres or 69% of the project area. However, when considering only those PVGs that would provide source habitat when within the HRV (PVGs 3 and 8), total source habitat capacity is only 3,528 acres or 18% of the project area. Based on only those stands that could produce source habitat when within the HRV, habitat patches would be fragmented and dispersed across the project area (green patches only) and might not provide sufficient source habitat for reproducing pairs of pileated woodpeckers.

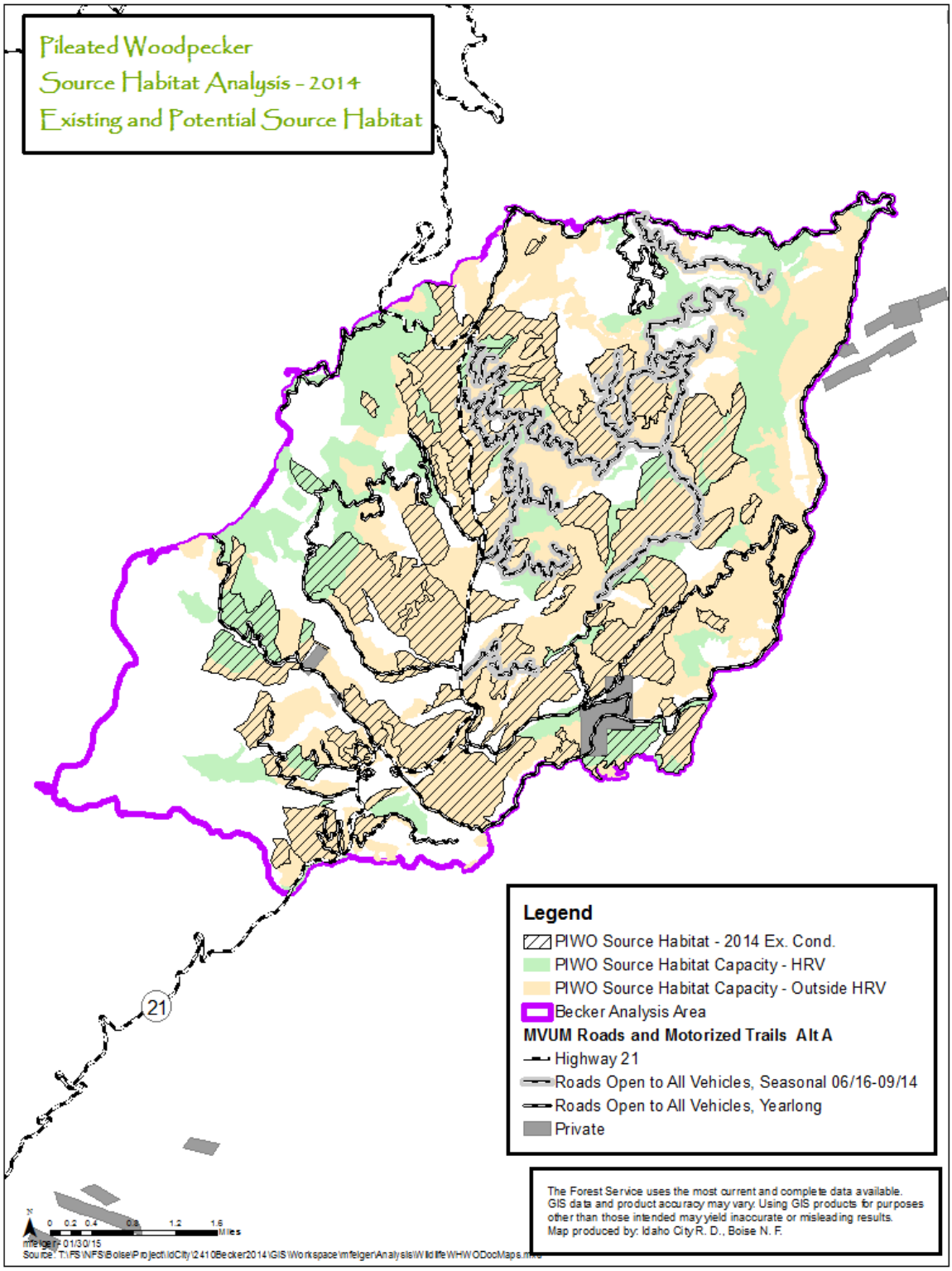


Figure 3-51. Existing source habitat and source habitat capacity within and outside the historical range of variability for the pileated woodpecker

This assessment of source habitat capacity is consistent with the Forest-scale analysis for the Crooked River watershed (Nutt et al. 2010). Source habitat capacity as a percentage of the watershed was found to be relatively low (17%), with only a small percentage of that (6%) currently functioning as source habitat for pileated woodpeckers. These findings are consistent with the assessment for the project area, which shows a relatively low representation of source habitat capacity for PVGs that provide habitat when within the HRV.

The site-scale model documented in the wildlife technical report (available in the project record) was used to assess source habitat, based on parameters describing macrovegetation characteristics, in the project area. The assessment for modeled habitat included conditions that provide function when within and outside the HRV for corresponding PVGs. A total of 5,570 acres of source habitat for pileated woodpecker was modeled (Table 3-69). Of source habitat present, 90% occurs in stand conditions that are considered outside the HRV (Table 3-69), with the majority (86%) occurring in PVG 2 habitat types. This habitat is relatively fragmented, with small average patch sizes (206 acres). Only two patches contain enough connected habitat to meet a minimum territory of 1,006 acres (Table 3-69). These stands are typified by high canopy covers and diverse species compositions, including abundant Douglas-fir and subalpine fir along with the ponderosa pine that typifies the habitat types.

Table 3-69. Habitat condition summary for the pileated woodpecker in the project area (19,327 acres)

	Source Habitat Capacity (acres)	Source Habitat (acres)	Source Habitat Due to Conditions Outside HRV (% Source Habitat)	Source Habitat Patch Characteristics		
				Number of Patches	Patch Size Range (acres)	Number of Patches Grater than Home Range of 1,006 acres
Within HRV	3,528	583	NA	12	3–222	0
Total	13,338	5,570	90%	27	4–1,433	2

Figure 3-51 displays the distribution of source habitat capacity and existing source habitat. Stands in green would function as source habitat when within the HRV and are composed of PVGs 3 and 8. Note the heavily fragmented nature of those stands on the landscape. Stands in tan would function as source habitat when outside the HRV and are composed of PVG 2, the most abundant in the project area. It also provides for large, continuous patches of source habitat for reproducing pairs of pileated woodpeckers. Most of these PVG 2 habitats are departed from desired conditions as a result of past harvest management actions and extended fire suppression (vegetation resources technical report).

Pileated woodpeckers can take advantage of forested conditions outside the HRV, and departed landscapes may provide important connectivity within some areas of the Forest (Nutt et al. 2010, p. 414). This is probably the case in the project area, which lies along the outer edges of historic source habitat for the species. By themselves, source habitat in stands of PVG 3 and 8 would not likely function well for productive pileated woodpecker pairs because the patches of habitat would be too fragmented and dispersed across the project area (Figure 3-51, Table 3-69). However, with PVG 2 habitats in their departed condition interspersed among PVGs 3 and 8 stands, suitable contiguous patches of source habitat occur

in sufficient patch size and juxtaposition to provide effective reproductive habitat (Figure 3-51, Table 3-69). The interspersed PVG 4 and 7 habitat types that are experiencing extensive insect and disease infestations and high snag and down log densities (vegetation resources technical report) provide additional habitat for more reproducing pairs than would have occurred within the HRV. This condition is affirmed by recent pileated woodpecker activity (excavated snags) documented in field surveys (field survey data available in the project record).

The project area is split between nonlethal and mixed1 fire regimes dominated by stands of PVGs 2 and 3. Very little PVG 8 is present in the project area (vegetation resources technical report [project record]). The Crooked River watershed has a low percentage of historic source habitats (6% of watershed) and source habitat capacity (16% of watershed) (Nutt et al. 2010). Historically, the bulk of PVG 2 and 3 stands would not have functioned as source habitat due to frequent low-intensity fires and resulting species composition and structural condition that are not conducive to pileated woodpeckers.

Source Habitat Quality

Source habitat quality can be further described in terms of key habitat component abundance and road density. Snags and coarse woody debris are important components of pileated woodpecker habitat, providing nesting, roosting, and foraging sites. Habitat quality increases with abundance of snags and large down logs, and these components are more likely to be abundant in old forest habitat and the large tree size class. Road and motorized trail density can represent a variety of risks to the species and habitat. These risks include loss of snags and down logs to firewood gathering, modification or loss of habitat from management or noxious weed infestations, and structural changes within forests that may lead to uncharacteristic disturbances.

The quality of source habitat in the project area has been impacted by past forest management actions, long-term fire suppression, and fire disturbances. In stands with PVGs 3 and 8, where stand conditions within the HRV function as source habitat, past vegetation management actions and fire disturbances associated with the 1989 Gold Fork and Sawmill Fires have reduced the quality and increased fragmentation (Figure 3-52).

In all PVGs supporting source habitat, past harvest management has diminished the amount of large tree habitat required by pileated woodpeckers. Old forest habitat conditions, such as those defined the Forest Plan (USDA Forest Service 2010a, Appendix E), are not present in their entirety in any one stand, probably due to of past vegetation management, current disturbance regimes (fire, insects and disease), and minerals exploration (minerals technical report, available in the project record). Within large tree stands, some individual components of old forest habitat are present, including snags and canopy complexity. Modeled stand exam data indicates large snags meet or exceed desired conditions for PVGs with source habitat capacity stands. Large coarse wood habitats are below desired conditions. Recent insect and disease outbreaks within source habitat stands, as well as in adjacent PVG 4 and 7 stands, have created pockets of medium snags and abundant down wood, providing foraging and nesting habitat.

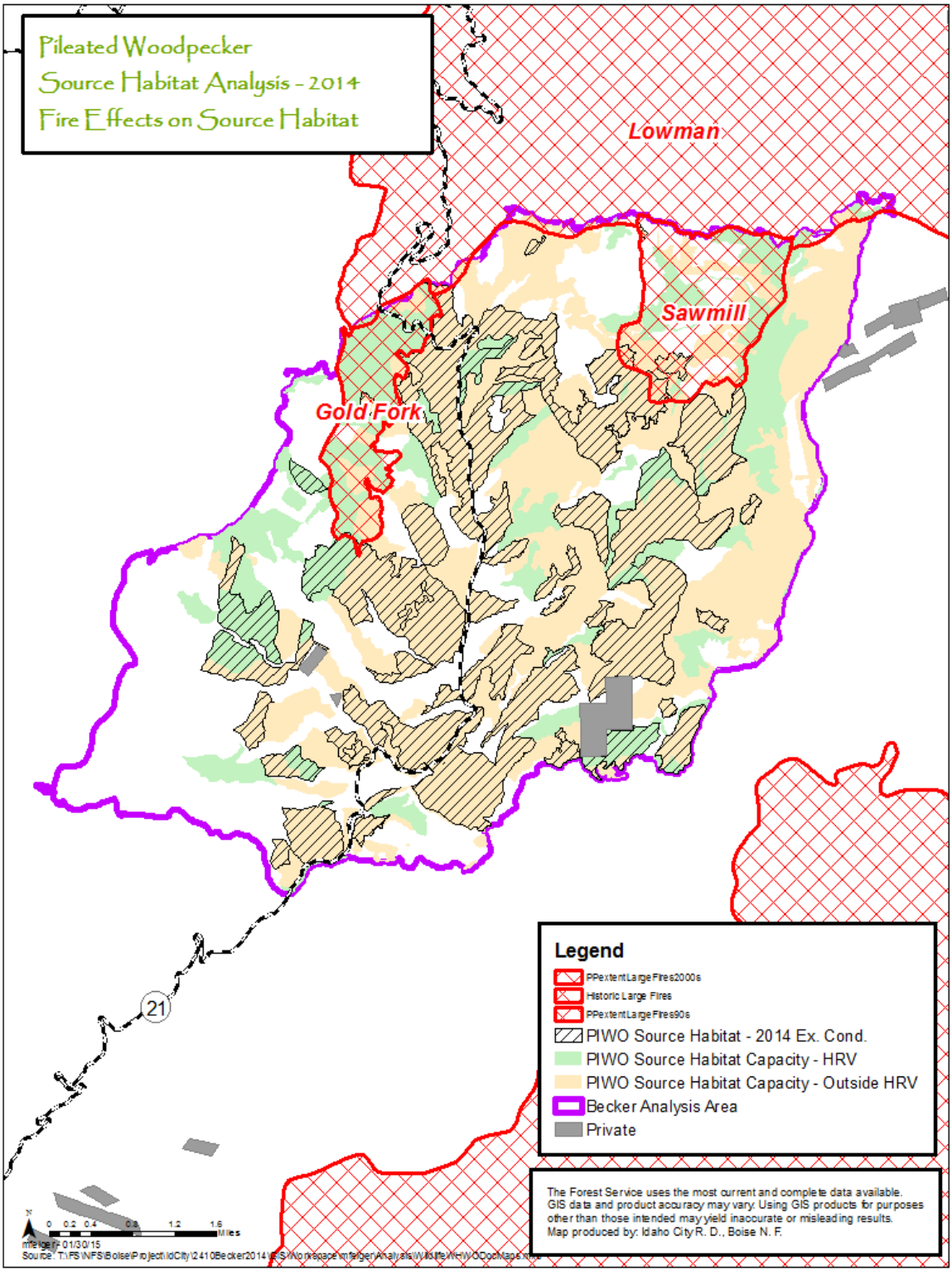


Figure 3-52. Effects of fire on pileated woodpecker source habitat

The quality of habitat has also been degraded by construction, maintenance, and use of roads and motorized trails. Total road density in the project area is high, at 2.9 mi/mi^2. Road construction and maintenance result in habitat loss and fragmentation. Snags and down logs are reduced in habitats adjacent to roads and open to firewood gathering.

For PVG 2, fire suppression has increased source habitat over time through the loss of the historically frequent, low-intensity fire disturbance, leading to stands with higher densities, species compositions, and structural characteristics preferred by pileated woodpeckers. These changes have also increased densities of snags and down logs used for foraging and nesting habitat. As for PVGs 3 and 8, roads have impacted down log recruitment to some degree, but recent insect and disease outbreaks have compensated for those impacts.

Environmental Effects

Direct and Indirect Effects

Source habitat quantity and patch characteristics are used as effects indicators for the pileated woodpecker (Table 3-68). Large tree size class, large snags, large down logs, and old forest habitat abundance are all indicators of trends in habitat quality. Road and motorized trail density and open road density are indicators of risk to species persistence and of trends in habitat quality. As density decreases, impacts are reduced and habitat quality increases. Table 3-70 shows source habitat indicators for the species by alternative and year.

Alternative A

Because Alternative A would not implement actions resulting in disturbance or displacement effects, there would be no direct effects with this alternative.

Source habitat would increase in both the short and long term and remain above the amount that would have been suitable under historical conditions (Table 3-70). Source habitat in stands with PVG 2 would continue to increase due to further development of departed conditions, highly diverse species composition, high canopy covers, and multilayered canopy complexity conducive to pileated woodpecker habitat. Patch size would increase, with patches becoming less fragmented than would have occurred historically. By 2044, patches would be sufficient to provide for nine or more exclusive home ranges that would not overlap (Table 3-70).

However, these departed conditions in the PVG 2 stands would increase the risk of uncharacteristic wildfire disturbances (fire and fuels technical report [project record]). If such a disturbance occurred on a scale similar to the Lowman Fire (1989) or Rabbit Creek Fire (1994), pileated woodpecker habitat would be lost in the long term.

Large snag and down log habitat features would likely increase over time as more stands developed large tree structure and Douglas-fir species components matured and succumbed to insect outbreaks and disease. The higher road density and distribution of open roads would likely limit increases in snag and down logs due to continued firewood harvest.

Table 3-70. Source habitat indicators for pileated woodpecker by alternative and year

Indicator	Reference Condition	Year	Alt A	Alt B, C, F (D)	Alt E
Source Habitat within HRV Only, (acres and percent source habitat)	Source habitat capacity is 3,528 acres for PVGs providing habitat when within the HRV. At the watershed scale, an estimated 6% of the watershed would have been in a suitable condition for pileated woodpecker under historical conditions.[a]	2014	583 (10%)	337 (334) (12%)	415 (14%)
		2024	752 (11%)	544 (541) (13%)	607 (14%)
		2044	1,086 (12%)	985 (998) (17%)	1,041 (18%)
Total Source Habitat (acres)	Source habitat capacity is 13,338 acres for PVGs providing habitat when within and outside HRV. The pileated woodpecker is able to take advantage of conditions outside HRV. The desired condition is to have less source habitat in PVGs that did not historically provide source habitat as long as source habitat outside HRV is not needed to maintain well-distributed habitat in the short term.	2014	5,570	2,894 (2,876)	2,980
		2024	6,632	4,330 (4,327)	4,267
		2044	9,109	5,798 (5,811)	5,900
Patch Size–Range (acres) (long-term trend)	The majority of source habitat capacity is in nonlethal and mixed1 fire regimes. Nonlethal fire regimes patches would generally not function as source habitat under historic fire regimes. Within mixed1 fire regime patches, patch size could be highly variable, ranging from <1.0 acre up to several thousand acres. Based on fire regime patch size and the occurrence of mixed1 fire regime (smaller patch size), some habitat would likely have been suitable for the pileated woodpecker at any given time.	2014	4–1,433	4–235 (4–326)	4–326
		2044	3–7,651	4–2,819 (same)	4–2,892
Number of Patches Grater than Home Range Size	Estimated home range size is 1,006 acres. While home ranges can consist of source habitat and non-habitat, patches in contiguous blocks are better than fragmented habitat. The number of exclusive home ranges helps define the patch size and effectiveness. Fewer patches containing more exclusive home ranges are the desired condition.	2014	5+	2+ (same)	2+
		2044	9	5–6 (same)	5–6

Note: PVG = Potential Vegetation Group; HRV = historic range of variability

[a] The reference for historical abundance at the watershed scale is based on the midpoint of the HRV range for the vegetation conditions (PVG, tree size class, and canopy cover) that provide source habitat for pileated woodpecker (Nutt et al. 2010).

Action Alternatives

Differences between the alternatives are limited, even when including the additional acres of harvest proposed under Alternative D and the restriction on harvesting trees >18 inches dbh under Alternative E. The differences in outcomes of source habitat between action alternatives would be less than 5% through all time frames and result in little-to-no differences in patches of sufficient source habitat (Table 3-70).

Mechanical thinning of all types, prescribed fire application, and road management (temporary and permanent road construction, realignment, closure, decommissioning, and resurfacing/maintenance) would directly affect nesting pileated woodpeckers when they occur near actively nesting pileated woodpeckers.

Pileated woodpeckers are reportedly tolerant of humans. However, instances of attacks on humans at the nest and displacement of woodpeckers from roost sites have also been reported (Bull and Jackson 1995). Activities that could impact pileated woodpecker productivity include those overlaping with the nesting period (May through mid-July) or those directly affecting habitat features. Any activity that occurs near an active nest site could disrupt parental care if the adult becomes agitated and distracted by human presence. This disruption could reduce survival of the young and productivity of the pair. In addition, nests, eggs, or nestlings could be directly affected if a nesting snag were felled for safety reasons or if it were consumed or fell during prescribed burning.

Modeled source habitat abundance would decrease under the action alternatives in the short term by roughly 2% in stands functioning within the HRV and by 14% for all source habitats under all action alternatives (Figure 3-53). These reductions would be the result of stands dropping below canopy cover thresholds (40%) after mechanical treatments, fuels treatments, and prescribed fire. Species composition would also change, particularly in departed PVG 2 habitats that currently function as source habitat, because the proportion of ponderosa pine/Douglas-fir and possibly subalpine fir would shift toward ponderosa pine in order to move toward desired conditions (vegetation resources technical report [project record]).

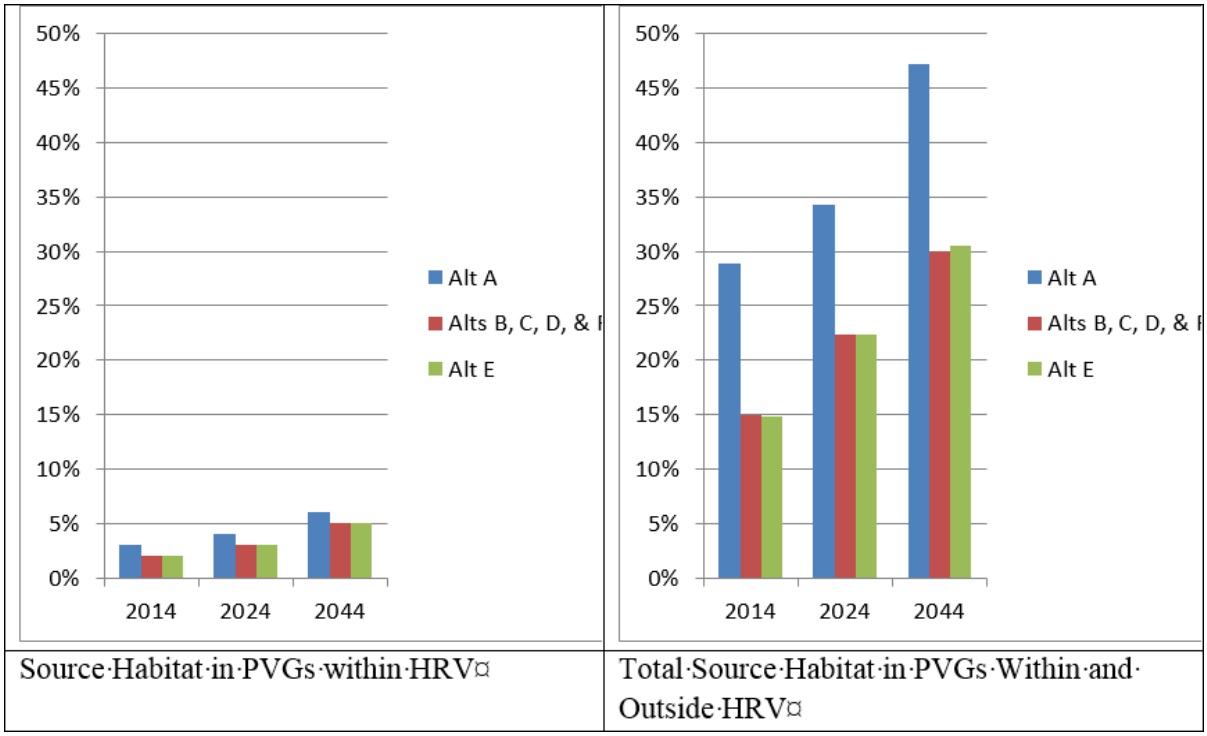


Figure 3-53. Comparison of the effects of alternatives over time on pileated woodpecker source habitat (as a percent of the project area)

In the mid to long term, as canopy covers in treated stands increased, modeled source habitat would also increase. By 2044, modeled source habitat in the project area would exceed current conditions, as would the largest patch size in both habitats functioning in PVGs within HRV and those functioning outside HRV (Figure 3-53, Table 3-70). However, the quality of those habitats would likely be less than current conditions, and they would certainly be less than the source habitat that would develop with Alternative A over comparable time frames (Figure 3-53). The reason is that species composition would shift away from Douglas-fir (and to a lesser degree, subalpine fir) in PVGs 2 and 3 toward ponderosa pine as a result of proposed treatments (see "Vegetation" section). That shift in species composition would likely continue into the mid and long term as part of the restoration objective for the project. In regard to source habitat quality and function, the consequences would likely be a lower density of snags and down log habitats for nesting and foraging. Ponderosa pine-dominated stands tend to be more resilient to insects, disease, and damage from fire than stands dominated by Douglas-fir, and they would produce fewer snag and down log habitats in the long term.

Additionally, with the treatments proposed in the action alternatives, stand canopy complexity would likely decrease in the mid to long term from what exists or would be developed under Alternative A in the long term (see the wildlife technical report for detailed maps of modeled source habitat for each alternative). With less Douglas-fir and subalpine fir in PVG 2 and 3 stands, middle and upper canopy layers would be more open, less complex, and less variable. These conditions would further reduce habitat quality for pileated woodpeckers, as they use highly complex canopies to avoid predators.

As indicators of the loss of snags and down log to firewood collectors, road density and distribution would be reduced under the action alternatives. Alternatives B and E would reduce open road density to 1.9 mi/mi^2, while Alternatives C, D, and F would reduce that density to 2.1 mi/mi^2. Therefore, loss of snag and down log habitat would also be reduced, incrementally improving habitat conditions for the species in the mid to long term.

Cumulative Effects

Cumulative effects were assessed at the watershed scale (Crooked River 5th HU—1705011102; Figure 3-54); however, the analysis included only that portion administered by the Forest (excluding private land). The Crooked River watershed was selected based on the wildlife resources analysis (WCS) (Nutt et al. 2010) completed for the 2010 Forest Plan that also used the watershed scale as a mid-scale comparison for effects to pileated woodpeckers. This analysis area was chosen to display how the project contributed to maintenance or restoration of habitat within the watershed.

Source habitat in the watershed has decreased by 34% (Table 3-71; Nutt et al. 2010). Roads and motorized trails are also influencing source habitat quality and fall within the high category (≥1.7 mi/mi^2).

Table 3-71. Crooked River 5th HU (1705011102) habitat condition summary for pileated woodpecker

Source Habitat Capacity[a] (acres)	Historic Source Habitat[a] (acres)	Current Source Habitat[a] (acres)	Relative Change (historic to current)	Total Road Density (SHC) (mi/mi^2)
11,096	3,961	2,590	–34%	3.11

[a]The site-scale analysis indicates a higher abundance of source habitat and capacity than reflected for the entire watershed due to differences in the datasets (stand examination versus landsat imagery) used for modeling.

Source habitat capacity presented in Table 3-71 includes those PVGs that could historically develop source habitat conditions under historical fire regimes. Capacity is concentrated in the high-elevation areas of the Crooked River and associated tributaries, including the tributaries in the analysis area. Across the watershed, habitat capacity is fairly fragmented where it occurs in cool air drainages or northern aspects.

Source habitat at the analysis area has declined for many of the same reasons that it declined in the project area. Factors include past forest management actions, historic minerals exploration and operations, and recent large-scale wildfire disturbances.

Source habitat has increased in part due to departed conditions at low elevations, likely because of fire suppression. Under the historical fire regime, natural disturbances would have created patches of early-seral habitat unsuitable for pileated woodpeckers. But past vegetation management has contributed to degraded habitat conditions. Past silvicultural practices focused on timber production with short harvest rotations. The resulting stands lack the key components of pileated woodpecker habitat: higher canopies, multi-stories, diseased and damaged trees, and large snags and down logs. An extensive road system was built to facilitate timber harvest, and together with motorized trails, it continues to affect habitat quality through loss of snags and logs for fuelwood and the introduction and spread of noxious weeds.

Past activities have contributed to the existing condition. These activities include several timber and sanitation/salvage sales (88,363 acres), reforestation (229 acres), timber stand improvement (5,099 acres), the firewood program, construction and maintenance of roads and motorized trails, and fire suppression. Several large wildfires have burned in recent years. The 1989 Gold Fork and Sawmill fires (2,082 acres) affected portions of the analysis area. The 1994 Rabbit Creek Fire further impacted 14,215 acres of the analysis area, some of which provided source and potential source habitat for the pileated woodpecker. The fires burned with moderate to high intensity and replaced most ponderosa pine forests with early-seral habitat. The 2007 Trapper Flat Fire (42 acres) burned at higher elevations and had no effect on source habitat for pileated woodpeckers.

Appendix B contains a comprehensive list of activities considered in this analysis.

Alternative A

No cumulative effects would be associated with Alternative A because Alternative A does not propose any actions. A trend of increasing habitat, habitat patch size, and habitat quality would continue as a result of continued development of source habitat, much of which would occur in PVGs outside the HRV. The increase in source habitat abundance would be caused in large part to the increasing departure from historical conditions in the low-elevation forests.

Action Alternatives

Vegetation management and natural fuels actions proposed under Alternatives B, C, D, E, and F would add cumulatively to the effects of past actions, resulting in a cumulative modification of source habitat for pileated woodpeckers. In the short term, those effects would reduce source habitat. However, over time, source habitat would increase within the analysis area as adjacent stands previously affected by those past actions developed source habitat conditions. Over the long term, source habitat would be expected to reach or exceed historic levels for the analysis area.

Personal fuelwood cutting is expected to continue. Although the quantity of material removed annually is unknown, this activity occurs primarily adjacent to open roads. Changes to motorized transportation proposed in Alternatives B, C, D, E, and F would not add to this ongoing risk of snag loss because the miles of roads open for public access would be reduced under the action alternatives. Cumulatively, these proposed reductions in access would also reduce effects to snag habitats that function as nesting habitat across the analysis area.

Regarding foreseeable future actions, none that would affect pileated woodpecker source habitat were identified.

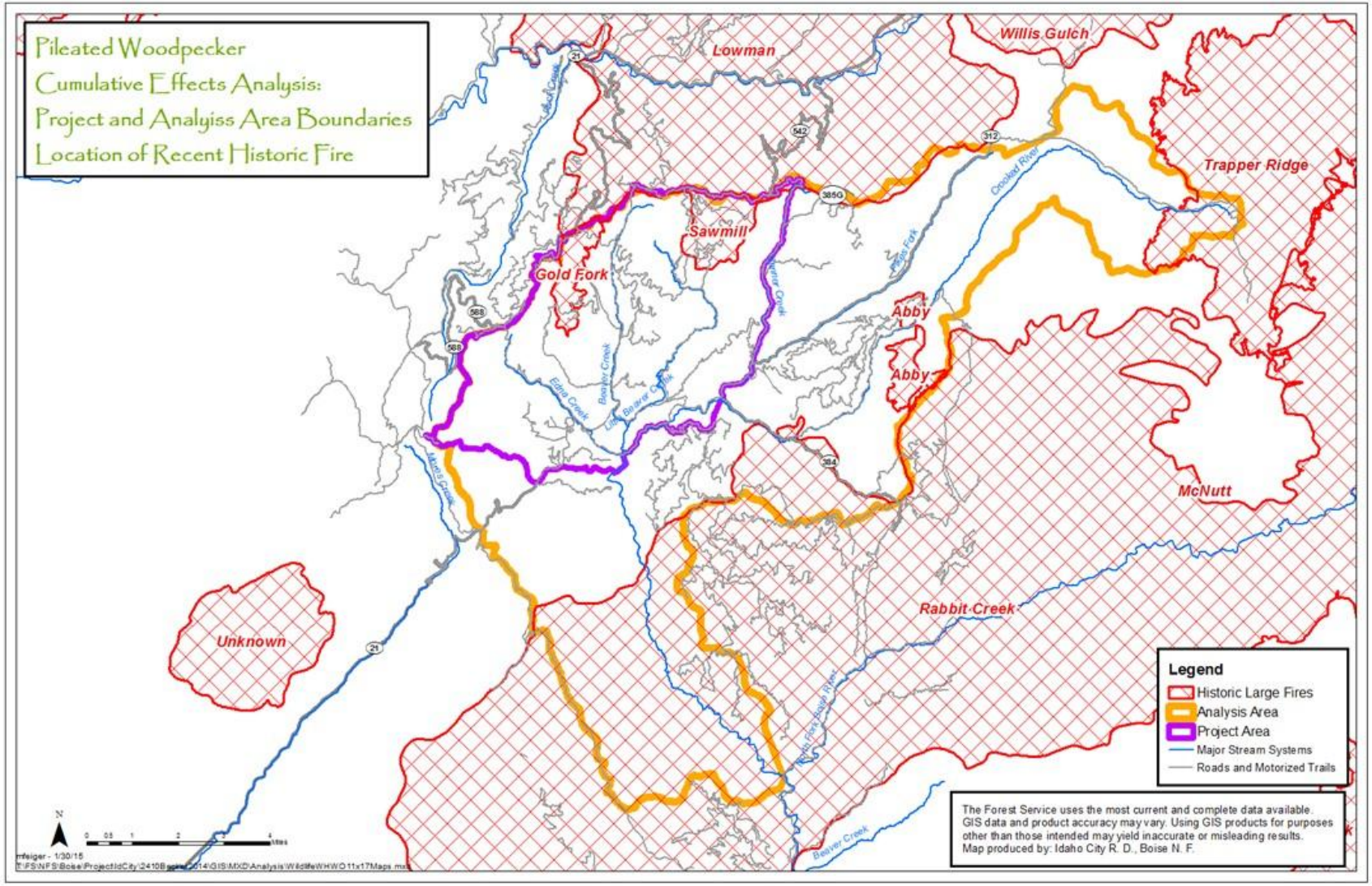


Figure 3-54. Map of the analysis area for the cumulative effects of action alternatives on the pileated woodpecker

3.5.2.3 Family 3—Forest Mosaic

Species within this family tend to be habitat generalists in montane forests. Most species also use subalpine forests, lower montane forests, or riparian woodlands as source habitats. A few species use upland shrub and upland herb communities. Source habitat occurs across all PVGs and structural stages.

The WCS assessed the condition of source habitats for Family 3 on the Forest. Historically, source habitat occurred in 64 watersheds. Current source habitat estimates indicate that source habitat has declined in 72% of watersheds, increased in 5% of watersheds, and remained neutral in 23% of watersheds. Decreasing trends are tied primarily to the reduction in forests dominated by large trees. Neutral and increasing trends appear to be largely tied to increased stand densities as a result of departed landscapes. Family 3 has been identified as a family of greatest concern due to the effects of negative human interactions. Clear Creek watershed has been identified as a priority watershed for source environment restoration.

Three threatened, proposed, or sensitive species are members of Family 3: Canada lynx, mountain quail, and wolverine. Two of these species were selected as project focal species.

Canada Lynx (Threatened, Focal)

Canada lynx is listed as threatened under the ESA (USDI FWS 2013). The following habitat requirement description is adapted from Nutt and others (2010, pp. 537–538).

Lynx are typically associated with large tracts of higher elevation boreal or coniferous forest that is often interspersed with rock outcrops, bogs, and thickets. Canada lynx typically inhabit montane and subalpine coniferous forests above 4,000 feet in Idaho (McKelvey et al. 2000; Ruediger et al. 2000). Lodgepole pine, subalpine fir, and Engelmann spruce habitat types have been identified as primary habitat in central Idaho (Ruediger et al. 2000). Cool, moist Douglas-fir, where interspersed with subalpine forest, also provides habitat (Ruediger et al. 2000).

Source habitats for lynx are provided by most of the coniferous forest structural stages with the exception of old forest single-storied stands. Riparian woodlands and shrublands are also source habitats. Key components of lynx habitat include denning, foraging, and travel corridors provided by a mosaic of forest habitats (Ruggiero et al. 1994).

Late-seral forests are used for denning and rearing young and for hunting alternative sources of prey (Ruggiero et al. 1999). Relatively small patches (2.47 acres) of old forest are required for dens, although these areas must be near and connected to high-quality foraging habitat (Koehler and Brittell 1990). Denning habitat is used during parturition and rearing of young until they are mobile. The common component appears to be large amounts of CWD, either down logs or root wads, which provide escape and thermal cover for kittens. Denning habitat may be found either in older mature conifer or mixed conifer/deciduous types or in regenerating stands older than 20 years. Denning habitat must be located within daily travel distance of foraging habitat (Ruediger et al. 2000). Habitat quality, as measured by the availability of alternate den sites, appears to be an important factor in kitten survival when disturbance occurs (Ruggiero et al. 1994). Den sites occur primarily on north-to-northeast aspect slopes in mature forest types and are often in large hollow logs, beneath windfall, upturned roots, or in brush piles in dense thickets. Optimal denning stands have minimal

human disturbance and are close to foraging areas. Late-successional stands also provide refuge from inclement winter weather and drought (Terra-Berns et al. 1998). Denning activities typically occur from early to mid-March through June (Ruggiero et al. 1994).

Foraging habitat supports primary prey (snowshoe hare) and/or important alternate prey (especially red squirrels) that are available to lynx. Lynx primarily forage in early seral forests and in some mid-seral forests that support high numbers of prey. The highest quality snowshoe hare habitats are those that support a high density of young trees or shrubs (4,500 stems or branches per acre), especially with branches that protrude above snow levels. These conditions may occur in early successional stands following some type of disturbance or in older forests with a substantial understory of shrubs and young conifer trees. Red squirrel densities tend to be highest in mature cone-bearing forests with substantial quantities of CWD (Ruediger et al. 2000). Although snowshoe hares are the primary food of lynx throughout its range, they also rely on mice, squirrels, and grouse, especially during the summer (Ruggiero et al. 1994).

Lynx are known to move long distances, but open areas, whether man-made or natural, will discourage use by lynx and disrupt their movements (Ruggiero et al. 1994). In general, suitable travel cover consists of coniferous or deciduous vegetation 2 feet taller than the average snowfall with a closed canopy adjacent to foraging habitat. Most successional stages serve as travel cover, provided they offer vegetative cover in sufficient quantity and arrangement to allow for lynx movement. Narrow forested mountain ridges or plateaus may provide a linkage between more extensive areas of lynx habitat. Wooded riparian communities may provide travel cover across otherwise open valley floors between mountain ranges. Linkages may be provided by forest stringers that connect large forested areas or by low, forested passes that connect subalpine forests on opposite sides of a mountain range (Ruediger et al. 2000). Lynx avoid large open areas and, although they will cross openings less than 330 feet wide, they do not hunt in these areas. Travel cover allows for movement of lynx within their home ranges and provides access to denning sites and foraging habitats.

Home range size varies considerably and usually depends on prey base availability. Typical home range territories across southern Canada and the lower 48 states vary between 15 and 147 mi^2 (Ruediger et al. 2000). Lynx movement and dispersal distances vary greatly. Documented daily movement distances have varied from 1.6 to 3.2 miles depending on prey densities. Exploratory movements, usually the summer and outside of identified home range boundaries, have varied between 9 and 25 miles. Both adult and sub-adults have been documented making long distance movements during periods of prey scarcity; recorded distances have been up to 600 miles (Ruediger et al. 2000).

On the Forest, vegetative communities that could provide source habitat conditions include PVGs 3, 7, 8, 9, 10, and 11 (Nutt et al. 2010, Appendix 7). These are the PVGs capable of developing characteristics of source habitat as described in literature. Source habitat capacity occurs primarily in mixed2 and lethal fire regimes where large fires historically played a natural process role, creating an ebb and flow of lynx habitat across the landscape through time.

Down logs and root wads are a special habitat feature for lynx (Wisdom et al. 2000, Ruggiero et al. 1999, Koehler 1990) and provide important natal and maternal denning sites.

Affected Environment

Lynx Analysis Units (LAUs) have been identified through consultation with U.S. Fish and Wildlife Service and are used to evaluate lynx habitat and effects to lynx. The project area falls within the Pilot Sunset and Jackson Peak LAUs (Figure 3-55). These two LAUs comprise the direct and indirect effects analysis area for Canada lynx. Within this analysis area, the boundary between the LAUs runs between the hydrologic boundary between the Pikes Fork (Jackson Peak LAU) and Beaver Creek (Pilot Sunset LAU) drainages. Neither LAU is identified as Critical Habitat for Canada lynx (FR 2014).

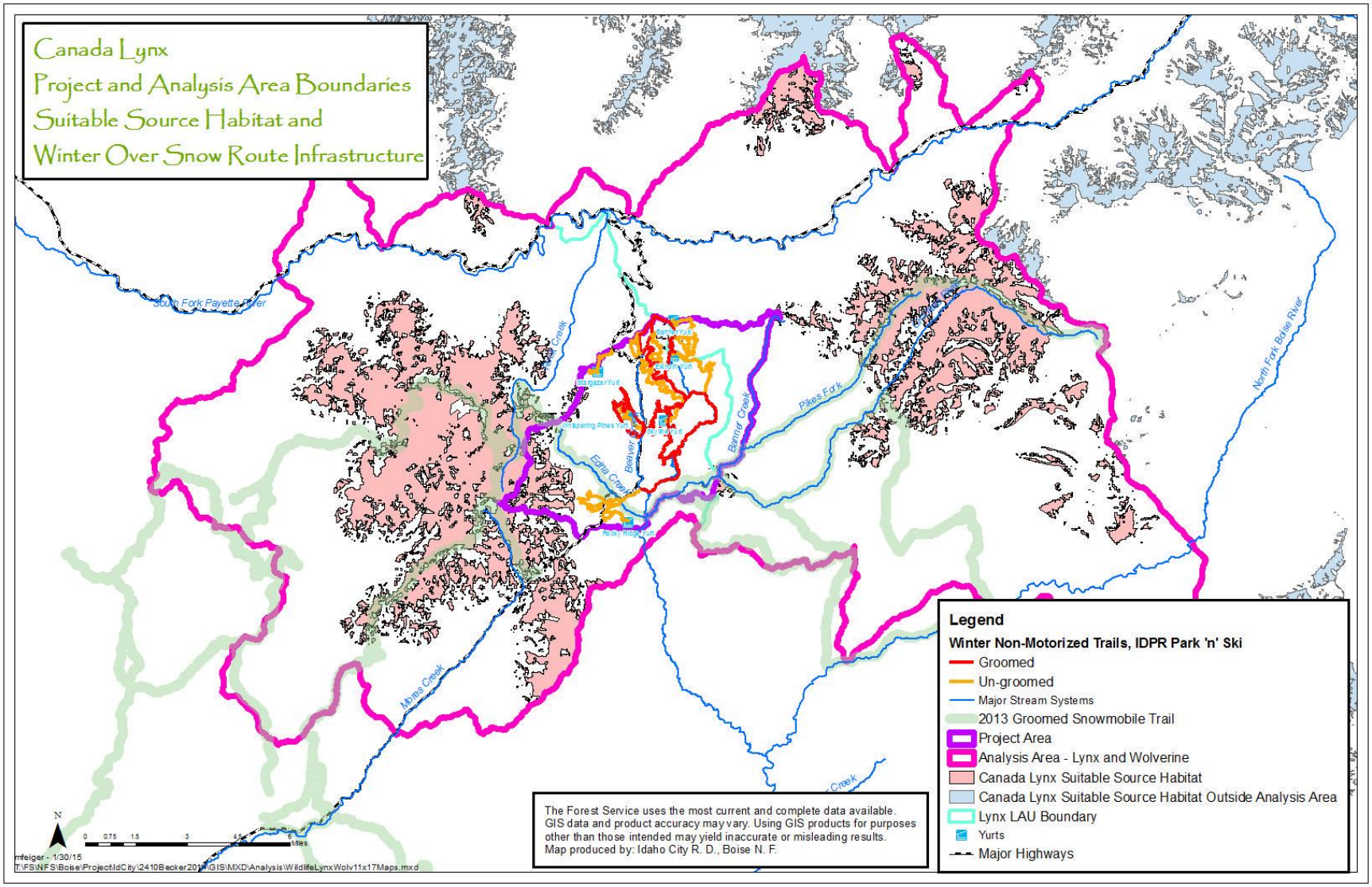


Figure 3-55. Canada lynx analysis area and existing condition

The Pilot Sunset LAU contains 23,997 acres of source habitat capacity of which 23,900 acres are currently in a suitable condition for lynx (Table 3-72). In 2014, a portion of one large fire— Grimes Fire portion of the Whiskey Complex —burned within the LAU. Only 7–10 acres of suitable habitat was consumed in that fire and has been accounted for in the total acres of source habitat assessed. Burned areas are not expected to provide source habitat for three or more decades post-fire or until regeneration reaches heights and densities to provide cover and food for prey during the winter. Early seral habitats that provide key foraging areas are limited and most of lynx habitat is in a mid- or late-seral condition. Currently, most foraging opportunities are found in mature, multi-storied stands with brush and young trees in the understory. Mature forests with abundant down wood or pockets of down wood provide potential denning habitat. These are most prevalent in the unroaded portion of the LAU where vegetation treatments and fuelwood activities have not affected vegetation structure.

Table 3-72. Canada lynx baseline conditions

Lynx Analysis Unit Name	Source Habitat Capacity (acres)	Source Habitat (acres)	Percent Suitable	Percent Unsuitable[a]	Road Density in Suitable Habitat (mi/mi^2)	Recreational Trail Density in Suitable Habitat (mi/mi^2)
Pilot Sunset	23,997	23,900	99.6%	0.4%	1.5	0.5
Jackson Peak	18,811	14,535	77.3%	22.7%	1.0	0.7
Totals	42,808	38,435	89.7%	10.3%	N/A	N/A

[a]TEST15 (USDA Forest Service 2010a) states that if more than 30% of lynx habitat within a LAU is currently in unsuitable condition, no additional habitat may be changed to unsuitable habitat by vegetative management projects. Fire hazard reduction activities within wildland-urban interface (WUI) watersheds that reduce the risk of wildfire threats to WUI areas are not bound by this standard.

The majority of the project area is within the Pilot Sunset LAU (Figure 3-56). The portions of the project area in the Beaver Creek, Edna, Whoop ‘em Up, and Lamar Creek drainages reside in this LAU. Suitable habitat in that portion of the project area occurs primarily in the southwestern quarter in the higher elevation areas of Lamar, Whoop ‘em Up, and Edna Creek, with isolated patches located along the ridgeline above China Fork of Beaver Creek and in the headwaters of Beaver Creek. These patches are composed primarily of PVGs 3, 4, and 7. With the exception of the groomed snowmobile route that bisects the isolate patches of habitat along the western project area boundary, no road or trail (winter or summer) bisects the patches of suitable habitat.

The Jackson Peak LAU contains 18,811 acres of source habitat capacity of which 14,535 acres are currently in a suitable condition for lynx (Table 3-72). Five fires have affected the condition of lynx habitat in the LAU over the past 25 years: Willis Gulch (1988), Lowman (1989), Rabbit Creek (1994), Trapper Ridge (2007), and Abby (2009). Similar to fire-affected areas in the Pilot Sunset LAU, burned areas are not expected to provide source habitat for lynx and their prey for three or more decades post-fire. Currently, 22.7% of potential habitat is in an unsuitable condition (Table 3-72). Source habitat capacity is concentrated in the north-central part of the LAU. Elsewhere, capacity is naturally fragmented, occupying upper ridges and moist, northerly aspects.

Roughly one-quarter of the project area is within the Jackson Peak LAU. This portion of the project area contains two isolated patches of suitable habitat disconnected from the larger patches at the core of this and the Pilot Sunset LAU (Figure 3-56). The remainder of suitable

habitat in this LAU occurs outside the project area, in and around the headwaters of Crooked River watershed.

The majority of habitat is located in relatively non-roaded portions of the LAU. The Pikes Fork Road (NFS road 312) is groomed for snowmobiles during the winter and bisects the largest block of lynx habitat. The Hunter Creek/Crooked River road (NFS road 348) is also groomed and passes through lynx habitat at the southern end of the central block. Off-trail snowmobile use in lynx habitat is generally limited to the Jackson Peak road and major ridgelines or openings between Jackson Peak and Trapper Flats.

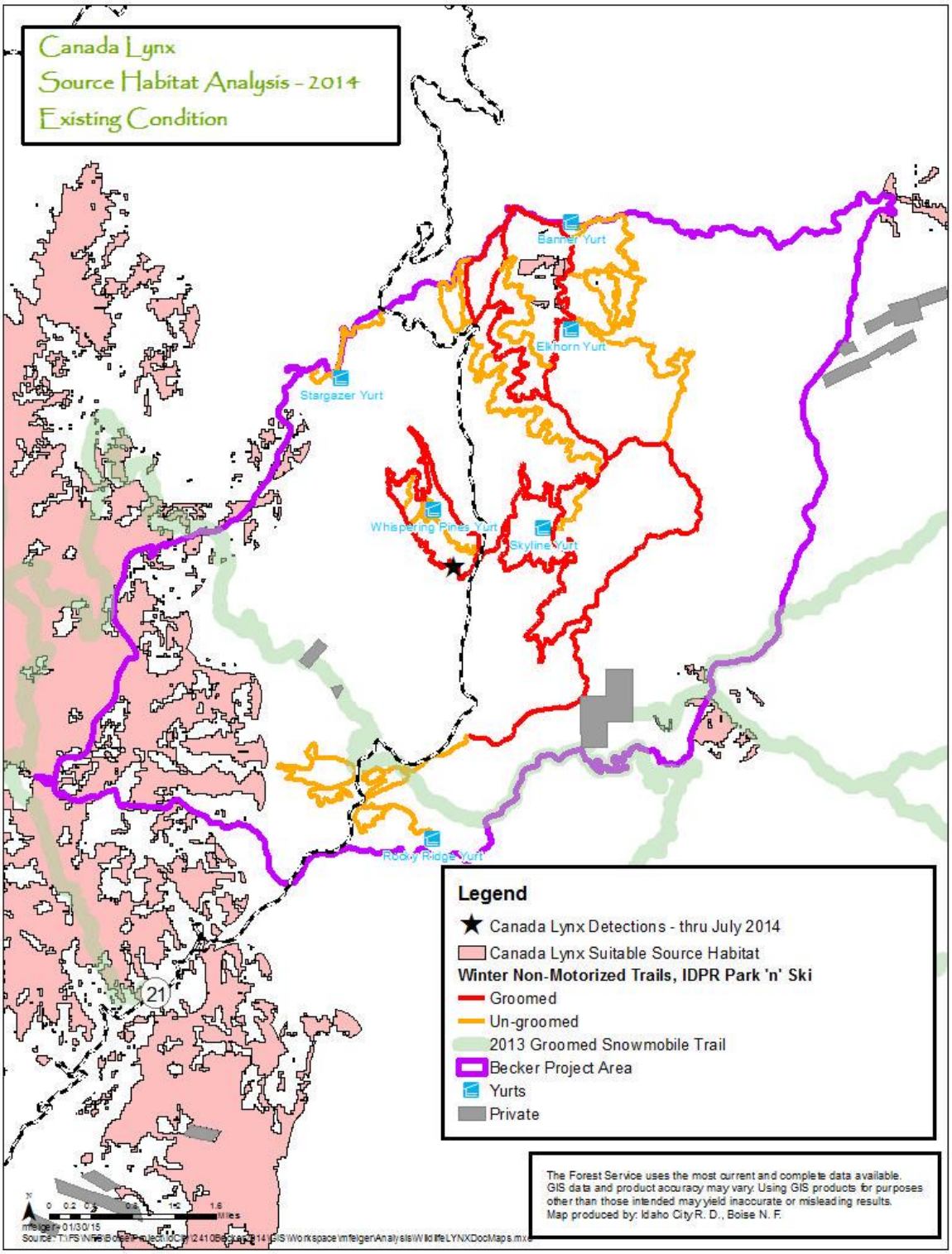


Figure 3-56. Lynx habitat in the project area

One occurrence of lynx has been documented in the LAUs. A track was observed in the Pilot Sunset LAU (Figure 3-56), near the Gold Fork trailhead, along one of the groomed IDPR Park‘n’Ski routes. The track was reported by a biologist for the USFWS to the Idaho Department of Fish and Game in 1998. The observation occurred outside of forests described as suitable for the species (Figure 3-56).

Within the project area, 1,252 acres of suitable source habitat occurs based on habitat modeling in support of revised Forest Plan analysis (Nutt et al 2010). All suitable condition for lynx includes three forest types: Douglas-fir, subalpine fir, and lodgepole pine. The majority of suitable habitat occurs as mature forests. Stands of sapling and pole size trees that provide important foraging sites are limited. The mature stands provide for travel, denning, and limited foraging habitat. Scattered stands have higher density of logs for denning. Stands are highly variable structurally, but pockets of dense shrubs and trees in the understory do occur across the area, and improve habitat conditions for snowshoe hare. Another prey species, red squirrel, is common in mature forests due to cone production in these areas. Dusky, ruffed, and Franklin’s grouse all occur within the project area and occupy different microsites or elevations. Riparian habitat is common due to the steep, dissected topography of the area, providing additional foraging opportunity. Riparian habitats are generally more biologically and structurally diverse due to moist conditions and provide food and cover for many prey species, as well as travel corridors for lynx.

The dominant fire regime for lynx habitat within the project area is mixed2. Historically, patch size could have been highly variable, ranging from small patches <1.0 acre up to several thousand acres. Suitable habitat within the project area would have varied in abundance and patch size through time. At any given time under the mixed2 fire regime, some, none, or all of the capacity could have been suitable for lynx, and the existing patch size and distribution could have occurred.

The *Lynx Biological Assessment for Ongoing Actions* (BA; USDA Forest Service 2002) analyzed ongoing actions in both LAUs, including actions affected by what is proposed in the analyzed alternatives. The transportation system providing access for full sized and recreational motorized vehicles serves as a potential source of disturbance to denning lynx, and may influence distribution of neonatal kittens (ILBT 2013). That infrastructure, depending upon placement and use, also has the potential to fragment lynx source habitat (*ibid*). Similarly, recreational infrastructure, including summer and winter trail systems, can affect lynx and lynx habitat through disturbance effects and potentially the introduction of competing predators into lynx winter habitat (*ibid*). Within the LAUs considered for this analysis, both road and recreational trail infrastructure is present, maintained, and managed in the analysis area (Table 3-72). Road density in lynx habitat is relatively low, however, the BA (USDA Forest Service 2002) notes that road distribution can create much higher densities within specific patches of suitable habitat. Likewise, recreational trails, motorized and non-motorized and summer and over snow, are also at low densities within suitable habitat (*ibid*). Of particular note relative to this analysis, the IDPR Park ‘n’ Ski trail network for which the action alternatives assessed would propose for adoption was analyzed in the BA as an ongoing action (*ibid*).

Environmental Effects

Because the project area is located within the Pilot Sunset and Jackson Peak LAUs, all actions proposed are contained within either LAU. Actions that would potentially affect lynx and lynx habitat include vegetation and fuels management actions and changes to the transportation and recreation infrastructure.

Source habitat abundance and road and recreational trail density are used as indicators for effects to lynx habitat (Table 3-73). The desired condition for lynx is to have 70% or more of habitat within an LAU in a suitable condition based on Forest Plan standard TEST15 (USDA Forest Service 2010a). Road and recreational trail density is used to describe potential risks associated with the presence and use of those routes.

Table 3-73. Source habitat and quality indicators for the project area

Indicator	Year	Alternative A (% Total Suitable)	All Action Alternatives (% Change Total Suitable)
Source Habitat Abundance (acres)	2014	1,252 (3.3%)	352 (2.3%)
	2044	1,252 (3.3%)	1,252 (3.3%)
Road Density in Suitable Habitat (mi/mi^2) (Pilot Sunset/Jackson Peak)	2014	1.5/1.0	1.5/1.0
	2044	1.5/1.0	1.5/1.0
Recreational Route Density in Suitable Habitat (mi/mi^2)	2014	0.5/0.7	0.5/0.7
	2044	0.5/0.7	0.5/0.7

Direct and Indirect Effects

Alternatives A

No direct effects would be associated with this alternative because no actions are proposed under Alternative A.

Indirect effects would be minimal, as little change to suitable habitat would be expected. Under Alternative A, natural succession would continue to drive vegetation structural change within lynx habitat and capacity. Source habitat abundance, which includes foraging, denning, and travel habitat, would remain similar to the current condition in both the short and long term. Forests would continue to mature and the stands that currently provide key foraging habitat (sapling and small tree size class) would become less suitable for snowshoe hares as trees grow and no longer provide winter food and hiding cover for them. Other stands within recent wildfire areas may be recruited into suitable conditions for lynx and provide foraging opportunities. Patchiness would decrease in the absence of fire disturbance; denning habitat would increase. Modeling completed for stands in the project area indicate that log abundance would increase. As logs increase occurs, suitable microsites for denning would be more likely to occur across the landscape. Risks associated with roads would remain unchanged. The amount of capacity in a suitable condition would remain above 70% in both LAUs (Table 3-74).

Table 3-74. Lynx Analysis Unit changes resulting from alternatives, 2014

	Pilot Sunset LAU		Jackson Peak LAU	
	Alternative A	Action Alternatives	Alternative A	Action Alternatives
Suitable Source Habitat (%)	99.6	97.3	77.3	77.3
Source Habitat Within Desired Condition (≥70% Suitable)?	Yes	Yes	Yes	Yes
Road Risk Rating in Source Habitat Capacity (Desired is Low [<0.7 mile/mi^2])	Moderate	Moderate	Moderate	Moderate
Road Risk Trend	No Change	No Change	No Change	No Change

All Action Alternatives

All activities proposed in lynx habitat have the potential to disturb or displace lynx if lynx are present during implementation. Disturbance at sensitive sites such as natal or maternal dens would have the greatest potential to impact lynx. No den sites are currently known. Design Feature WI-7 has been included to protect any active dens sites discovered during project implementation and would help minimize potential impacts to productivity. The vast majority of the vegetation management actions are located outside suitable lynx habitat (Figure 3-57). Those actions that do occur within suitable lynx habitat are located on the edges of the larger suitable habitat patches, or are associated with small isolated patches of suitable habitat. A similar discussion is relevant to the transportation management actions displayed in Figure 3-58 where Alternative D represents all action alternatives. Risks associated with roads and motorized trails (Figure 3-58) would not change under all action alternatives when compared to current conditions, as changes to road and trail infrastructure would occur outside of suitable lynx habitat, or would merely represent the adoption of existing infrastructure already in place and used, as is the case of the non-motorized trail system.

Natural fuels treatments, on the other hand, would involve a greater degree of suitable habitat than other actions, and its implementation could potential affect lynx, as lynx denning habitat would be affected (Figure 3-59). Fuels treatments may result in displacement effects to lynx that may occupy those affected habitats. However, as noted above, only one sighting from 1998 is known in the project area. While an abundance of suitable habitat is located within both LAUs, both are largely absent of high-quality foraging habitat, comprised of early seral lodgepole pine habitat. Such conditions, as noted, further reduce the likelihood of occupancy and reproduction, and thus a reduced risk of disturbance effects.

The amount of habitat in a suitable condition would remain similar to the existing condition. Natural succession would be the driver for most vegetation structural change except for 900 acres of habitat treated under all action alternatives. These treatments are designed to mimic natural insect and disease disturbances except that some trees would be removed from the forest and would not remain on site for future recruitment as snags and logs. Patches of open canopies and small created openings would allow sunlight to reach the forest floor enhancing diversity and growth of understory. While quality of foraging may be reduced in the short-term on treated areas, foraging habitat quality would increase in the long-term as additional

conifers become established in the small openings. Similar to Alternative A, existing high quality foraging sites (early seral, sapling/poles-size) would advance successionally becoming less suitable for snowshoe hare. Additional early seral foraging habitats are likely to be recruited within recent wildfire areas as seedlings become established and growth to heights that extend above winter snow. In the Pilot Sunset LAU, most foraging opportunities would occur in conjunction with mature forests as few disturbances have affected lynx habitat in recent years. Patchiness, or the juxtaposition of early and late-seral forests, would decrease in the absence of fire disturbance. Denning habitat would increase due to higher density of down logs. The amount of capacity in a suitable condition would be the same in the long-term as under all action alternatives.

Both LAUs would remain above the 70% threshold for habitat modification described in TEST15, with only 2.3% reduction in suitable habitat in the Pilot Sunset LAU, and a less than 0.1% reduction in the Jackson Peak LAU (Table 3-74).

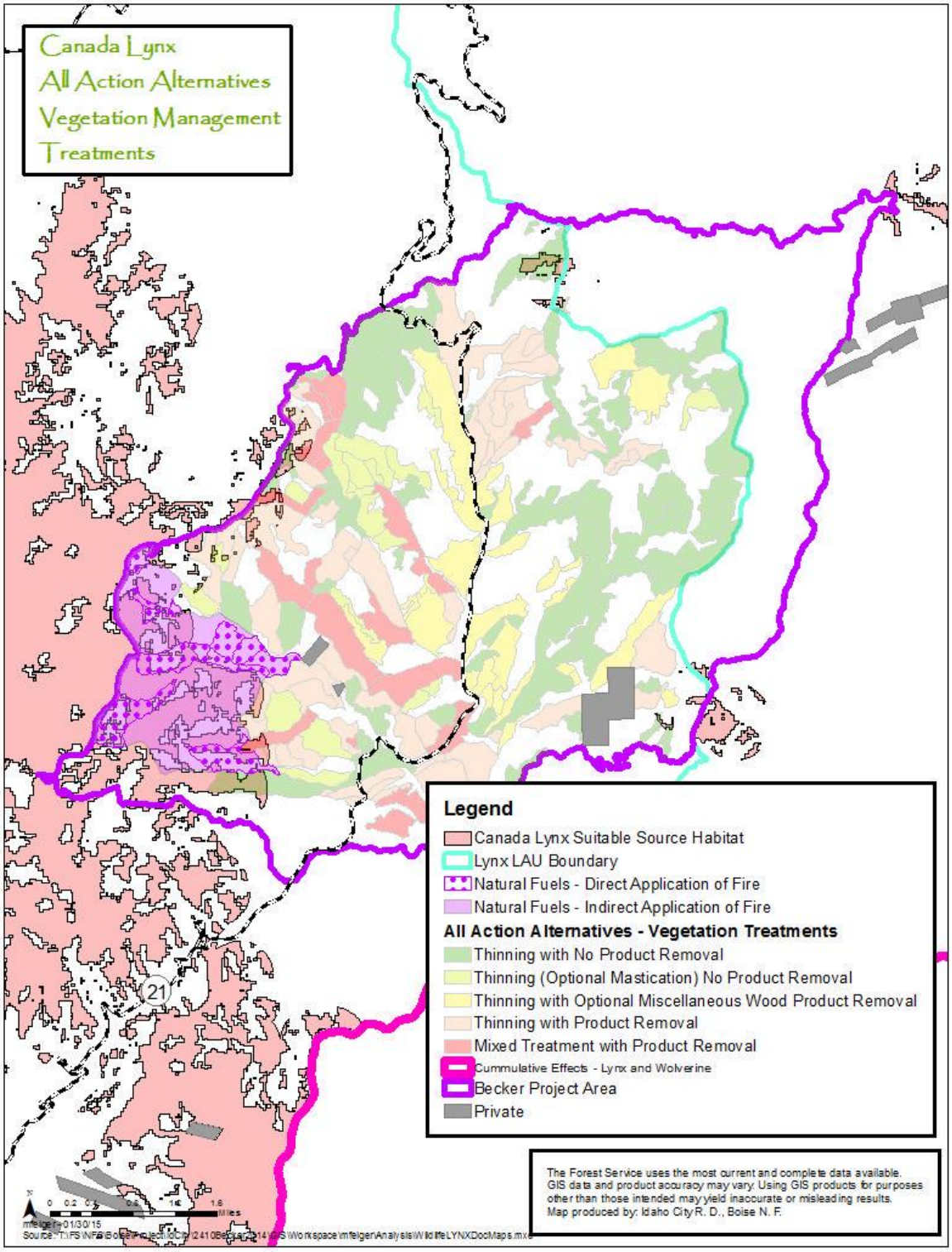


Figure 3-57. Location of vegetation treatments under all action alternatives relative to Canada lynx suitable source habitat

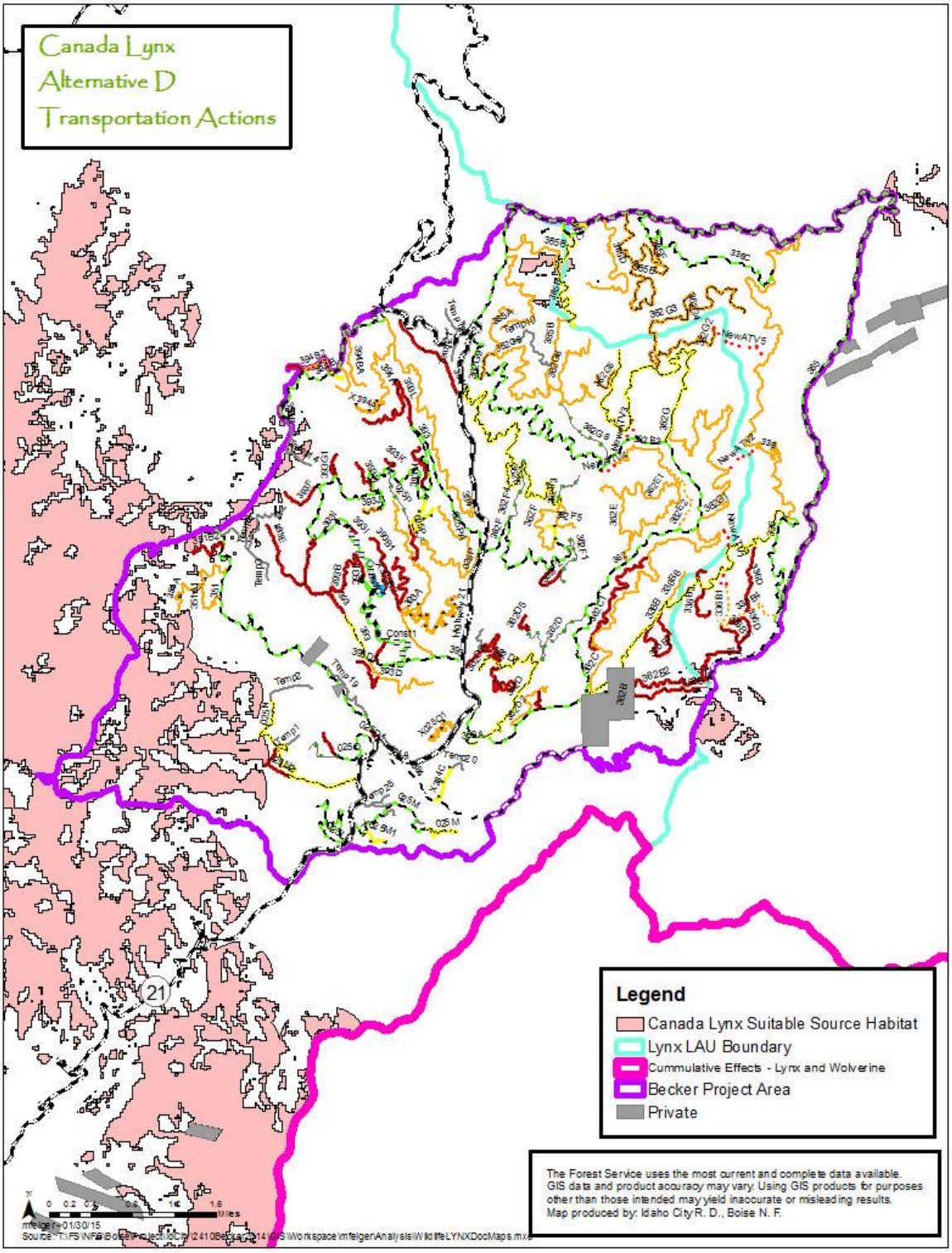


Figure 3-58. Location of transportation actions under all action alternatives relative to Canada lynx suitable source habitat; Alternative D is representative of all action alternatives

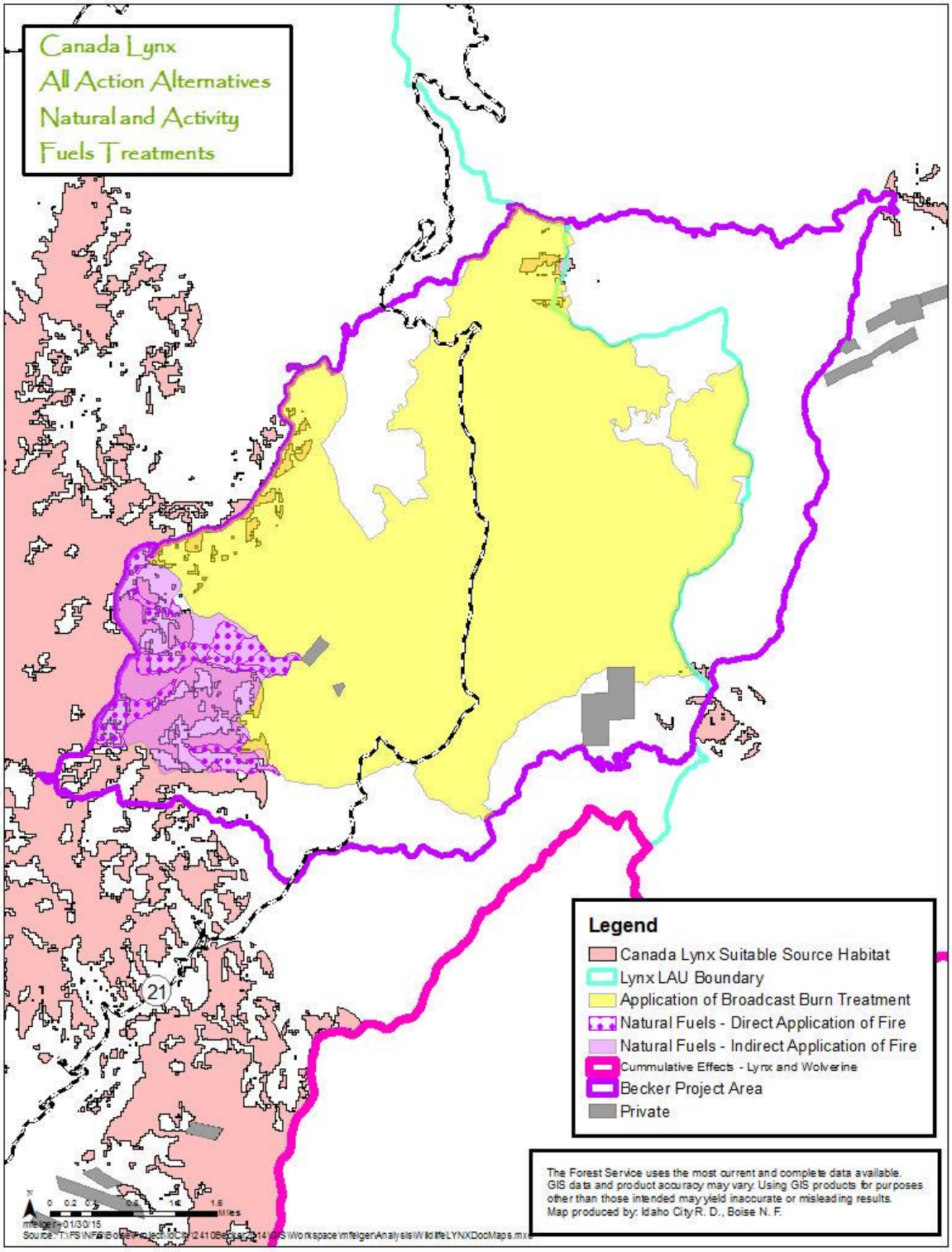


Figure 3-59. Location of fuels treatments under all action alternatives relative to Canada lynx suitable source habitat

Cumulative Effects for NEPA

The cumulative effects analysis area is the same as for direct and indirect effects and includes the Pilot Sunset and Jackson Peak LAUs.

Alternative A

Alternative A would have no cumulative effects on Canada lynx since no actions are proposed.

Action Alternatives

Ongoing activities within the cumulative effects area that could potentially impact Canada lynx are discussed below. The CuMo Exploration Project was identified as a reasonably foreseeable future project occurring within the Analysis Area for which disturbance effects could occur to lynx. The draft environmental analysis for this project (USDA Forest Service 2015c) indicates the possibility of disturbance effects to lynx if they occupy habitat within the CuMo project area. However, for the same reasons described above, the risk of those effects would be minimal because both actions would occur on the fringes of the larger block of suitable habitat in the Pilot Sunset LAU. Coupled with the low likelihood of habitat occupancy, the risk of cumulative disturbance effects would be low for all action alternatives.

Effects from past activities have been considered when describing the affected environment. These activities include several timber and sanitation/salvage sales, reforestation, timber stand improvement activities, the firewood program, construction and maintenance of roads and motorized trails, large wildfires, and fire suppression. Because of limitations in access and the types of forest habitats for which suitable lynx habitat occurs, the amount of habitat modification has been relatively small. Across the Pilot Sunset LAU, only 0.4% of habitat capacity is not in a suitable condition. All action alternatives would slightly reduce suitable habitat as a result of mechanical vegetation and natural fuels treatment actions. These effects would be cumulative to the limited past effects of other management actions on suitable habitat.

Maintenance and use of roads and trails would continue. These activities could impact lynx through down log reduction (fuelwood removal) and disturbance at denning sites. The action alternatives would not change the transportation system as it pertains to suitable lynx habitat. As such, the action alternatives would not add to the cumulative effects of actions creating the existing transportation systems.

Fuelwood cutting for personal use is expected to continue. Although quantities of material removed annually are not known, such activities occur primarily adjacent to open roads. Source habitat adjacent to roads would continue to be impacted by the fuelwood program through loss of logs and reduced recruitment potential of down logs (snags are removed). The action alternatives would not add to or change the effect of fuelwood removal on lynx habitat, as there would be no change to access along open NFS roads that are associated with suitable lynx habitat.

Cumulative Effects for ESA

Cumulative effects under ESA consider the effects of State, tribal, and private actions, but excludes future federal actions. No State, tribal, or private actions are proposed that would affect lynx in the Pilot Sunset and Jackson Peak LAUs. In addition, no future federal action,

potentially impacting lynx was identified. Therefore, the cumulative effects for ESA are the same as those described for NEPA above.

Determination

Implementing Alternatives B, C, D, E, and F **may affect but are not likely to adversely affect** Canada lynx. Actions affecting suitable lynx habitat in the analysis area, composed of the Pilot Sunset and Jackson Peak LAUs, are effectively the same across all alternatives. Implementing those actions would carry a small risk of disturbance since some actions, including mechanical vegetation treatments and natural and activity fuels treatments, would occur in currently suitable habitat which could be occupied. Those actions would result in a short-term reduction in suitable habitat in the Pilot Sunset LAU. Other actions, such as changes to the transportation system and adoption of non-motorized trail routes, would not affect existing conditions of suitable lynx habitat in either LAU.

While a risk of effects would exist in the analysis area, those effects would not likely be adverse for the following reasons:

- Modification and reduction in suitable habitat would only be by 2.3% in the Pilot Sunset LAU, and less than 0.1% in the Jackson Peak LAU
- Suitable habitat would remain greater than 70% of habitat capacity for both LAUs under any action alternative
- Effects to habitat would be short term, as modified habitat would be expected to develop suitable habitat conditions through natural successional processes
- Risk of disturbance and displacement effects would be low, as likelihood of occupancy in the analysis area would be low
- Neither LAU is identified as Critical Habitat for Canada lynx

Wolverine (Sensitive)

Wolverine is a Sensitive species on the Forest. Wolverine do not appear to specialize on specific vegetation or geologic habitat features, instead they select cold areas with reliably maintain deep persistent snow into the warm season. Spring snow cover (April 15–May 14) is the best overall predictor of wolverine occurrence (Aubry et al. 2007; Copeland et al. 2010). Snow cover during the denning period is essential for successful wolverine reproduction range-wide (Hatler 1989; Magoun and Copeland 1998; Inman et al. 2007). The persistent spring snow layer delineated by the MODIS model (Copeland et al. 2010) contained all known wolverine den sites in the contiguous United States. Wolverine dens tend to be in areas of high structural diversity such as logs and boulders with deep snow (Magoun and Copeland 1998; Inman et al. 2007). Reproductive females dig deep snow tunnels to reach the protective structure of logs and boulders where they produce offspring. This behavior presumably protects the vulnerable kits from predation by large carnivores, including other wolverines (Pulliainen 1968; Zyryanov 1989), but may also have physiological benefits for kits by buffering them from extreme cold, wind, and desiccation (Pullianen 1968). All of the areas in the lower 48 States for which good evidence of persistent wolverine populations exists (i.e., Cascades, Sierra Nevada, northern and southern Rockies) contain large and well-distributed areas with deep snow cover that persists through the wolverine denning period (Brock et al. 2007, Aubry et al. 2007). Special habitat features

include talus slopes, boulder fields, beaver lodges, old bear dens, fallen logs, root wads of fallen trees, large cavities used for den sites. Denning activities occur from February through early May until the natal and/or maternal den site is abandoned (Magoun and Copeland 1998). Denning habitat may be a factor limiting distribution and abundance (Copeland 1996), and wolverines may abandon dens in response to disturbance (Copeland 1996; Magoun and Copeland 1998).

Projected habitat loss is linked to increasing temperatures and reduced late spring snowpack. As temperatures become warmer, more precipitation falls as rain, and snowmelt occurs earlier in the spring. As these changes continue, currently suitable habitat would become unsuitable, and wolverine habitat would contract, moving up mountain slopes. Habitat losses are likely to occur throughout the contiguous United States and are projected to be most severe in central Idaho (FR Vol. 8, No.23, Feb. 4, 2013). McKelvey and others (2011) predict that 31% of current habitat will be lost due to climate warming by 2045. The loss will increase to 63% by 2085. In conjunction with reduced area, habitat will become more fragmented. The number of wolverines that could be supported by habitat would decrease and the distance between subpopulations would increase. Both changes would affect metapopulation dynamics, resulting in increasing difficulties with recolonization and genetic exchange (FR Vol. 8, No.23, Feb. 4, 2013).

Affected Environment

The analysis area for wolverine is the project area 19,327-acre project area.

On the Forest, wolverine source habitat is defined by areas that retain snow into late spring (April 15 to May 14). These areas typically coincide with mixed conifers at mid-elevations and subalpine and alpine habitats at higher elevations. Special habitat features include deep persistent snow above timberline and den sites (talus slopes, boulder fields, beaver lodges, old bear dens, fallen logs, root wads of fallen trees, large cavities). Denning habitat may be a factor limiting distribution and abundance (Copeland 1996), and wolverines may abandon dens in response to disturbance (Copeland 1996; Magoun and Copeland 1998).

A single documented sighting of a wolverine occurred along Highway 21 at Mores Creek Summit (southern project area boundary) in February 2004. Additional sightings within or adjacent to the headwaters of Crooked River watershed, dating back to 2008 and 2012 are also known. Wolverine may occupy the project area at some point during a given year, either as individuals pass through, or as a part of a larger territory. Denning and reproduction is not documented in the project area.

Source Habitat

Areas of persistent snow are used to define source habitat on the Forest (Figure 3-60). The Forest uses a model developed at the Forest Sciences Lab in Missoula, Montana, to define areas of persistent snow that extends to May 15 each year (Copeland 2008). Approximately 2,388 acres of source habitat occurs within the analysis area and generally falls within the elevation range of roughly 6,500 to 8,000 feet. Elevations vary somewhat based on aspect with persistent snow occurring at higher elevations on southern exposures.

Magoun and Copeland (1998) noted that denning sites in Idaho are typically located at elevations above 8,200 feet. This determination was based on the two central Idaho sites known at the time from Copeland’s study (Copeland 1996, Copeland and Heinemeyer 2013).

More recently, natal and maternal dens have been documented at lower elevations in central Idaho. Of 10 recent sites known from 5 females, they average approximately 7,333 feet in elevation (Copeland and Heinemeyer 2013).

Persistent snow patches (Figure 3-60) could potentially provide denning opportunities for wolverine. Habitat quality for denning, however, would appear to be poor as habitat features that provide potential den sites are not common in the analysis area. Cirque basins do not occur. Large down trees or concentrations of down trees are also uncommon. Ruggiero et al (1994) described the importance of rocky areas, including boulder fields and talus slopes, for denning habitat in Idaho. Neither feature occurs in the source habitat patches associated with non-motorized over-snow routes in the project area. Such habitats, however, do exist in the source habitat patch model in the southwestern corner of the project area, in the vicinity of Pilot Peak.

While rock formations are scattered throughout source habitat, they generally consist of a single large rock outcrop and lack the talus and bouldering effect that creates cavities and spaces that can be utilized as den sites.

Human Influence on Source Habitat

Wolverine is in Family 3, which has been identified as a family of concern on the Forest due to human influence on the source environment[39]. For wolverine, the concern is specific to the influence of winter recreation on successful reproduction and interaction with other individuals, factors that are important for sustainability (Nutt et al. 2010, p. 516).

The USFWS stated in its proposal for listing that natal den abandonment due to den site disturbance is rare and evidence is lacking to substantiate den abandonment due to human disturbance (FR Vol. 8, No.23, Feb. 4, 2013). The *Central Idaho Wolverine and Winter Recreation Research Study* is ongoing and covers portions of wolverine habitat on the Payette, Boise, and Sawtooth National Forests. Preliminary results indicate that wolverines in the study area are permanently residing even in some of the most highly recreated portions of the study area (Heinemeyer 2012). Study scientists acknowledge that further information is needed that will allow them to look at reproduction and other indicators of health in the wolverine population.

[39] Source environment is the composite of all environmental conditions that result in stationary or positive population growth for a species in a specified area and time. Source habitats contribute to source environments.

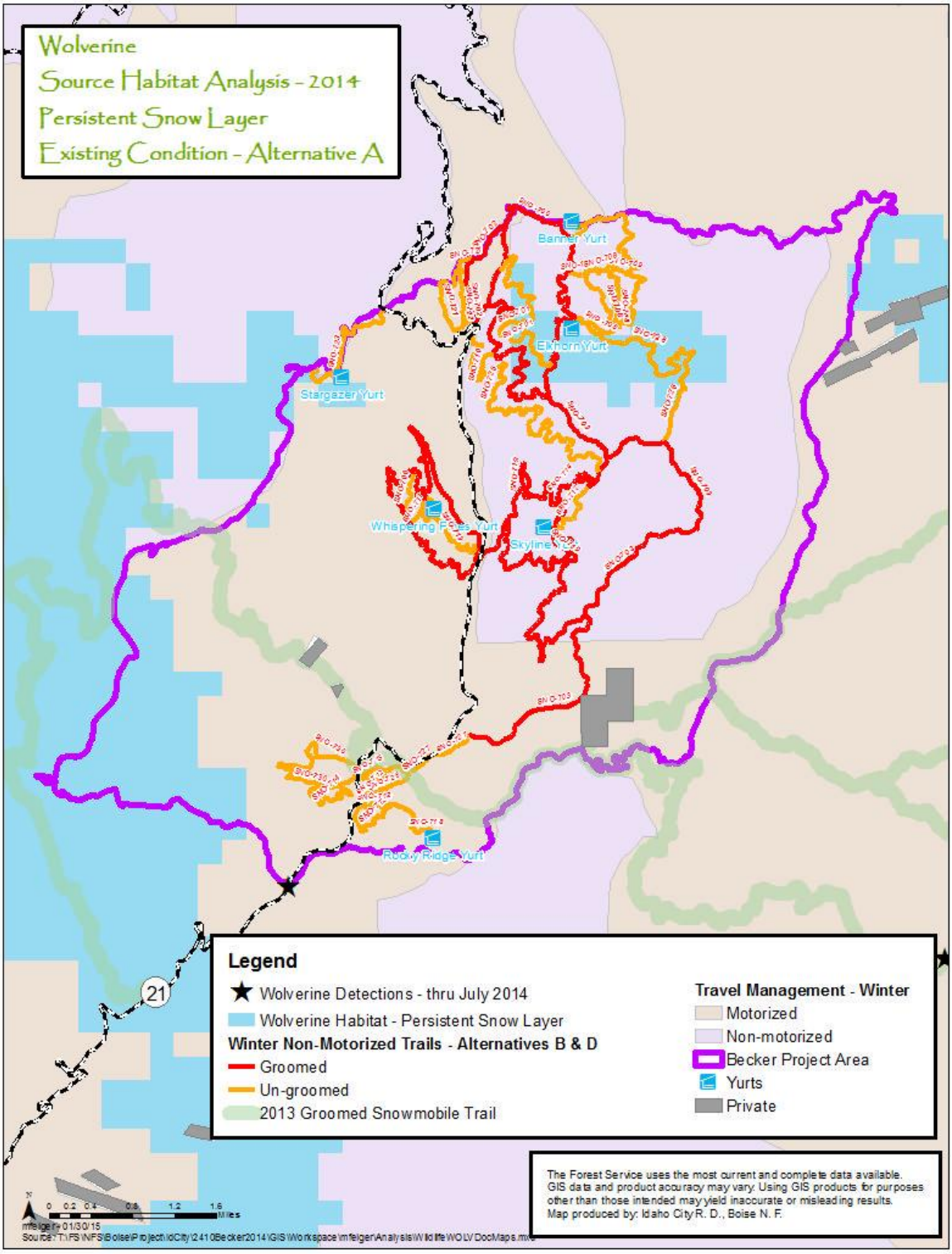


Figure 3-60. Wolverine existing condition

Potential effects from winter recreation are closely tied to changes in access or in management related to human presence and use in persistent snow areas. Road and trail density provide a quantitative indicator of change. Over-snow vehicle use, which may extend beyond trails and roads, will be discussed qualitatively.

An existing network of non-motorized over-snow routes occurs in the project area. This network is managed through an agreement with IDPR, which provide a network of groomed and un-groomed routes. These routes are utilized by backcountry and cross-country skiers and snowshoers to access much of the project area during the winter. These routes are also tied to IDPR yurts. These structures enable backcountry recreationists overnight access to the project area. The structures are popular and often rented daily throughout the winter (recreation technical report, available in the project record). Two of those yurts (Elkhorn and Stargaze), and a portion of the trail network overlaps a patch of persistent snow in the project area that could provide denning habitat for wolverine (Figure 3-60). Denning is not documented in that patch, nor are there any recorded sightings.

In addition to the non-motorized routes currently present and managed in the project area, two segments of groomed snowmobile routes originate from the Whoop ‘em Up snow park. These segments follow NFS roads 312, 351, and 384, leaving the project area where those routes intersect that boundary. Per These segments do not intersect modeled persistent snow patches within the project area (Figure 3-60).

Forest Plan identifies an area north of NFS road 384 and east of Highway 21 as a Primitive Winter Non-Motorized Travel Area, for which motorized over-snow travel is prohibited (recreation technical report, available in the project record). A total of 916 acres of modeled persistent snow habitat is located in this area (Table 3-75). With the lack of motorized over-snow travel occurring in this area, disturbances to wolverine would be less if individuals were to den in that patch. This determination is based upon the assumption that motorized over-snow activity may have greater disturbance consequences to wolverine than non-motorized over-snow travel. As noted in Heinmeyer (2012), further assessment of this assumption is needed. The remainder of the project area is managed as an area where motorized over-snow travel is permitted.

Harvest of wolverine was identified as a secondary threat to wolverine in its proposal for listing. Idaho does not have a trapping season for wolverine; however, the species is sometimes incidentally caught in legal traps set for other species. Trapping activities are facilitated by roads and trails that provide easier access during the winter. Road and trail density is used as an indicator of the potential risk of incidental trapping. Road and trail density is included as a risk indicator for some of the 9 conservation principles that form the basis for assessing current baselines, threats, and risks (USDA Forest Service 2010a, Appendix E, pp. E-7 through E-12). Road and trail density in source habitat is 1.6 miles per square mile of source habitat (Table 3-75), which represents a ‘high’ relative risk.

Table 3-75. Road and trail density in wolverine source habitat

Indicator	Existing Condition (Baseline)	Alternative A	Alternatives B and D	Alternatives C, E, and F
Road and Trail Density in Source Habitat (mi/mi^2) The desired condition is 'low' (<0.7 mi/mi^2) (USDA Forest Service 2010a, Appendix A) (long-term trend)	1.6	1.6	1.6	1.6
Persistent Snow Habitat within Primitive Non-Motorized Over-snow Travel Designation (acres)	916	916	916	986

Environmental Effects

Direct and Indirect Effects

The majority of the proposed actions would occur outside of wolverine source habitat. However, some actions are proposed for within source habitat, including commercial and noncommercial thinning, handpile and landing pile burning, broadcast burning, log hauling, road maintenance, road improvement, and the adoption of non-motorized and designation of motorized trail routes.

Two indicators, road and trail density within source habitat and acres of source habitat within primitive non-motorized over-snow travel designations, were used to assess potential impacts to wolverine for reasons previously described (Table 3-75). Persistent snow areas, which define source habitat, would not change due to any of the proposed actions; therefore, source habitat abundance is not used as an indicator of effects. Denning habitat and the potential for disturbance at den sites will be discussed quantitatively through the indicators and qualitatively.

Alternative A

The absence of any actions associated with this alternative would preclude any direct effects from this alternative. Indirectly, existing levels of disturbance, and the distribution of disturbance to wolverines potentially occupying the project area would remain unchanged. Road and trail density within source habitat and acres of source habitat in winter non-motorized area designations, indicators for human influence on the environment, would remain unchanged (high risk) (Table 3-75). Winter recreation would remain similar to the existing condition with most use concentrated on roads and trails. Current use of the IDPR Park 'n' Ski trail system would continue at similar levels. Areas west of Highway 21 would remain open to cross country travel of motorized over-snow equipment. Wolverine occupy habitats where winter recreational uses occur (Heinemeyer 2012), however, the influence of winter recreational use on reproduction and other health indicators is unknown at this time. Existing levels of disturbance to wolverine would remain.

Alternatives B and D

The potential for deb site disturbance would be low to non-existent due to a lack of apparent suitable denning habitat. Project implementation would not occur during winter to late

spring. Treatment units in source habitat lack habitat features that provide suitable denning sites (talus, boulders, abundant large down logs). In addition, winter logging would not occur and vegetation treatments in source habitat would be implemented outside the period when disturbance at den sites is of concern (February–May).

Winter recreational activity would not change in source habitat patches. The adoption of the non-motorized over-snow routes currently managed by IDPR through agreement would continue, including the grooming of some routes. Access to the yurt infrastructure would continue. As such, indirect effects of human-related disturbance would be unchanged from existing conditions (Figure 3-61).

Areas accessible to motorized over-snow vehicles would not change. As such, disturbance risk would not change from existing conditions.

Alternative C, E, and F

As with Alternatives B and D, the potential for disturbance at a den site is low to non-existent due to lack of apparent suitable denning habitat. Project implementation activities would not occur during winter to late spring. Treatment units in source habitat lack habitat features that provide suitable denning sites (talus, boulders, abundant large down logs). In addition, winter logging would not occur and vegetation treatments in source habitat would be implemented outside the period when disturbance at den sites is of concern (February–May).

Winter recreational activity would not change in source habitat patches. The adoption of the non-motorized over-snow routes currently managed by IDPR through agreement would continue, including the grooming of some routes. Access to the yurt infrastructure would continue. As such, indirect effects of human related disturbance would be unchanged from existing conditions.

The primary difference between these action alternatives and Alternatives B and D is the expansion of the Semi-primitive Non-motorized Winter Recreation area around the winter non-motorized trails not currently contained by that land area designation (Figure 3-62). Alternatives C, E, and F proposed to expand that designation to include area around those segments of the adopted trail network. Thus effectively expanding the area where motorized over-snow travel would not be permitted and further limiting risk from motorized over-snow travel and associated disturbance effects. Table 3-75 indicates an additional 70 acres of source habitat would be enclosed within the Semi-primitive Non-motorized Winter Recreation designation. This change would not likely change the effect measurably when compared to the other alternatives, however, because of the lack of suitable denning habitat structure in areas affected by this change.

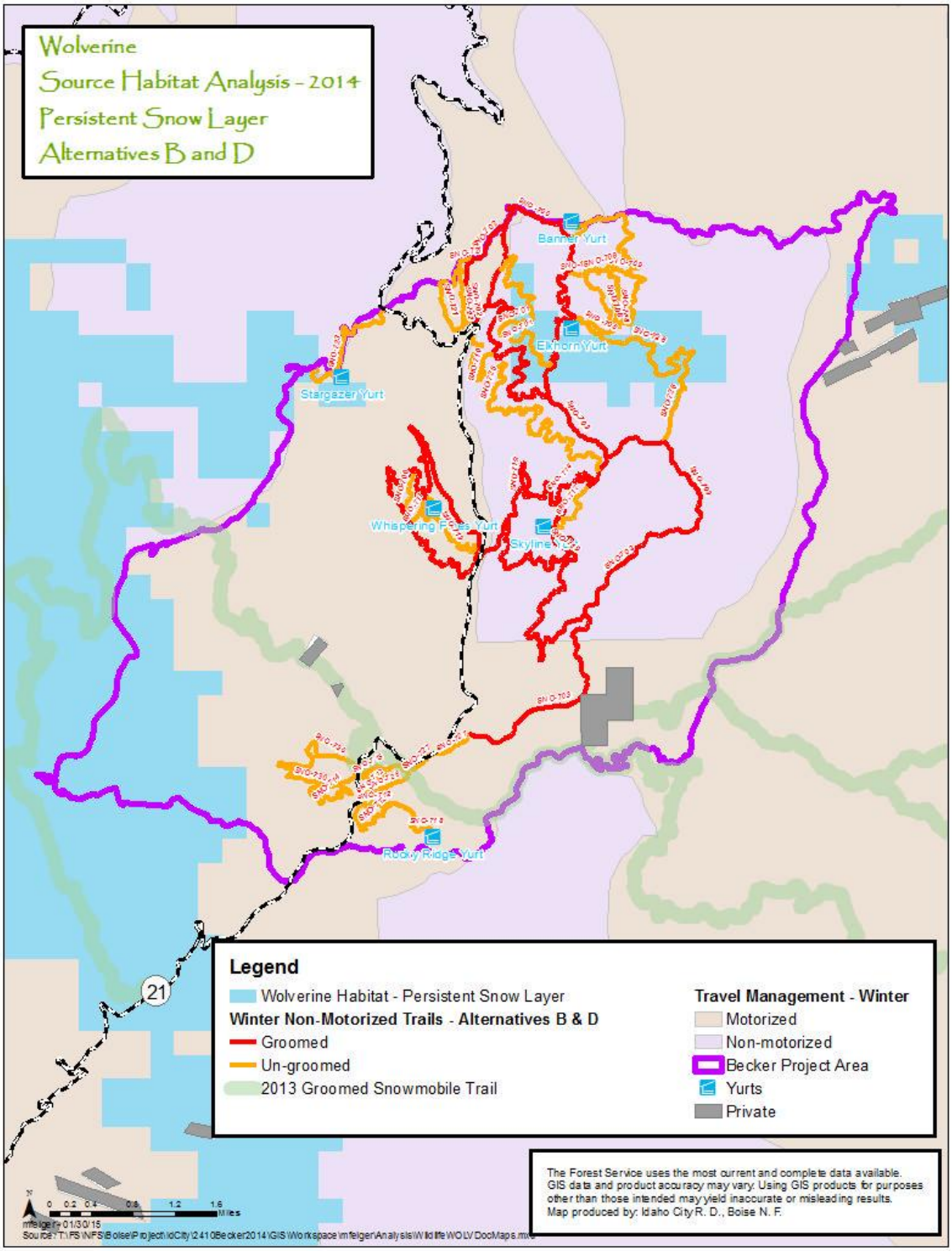


Figure 3-61. Effects of Alternatives B and D on wolverine source habitat

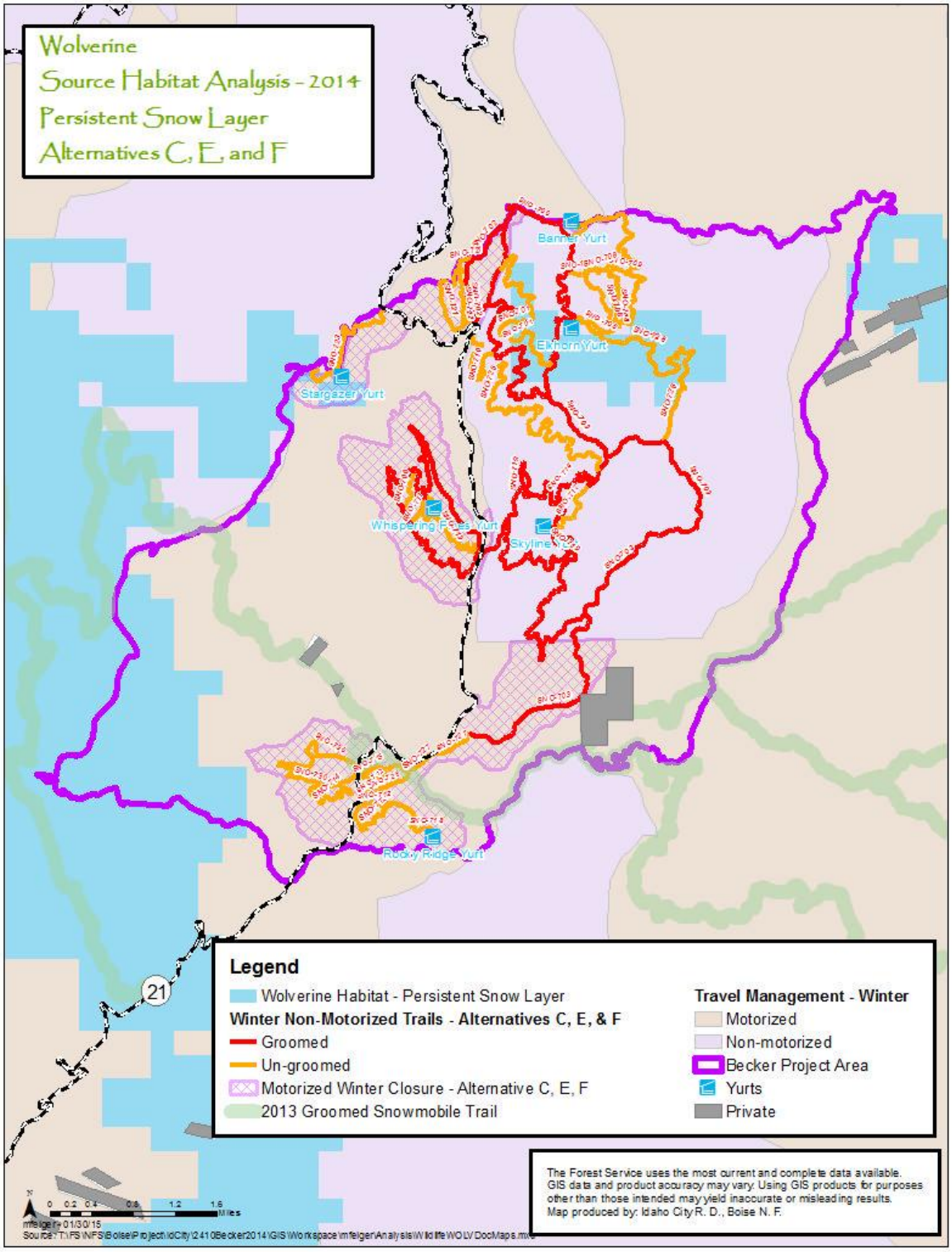


Figure 3-62. Effects of Alternatives C, E, and F on wolverine source habitat

Cumulative Effects

The cumulative effects analysis area encompasses the landscape within the two lynx analysis units assessed in the "Cumulative Effects" section for lynx. This area was selected for two reasons: 1) it provides a large enough area that would reasonably represent one or more potential territories for reproducing males and females; and 2) it captures in whole, or in part, two large patches of persistent snow source habitat for which one or more denning females could occupy. The cumulative effects analysis area encompasses 225,625 acres, a substantial portion of which is composed of lower elevation ponderosa pine and mixed conifer forest and other low-elevation habitats (Figure 3-63); habitat not likely to be occupied by wolverine except during larger exploratory movements. Within the cumulative effects analysis area, 55,907 acres of persistent snow source habitat occurs, representing 25% of the area (Figure 3-63).

Within the cumulative effects analysis area, persistent snow source habitat is located within one of two winter recreation designations: Semi-Primitive Motorized and Semi-Primitive Non-Motorized (Figure 3-64). In part, these designations identify the permitted over-snow recreation and travel that may occur in area. Across the analysis area, these two designations contribute the following:

- Semi-Primitive Motorized—160,346 acres (71% of analysis area)
- Semi-Primitive Non-Motorized—16,522 acres (7% of analysis area)

As noted, the Semi-Primitive Motorized designation is the most abundance and widely distributed and also intersects the vast majority of persistent snow source habitat (Figure 3-64). As such, the majority of source habitat would be susceptible to motorized over-snow disturbance.

Past activities have been considered in describing existing habitat. Roads and trails were built initially for a variety of reasons, including mining and timber extraction, and have been used subsequently for recreational purposes. These routes served to facilitate over-snow routes that potentially impact persistent snow source habitat in the analysis area.

Alternative A

The absence of actions associated with this alternative precludes any cumulative effects. Disturbance indicators would be maintained in their current condition across the cumulative effects analysis area.

Action Alternatives

Maintenance and use of roads and trails would continue, which would continue to provide human access into wolverine source habitat. None of the action alternatives propose changes to road and trail maintenance in respect to effects from over-snow/winter access to the analysis area. Thus, no change in cumulative effects as it relates to wolverine or wolverine habitat would occur.

Existing motorized and non-motorized over-snow routes provide for a variety of winter recreational opportunities in the analysis area. Over-snow route density within the analysis area appears to be low, with snowmobile routes occurring at a density of 0.32 mi/mi^2, and non-motorized over-snow routes at a density of 0.18 mi/mi^2. Furthermore, impacts from

these routes on patches of persistent snow habitat is also limited. Route density in persistent snow habitat is low: 0.37 mi/mi^2 for snowmobile routes and 0.07 mi/mi^2 for non-motorized routes. However, effects from these routes expand to areas adjacent to and accessed by those maintained over-snow routes. As noted above and in Figure 3-64, the majority of source habitat is with a Semi-Primitive Motorized designation, which would permit off-trail motorized over-snow travel and access. Wolverines are noted as being sensitive to disturbance at den sites and may move kits in response. The forced move may reduce parental care or encourage use of a less protected site that impacts survival of young. For species that may be sensitive to disturbance, the presence of humans may limit the availability of den sites. A direct tie between roads and trails that provide access and the potential for presence of humans in wolverine habitat during the denning period is possible.

Alternatives B and D would not change the current winter recreation designations, thus maintaining the current risk of disturbance. Alternatives C, E, and F would incrementally improve the cumulative effects from motorized disturbance risk through the additional area designated as Semi-Primitive Non-Motorized. However, the extent of that improvement would be minor, largely due to the relatively small number of acres of designation change and the limited amount of source habitat affected by that change.

No changes to motorized or non-motorized over-snow routes would be proposed under the action alternatives in the project area of cumulative effect analysis area.

The CuMo Exploration Project would implement the construction and use of temporary roads to facilitate minerals exploration activities. In addition to road work, exploration would also involve the operation of drilling equipment and associated support vehicles on those temporary routes. Effects to wolverine were assessed in that analysis, with the identification of potential disturbances to isolated patches of persistent snow source habitat occurring in late spring. This disturbance would potentially affect source habitat that is connected to the project area, and thus could add cumulatively to effects associated with this project.

The action alternatives would have minimal or no change to effects from winter over-snow recreation and access to source habitat, and no change is proposed to routes providing over-snow access. Actions would generally not occur during critical winter/late spring months in association with high-quality denning habitat. There would be an incremental improvement in effects associated with motorized over-snow recreation under Alternatives C, E, and F with the designation of additional Primitive Non-Motorized areas associated with the non-motorized trail system. Cumulatively, the effect would be a negligible improvement for the reasons described above.

Determination

Implementing Alternatives B, C, D, E, and F may impact individual wolves, but would not lead toward a trend of federal listing or loss of viability.

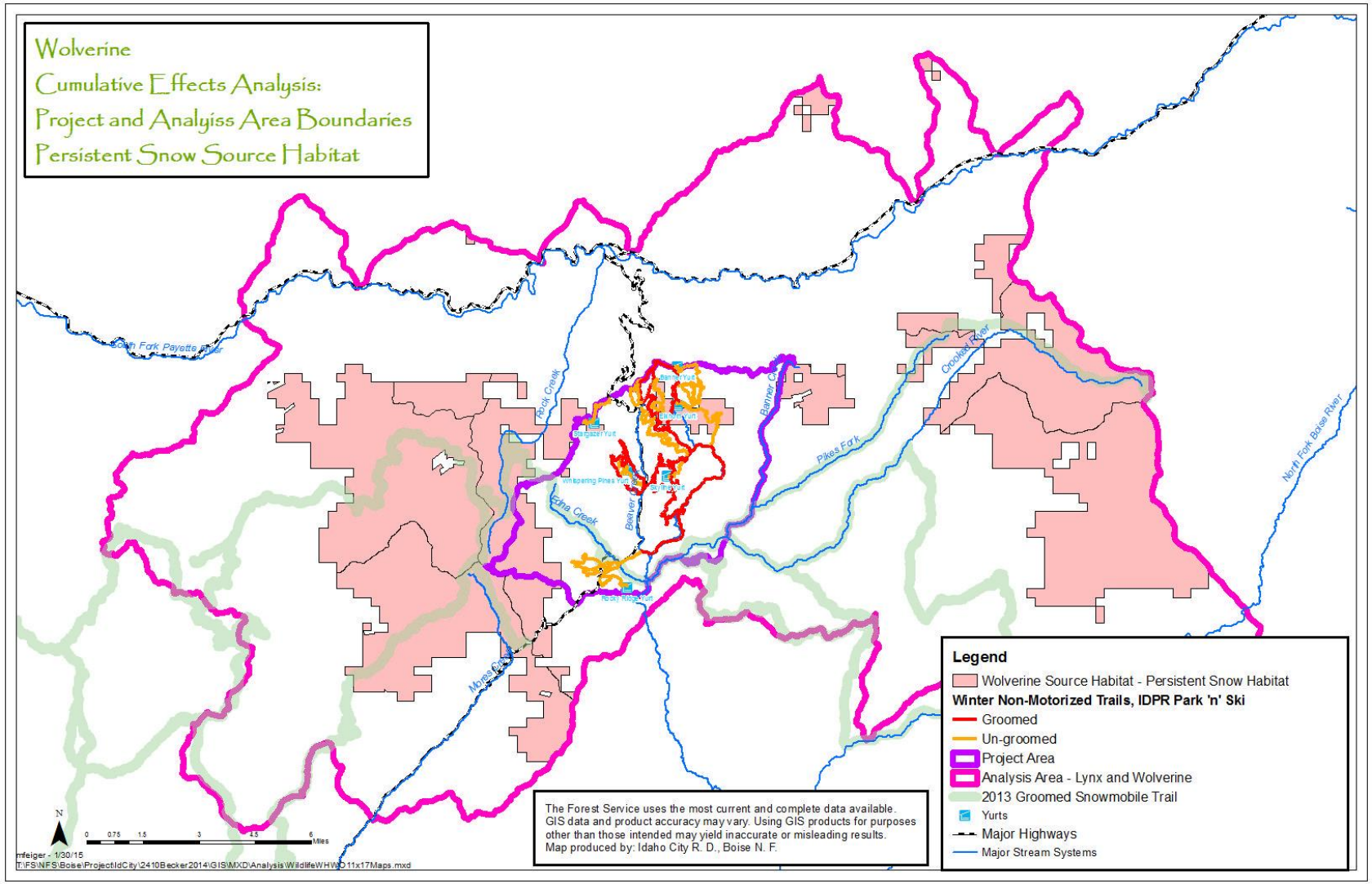


Figure 3-63. Wolverine analysis area with persistent snow source habitat and existing trail over-snow trail system

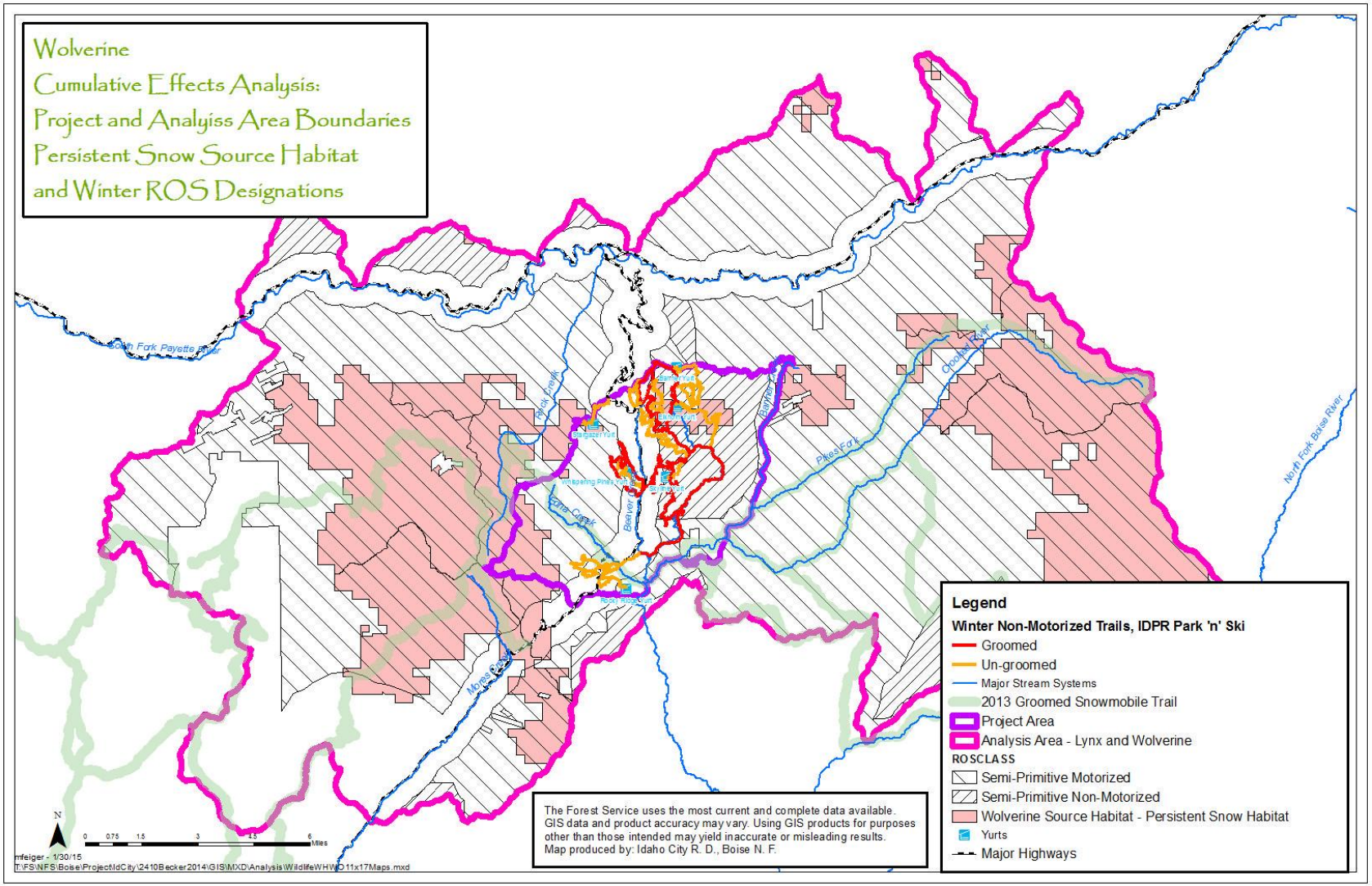


Figure 3-64. Wolverine analysis area with persistent snow source habitat, winter Recreation Opportunity Spectrum designations, and existing trail over-snow trail system

3.5.2.4 Family 5—Forest and Range Mosaic

Family 5 species use a broad range of forest, woodlands, and rangelands as source habitat (Wisdom et al. 2000). Source habitats occur in all PVGs and structural types, as well as woodland and non-forest types. Human disturbance is a primary factor affecting some species as is altered fire regimes (Wisdom et al. 2000).

Four species are included in this section: gray wolf, peregrine falcon, Rocky Mountain bighorn sheep, and Rocky Mountain elk. Of these species, bighorn sheep do not occur within the analysis area due to the lack of source habitat. Peregrine falcons may utilize the area for foraging; however, suitable nesting sites (tall cliffs) are not present. The remaining two species are big game species and habitat generalists

Rocky Mountain Elk

Analysis Scale and Population Background

Cumulative effects were analyzed within a 103,271-acre analysis area, which includes the larger Crooked River watershed and portions of the South Fork Payette and North Fork Boise River basins (Figure 3-65). This larger analysis area was selected to encapsulate summer and winter range lands used by elk inhabiting the project area. It also encapsulates several recent large fire disturbance events to demonstrate the effect of those disturbances on the elk distribution and vulnerability. The direct and indirect effects analysis area is the 19,327-acre project area. The project area includes private and NFS lands. The project area lies within the Boise River Elk Management Zone (GMU 39), which also comprises the majority of the analysis area (Figure 3-65). For the Boise river Elk Management Zone, elk numbers are above population objectives established by the Idaho Department of Fish and Game (IDFG) and have been increasing since 2008 (Table 3-76).

In addition to the Boise River Elk Management Zone, the analysis area contains a portion of the Sawtooth Elk Management Zone, including GMUs 33 and 35 (Figure 3-65), which include important elk breeding, calving, summering, and wintering areas in units along the South Fork Payette River. Elk that inhabit the project area are important contributors to the Sawtooth Elk Management Zone's desired population objectives. For the Sawtooth Zone, elk numbers are below population objectives established by the IDFG (IDFG 2014a, p. 106; IDFG 2010b, pp. 32 and 35; Table 3-77). Bull numbers and ratio to cows are also below IDFG objectives. Populations have declined, although population trends have recently improved. Calf-to-cow ratios are well below normal for the herd and of concern (IDFG 2014a, 2010b; Table 3-77). Wolf predation appears to be the leading source of [predation] mortality for elk in the Sawtooth Zone (IDFG 2010b, p. 34). Elk habitat issues noted by IDFG for the Sawtooth Zone include the effects of high road densities on elk vulnerability in some areas and degraded winter range conditions from heavy rush skeletonweed infestations.

Within the project area, elk occupy habitats from May (the start of calving) through October and November when individuals leave for winter range habitats to the north and south. Limited radio collar data indicate local elk populations winter in the lower Boise River and the North Fork Boise River areas and in the South Fork Payette River basin in the Lowman-Kirkham Hot Springs area (IDFG 2014b).

Within the project area, elk are meeting or exceeding population objectives established by Idaho Department of Fish and Game (IDFG) (IDFG 2014a, p. 109; Table 3 2). Bull-to-cow ratios are also within IDFG objectives, and calf to-cow ratios are within productive ranges for the herd (IDFG 2014a; Table 3 2).

Table 3-76. Winter elk population statistics specific to Boise River Zone (IDFG 2014a, p. 109)

Total Population	Current Objective[a]	2015[b]	2011[a] Status	2008
		7769	7275	6901
Cows	3200–4800	5417	4971	4216
Bulls	650–950	1035	916	962
Adult Bulls	375–575	587	NA	NA
Bulls:100 Cows	18–24	19	18	23
Adult Bulls:100 Cows	10–14	8	NA	NA
Calves	NA	1317	1388	1106
Calves:100 Cows		24	28	26

[a]Surveys are conducted every 3 to 5 years. Objectives apply to most recent survey year.
[b]Unpublished data based up January 2015 winter range surveys.

Table 3-77. Winter elk population statistics specific to Sawtooth Zone (IDFG 2014. p. 106; IDFG 2010b. p. 35)

Total Population	Current Objective[a]	2013[a] Status	2008
		3646	3456
Cows	3000–4500	2396	2696
Bulls	630–945	324	251
Adult Bulls	360–540	NA	82
Bulls:100 Cows	18–24	14	9
Adult Bulls:100 Cows	10–14	NA	3
Calves	NA	926	509
Calves:100 Cows	NA	38	19

[a]Surveys are conducted every 3 to 5 years. Objectives apply to most recent survey year.

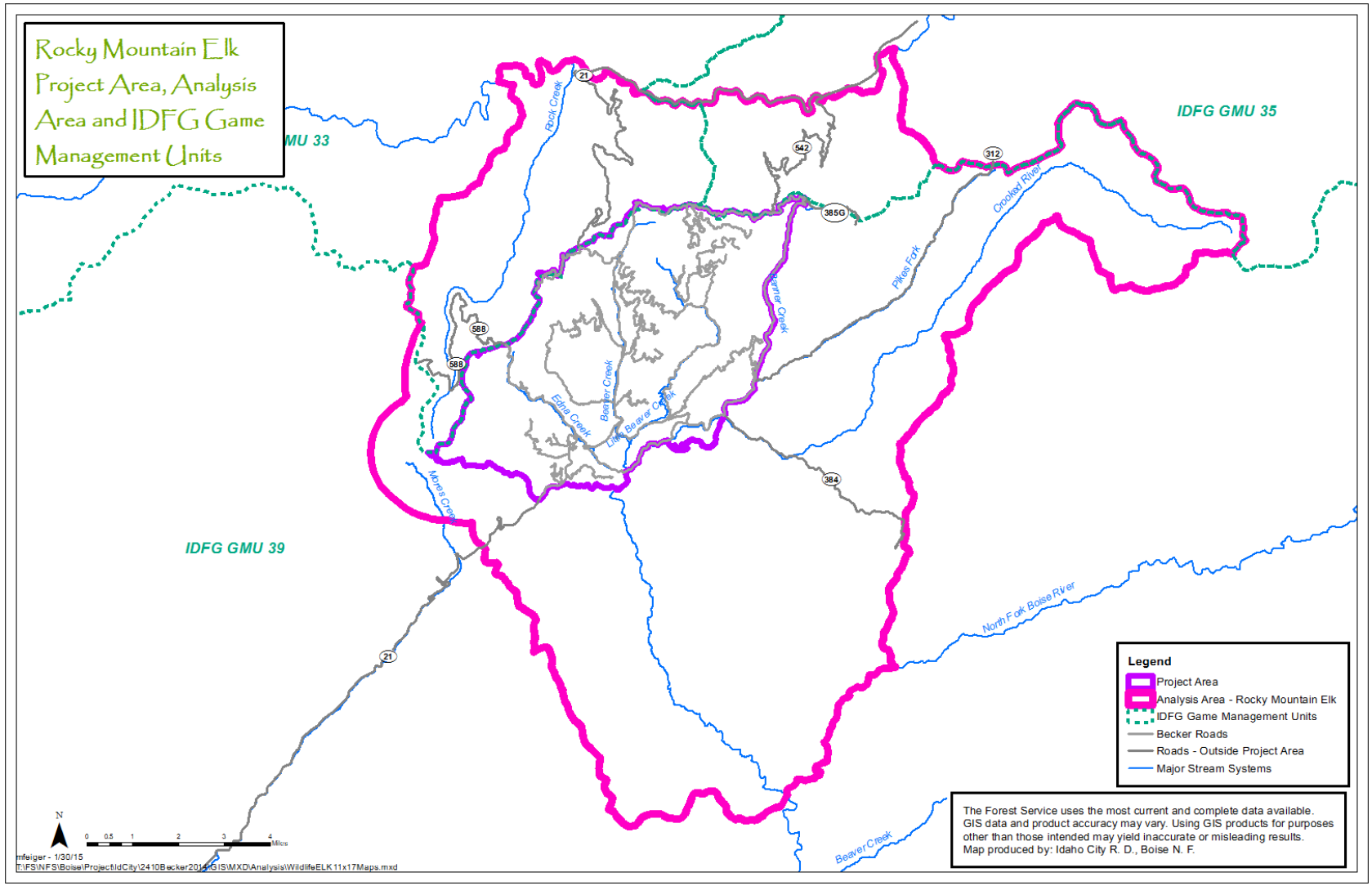


Figure 3-65. Elk analysis area and project area

Indicator 1: Nutritional Condition

Concern: Nutritional condition is important in population productivity (Cook 2002; Cook et al. 2003; Cook et al. 2005, Cook et al. 2013; Johnson et al. 2005). Nutritional condition of all components of an elk population affects the overall productivity of a population, whether it is measured in breeding effectiveness of bulls (Noyes et al. 2005), reproductive success of cows (Cook et al. 2013), or survival of calves to their first year (Cook et al. 2003; Cook et al. 2013). Nutritional condition is heavily influenced by the ability to acquire high quality forage and convert that forage to an improved physical condition and fat stores that enable individuals to survive and thrive through energy-draining time periods, such as the rut, parturition (birth) and lactation, and over wintering. Actions that reduce the quality, quantity, and or distribution of forage can negatively affect nutritional condition. Actions that affect an elk's ability to forage or rest undisturbed can decrease fat storage and nutritional condition as the flight response to disturbance utilizes energy that was accumulated. These effects to nutritional condition can be detrimental to overall population productivity.

Measures:

- Disturbance risk analysis
- Route density and distribution of NFS roads and motorized and non-motorized trails
- Qualitative assessment of vegetation treatments as it relates to forage quality

Summer range habitat and susceptibility to disturbance and displacement effects from late-spring through late-October are used to measure nutritional condition. Summer-autumn habitat is used by elk from late green-up (May) through early fall (October/early November) and provide important nutrition for lactating cows, growing yearlings and calves, and building fat reserves to carry animals through the winter (Cook et al. 2003). The nutritional quality of forage found on summer-autumn range also influences pregnancy rates of yearlings and lactating cows (Cook et al. 2003), thus affecting herd productivity.

An individual's ability to acquire sufficient nutrition and fat reserves is a function of the availability and nutritional quality and abundance of food resources and the ability to put those resources toward fat reserves and body mass versus consuming them. Access to adequate foraging areas with minimal disturbance is important for elk survival and population maintenance and growth (Cook et al. 2013).

Two components of summer-autumn range were considered: density and distribution of roads and trails open to motor vehicles and non-motorized recreation and the quality abundance and distribution of forage habitat. The motorized and non-motorized use of summer-autumn range is the primary vector for disturbance and displacement effects of elk on summer range. A variety of factors affect forage habitat, including species composition (including the presence of noxious weeds), disturbance influences, and the condition of forested canopies above the forage.

Affected Environment

Disturbance Risk Analysis

Rowland et al. (2005) established a model for assessing the risk of disturbance and effects to elk distribution effects from motor vehicle use of open roads. Wisdom et al. (2005b) further described the effect of recreational activities, including mountain biking, hiking, and horseback riding on disturbance and distribution of elk. This analysis utilizes the model

described in Rowland et al (2005) but incorporates motorized trails, and non-motorized recreational activities as described in Wisdom et al. (2005a,b). The modified model stratifies the project area into four distance bands radiating from roads and motorized trails open to motor vehicles and non-motorized trails. Each band is assigned a risk rating:

- *High Risk Disturbance*: Area within 0–600 meters from an open road, motorized trail, or non-motorized trail; represents an area where elk are highly susceptible to disturbance and displacement effects.
- *Moderate Risk Disturbance*: Area within 600–1200 meters from an open road, motorized trail, or non-motorized trail; represents an area where elk are moderately susceptible to disturbance and displacement effects.
- *Low Risk Disturbance*: Area within 1200–1800 meters from an open road, motorized trail, or non-motorized trail; represents an area where elk have a low susceptibility to disturbance and displacement effects.
- *No Risk Disturbance*: Area further than 1800 meters from an open road, motorized trail, or non-motorized trail; represents an area where elk are otherwise not disturbed or displaced by motor vehicle or motorized and non-motorized recreation.

These distance bands spatially depict disturbance risk and displacement effects of motorized and non-motorized roads and trails in the analysis area. Such disturbances often result in flight or other avoidance behaviors which expend energy, as opposed to resting or foraging (energy conserving). Those disturbances may also negatively affect reproductive success. The model results also provide a means for assessing when elk may be displaced, and to where. This can then be used to assess effects on access to forage and calving habitats within the project area.

Density and Distribution of National Forest System Roads and Motorized and Non-Motorized Trails

National Forest System Roads—The presence and human use of roads can affect elk use of summer-autumn habitat. Effects include changes in distribution and access of certain habitats and changes to behaviors and day-to-day activity (e.g., foraging, resting, travel, and movement). Studies have demonstrated a decline in the use of 400 meters to over 2,800 meters (0.25–1.8 miles) of habitat adjacent to roads, depending on the amount and kind of traffic, quality of the road, and density of cover adjacent to the road (Lyon and Christensen 2002, p. 567). Rowland et al. (2000) and Wisdom et al. (2005a) found that traffic affects elk up to 1,800 meters from roads. In general, elk preference and use of habitat increases strongly as distance to open roads increases (Rowland et al. 2000; Rowland et al. 2005; Wisdom et al. 2005a). Studies have also shown changes in elk behavior in response to motor vehicle use of roads, with a decline in the amount of time spent resting and foraging and an increase of time spent traveling and being alert (Ciuti et al. 2012; Rowland et al. 2000; Wisdom et al. 2005a). In summary, motor vehicle use of roads can displace elk from habitats closer to roads, depending on the frequency and duration of the disturbances. Disturbance can also affect elk behavior, including feeding, resting, and movement patterns, within various distances from roads.

Motorized Trails—Multiple studies at the Starkey Experimental Forest and Rangeland in Oregon have looked at the response of elk to recreational all-terrain vehicles (ATVs) in

forested landscapes. Wisdom et al. (2005b), Preisler et al. (2006), and Naylor et al. (2009) found elk response to ATV use within the study area, with elk exhibiting disturbance behavior (increased movement patterns and displacement from areas of disturbance) at distances greater than 2,000 meters with full sized motor vehicles use on open roads. Preisler et al. (2006) found elk movement patterns and habitat selection were affected at more than 1,000 meters from ATV use, the disturbance distance increased when near an actively used route. Naylor et al. (2009) found similar responses of elk to ATV-related disturbances. Similar to motor vehicle disturbances associated with roads, ATV use caused changes in behavior, movement and distribution patterns. One study in particular explored behavior changes as they related to the disturbance, the time of day the disturbance occurred, and the period of time for which disturbance-associated behavior persisted (*ibid*). With ATV treatments, they found elk spent more time moving and less time foraging and resting. Researchers also found a displacement effect with multiple passes during a day, resulting in elk occupying habitat further and further from the routes used by ATVs (*ibid*). Preisler et al. (2006), Wisdom et al. (2005b), and Cuiti et al. (2012) affirmed the displacement effect of ATV use on elk, particularly with repeated exposures from the same routes. As with roads, motor vehicle use of trails can displace elk from habitats closely associated with those trails and modify behaviors (feeding, resting, and movement) of elk within a range of distance from those routes.

Non-Motorized Trails—Naylor et al. (2009) and Wisdom et al. (2005b) also studied nonmotorized recreational use, and the effect on elk behavior, disturbance, and distribution. Both studies found similar responses from elk to hiking, horseback riding, and mountain biking to those documented for ATVs. Slight-to-substantial differences in elk responses to the different activities were noted. For example, the distance for which a disturbance response was detected was considerably less for hiking (~700 meters), horseback riders (~1,100 meters), and mountain bikers (~1,500 meters) (Wisdom et al. 2005b). Likewise, Naylor et al. (2009) found differences to behaviors in response to different activities with mountain biking causing the greatest increase in time spent moving and reduction in time spent foraging or resting. A similar finding was noted for hiking. Horseback riding, however, had little-or-no effect on foraging or resting activity (Naylor et al. 2009). Ciuti et al. (2012) found similar responses of flight, increased vigilance, and other changes in behavior in response to human foot travel associated with hunting. As with motorized use of roads and trails, non-motorized use of routes has the potential displacement and behavior modification of elk across a landscape in relation to those activities.

NFS roads and non-motorized trails as well as unauthorized nonmotorized routes are present and distributed across the project area. Administrative and recreational use of this infrastructure may affect elk occupying the project and analysis areas. Because of the similar nature of effects on displacement and changes in behavior to elk from the various uses of the roads and trails, coupled with the interconnected nature of the infrastructure, roads and trails were considered together in describing effects of changes to this infrastructure to elk.

Road and Trail Density and Distribution—Figure 3-66, Figure 3-67, and Figure 3-68 display the disturbance risk analysis for two different time periods for the project area and the analysis area. The disturbance risk analysis models the distribution of roads and associated disturbance risk bands for all routes open to motorized and non-motorized traffic and recreational use in the respective areas. Two time periods are displayed in these figures and were considered in this analysis:

- June 16–September 14: All routes open to motor vehicle travel as designated for each route
- September 15–June 15: Routes identified on MVUM as Seasonal Designation are closed to motorized travel of any type during this timeframe. Identified routes are open to non-motorized travel.

These time periods distinguish seasonal closures on designated roads and motorized trails. The seasonal closures prevent disturbance and displacement issues and vulnerability to hunting mortality associated with motor vehicle traffic.

As noted above, elk responses to disturbances varied by activity, with slight-to-substantial differences between the magnitude of effect and the degree of disruption of behaviors. To simplify the model, the disturbance parameters for passenger vehicles was used to represent all potential disturbance effects, recognizing that for some recreational activities (e.g., hiking and horseback riding), a substantial over-estimation of magnitude of effect would occur. The relevance of that potential over-estimation is discussed below.

Route density for roads and non-motorized trails in the project area is high (Table 3-78). Figure 3-66 displays the distribution of those roads and trails and the disturbance risk band assessment associated with those routes. Non-motorized routes include the routes managed by Idaho Department of Parks and Recreation (IDPR) through their Park and Ski Program.

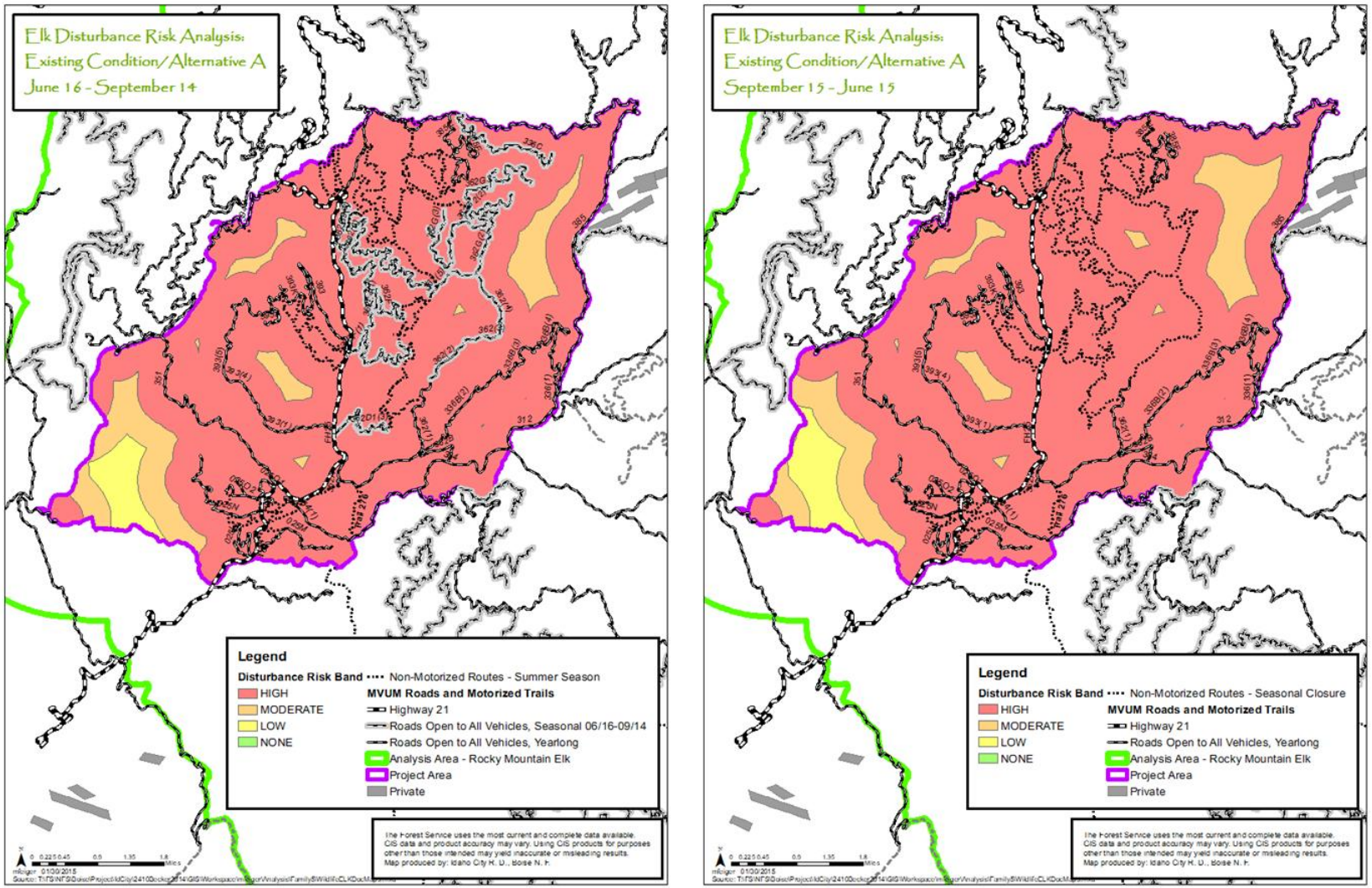


Figure 3-66. Disturbance Risk Analysis (June 16-September 14 and September 15-June 15) for the project area

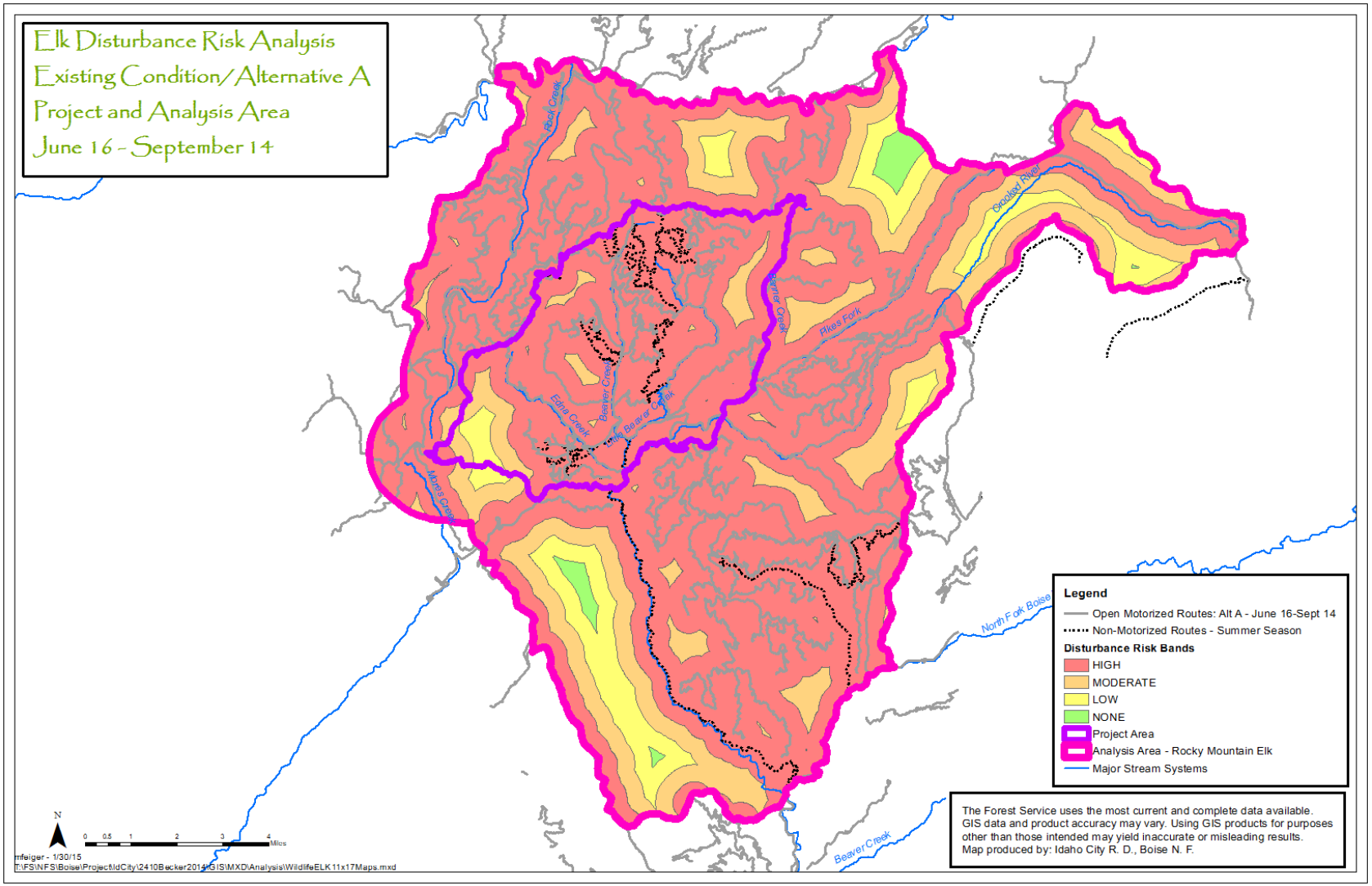


Figure 3-67. Disturbance risk analysis (June 16–September 14) for the project and analysis areas

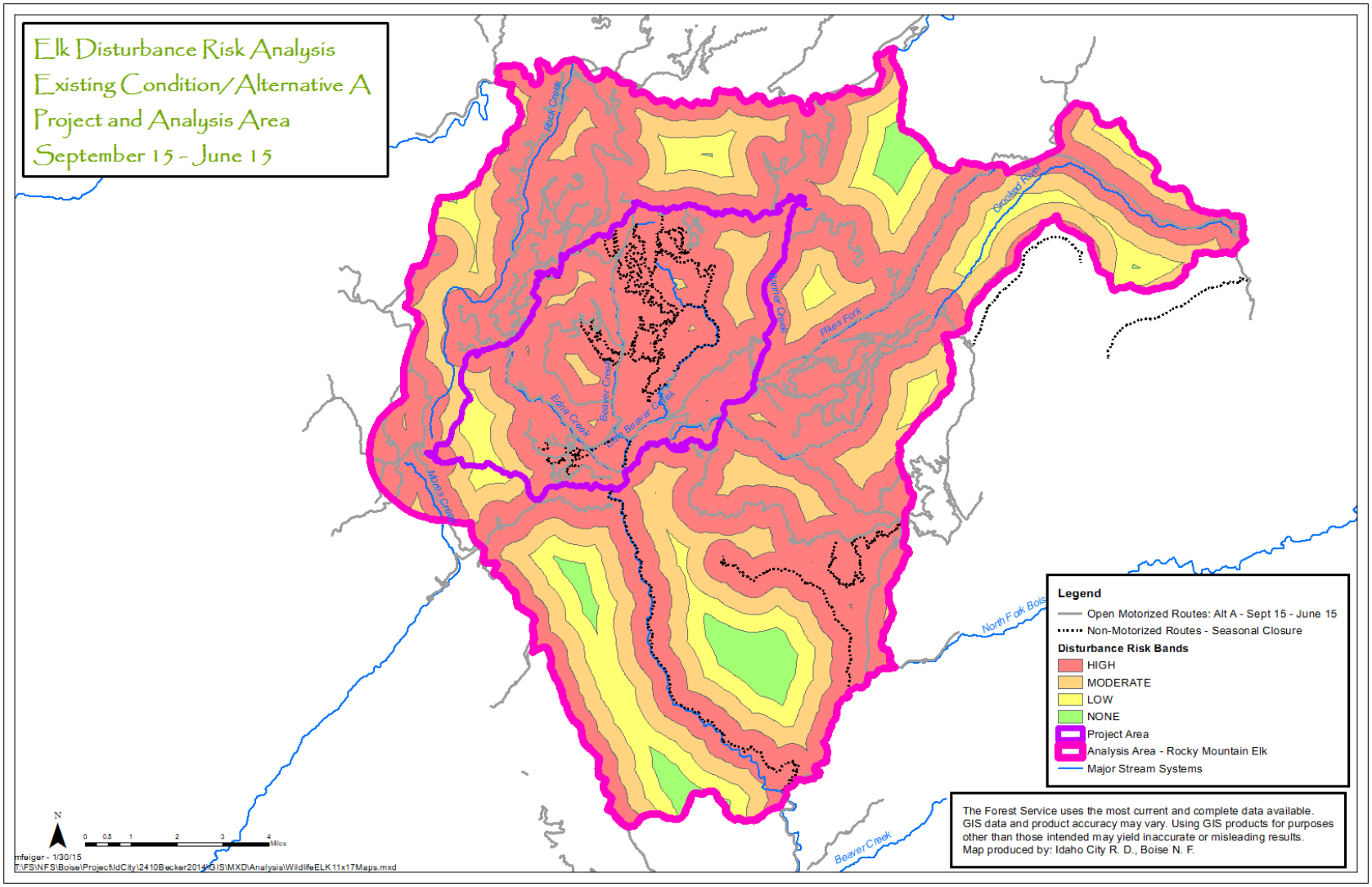


Figure 3-68. Disturbance risk analysis (September 15-June 15) for the project and analysis areas

Table 3-78. Summary open road and open route densities in the project area

Time Frame	Motorized Routes Only	Motorized and Non-Motorized Routes	IDFG Desired Density (IDFG 2014a)
June 16–September 14	2.88 mi/mi^2	3.95 mi/mi^2	0.7-1.7 mi/mi^2
September 15–June 15	1.99 mi/mi^2	3.54 mi/mi^2	

Figure 3-67 and Figure 3-68 display the distribution of disturbance risk bands across the analysis area, which includes the project area, and Table 3-79 summarizes the open road and motorized and non-motorized route densities for the analysis area. Similar to the project area, road and all open route densities are particularly high during the summer when no routes are restricted. The effect of seasonal road closures, however, is evident, with a large block of *Low* and *No Risk of Disturbance* available from September 15 to June 15 in the south end of the analysis area.

Table 3-79. Summary open road and open route densities in the analysis area

Time Frame	Motorized Routes Only	Motorized and Non-Motorized Routes	IDFG Desired Density (IDFG 2014a)
June 16 – September 14	2.96 mi/mi^2	3.36 mi/mi^2	0.7–1.7 mi/mi^2
September 15 – June 15	1.96 mi/mi^2	2.47 mi/mi^2	

In comparing the project area to the analysis area, densities of all motorized and non-motorized routes open to travel in the project area are much higher than those in the analysis area, particularly in the fall and spring (September 15–June 15) indicating how the project area's high density of roads and other accessible routes influences elk habitat and elk productivity of the larger analysis area, and indeed the Boise River and Sawtooth Elk Management Zones.

All road densities in the project area and the analysis area exceed the recommended densities from IDFG's Elk Management Plan (IDFG 2014a). As noted in that Plan, high road densities and the disturbance effects associated with them have consequences to elk productivity, summarized by the indicators assessed in this analysis (IDFG 2014a). The distribution of these open roads and non-motorized routes result in very few areas being identified as *Low* or *Moderate Risk* of disturbance and displacement effects, and no areas of *No Risk* in the analysis area (Figure 3-66, Figure 3-67 and Figure 3-68).

Figure 3-69 compares the project area to that of the larger analysis area relative to the percent distribution of the different disturbance risk areas. Most notable in both figures are the presence of a greater amount of *Low* and *No Risk* disturbance areas in the larger analysis area, particularly during seasonal closure periods. Note the relative difference in percentages in each risk band, particularly in the *High Risk* category. In the project area, 89% and 87% of the area have a *High Risk of Disturbance* and displacement, and none of the area has *No Risk* of disturbance and displacement (Figure 3-69). Conversely, across the larger analysis area, 74% and 63% of the area have a *High Risk of Disturbance* and displacement, and 1% and 3% have *No Risk* (Figure 3-69). This comparison of risk distribution highlights the high density of motorized and non-motorized routes within the project area and the potential effects that use of those routes could have on elk residing there. Perhaps more importantly, nearly 90% of the project area is within the disturbance risk influence of all recreational activities considered (hiking, horseback riding, mountain biking, ATV, and passenger vehicle; *High Risk* area), and 97%–98% of the project area is within disturbance risk areas influenced by all

actions but hiking (*Moderate* and *High Risk* areas), and all of the project area is within the disturbance risk influence for ATV and passenger vehicle use (Figure 3-69).

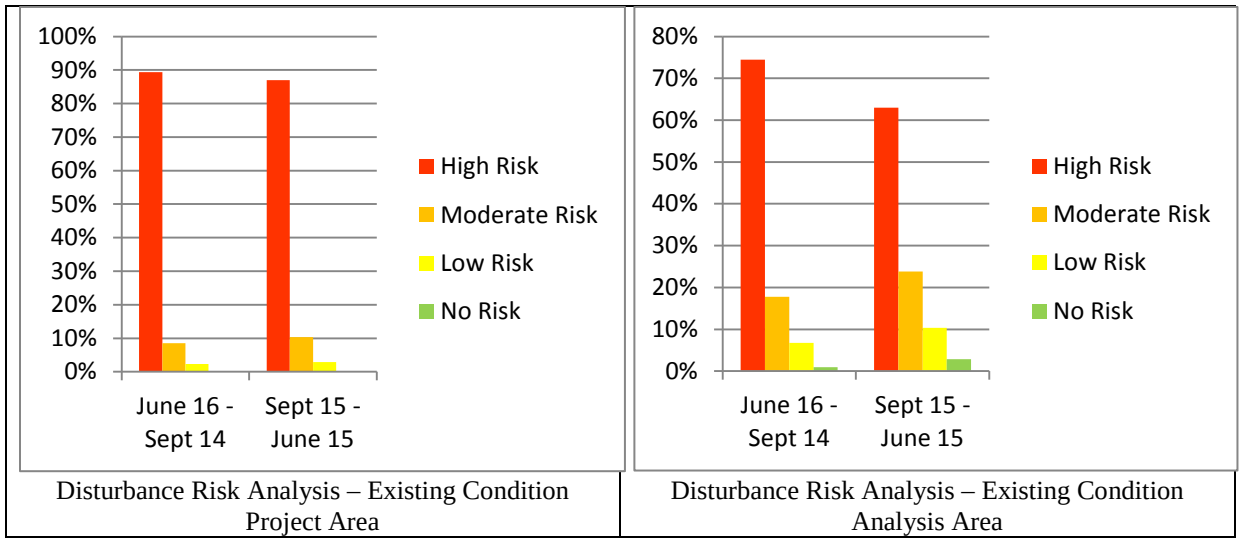


Figure 3-69. Current disturbance risk analysis for the project and analysis areas

Forage Quantity, Quality, and Distribution

Forage habitat in the forested environment is influenced by a variety of factors that affect the amount, condition, quality, and distribution of forage species available to elk. Forage preferences for elk are heavily weighted to herbaceous forage types (grasses, sedges, and forbs), with seasonal or sporadic use of browse forage (shrub and woody plant species) to supplement their diet (Cook et al. 2002). As such, the development of forest canopies both in their complexity and total canopy closure affect forage quality (Skovlin et al. 2002). In general, more open, earlier successional and or recently disturbed forest stands produced the greatest diversity and quantity of herbaceous forage, and is generally beneficial for browse species as well (*ibid*). Human disturbances in the form of vegetation management actions (e.g., timber harvest, forest thinning) and fuels treatments (e.g., activity fuels treatments, prescribed fire application) often improve forage condition from opened canopies and or the stimulation of growth from fire (Skovlin et al 2002, Lyon and Christensen 2002). Natural disturbances modify forest canopies, often improving forest conditions. Wildfire events, which often result in opening the forest canopy, increase the quantity and diversity of forage species. Fire itself is also a stimulating disturbance that results in new growth for most of the forage species present in the project area. The mixture of burn severities that can result from naturally occurring fires creates a desirable balance of forage and resting or security cover habitats that benefit elk (Skovlin et al. 2002). Larger scale insect and diseases outbreaks can sufficiently modify the canopy to enhance forage conditions as well. Generally, however, these disturbances occur on a much smaller scale than fire events in mixed fire regimes.

The project area is largely comprised of forested environments described in more detail in the vegetation technical report (project record) A variety of forest types are present, generally comprised of lower to mid-elevation PVGs and associated habitat types. In earlier successional and open canopy conditions, a wide variety of herbaceous and browse forage species are present and abundant. Forage species include pine grass, elk sedge, various forbs, antelope bitterbrush, choke cherry, bitter cherry, nine-bark, snowberry, huckleberry,

gooseberry, aspen, Scoular's willow, and other species. Exact mixes of species depend on the habitat type at any one site.

Forest Conditions and Disturbance Influences—Past and present disturbances in the forested habitats are a prevalent feature in the project area, as well as the larger analysis area. Timber harvest, understory thinning, application of activity fuels and prescribed broadcast fire treatments, and minerals exploration activities have occurred across these landscapes, resulting in diverse successional stages and overall forest canopy conditions. Since 1980, approximately 31,830 acres (30%) of forested habitat has been affected by vegetation management actions in the analysis area. Substantial variability exists in the extent of forest canopy modification from those actions, with some actions removing very little live canopy and others removing extensive understory canopy. Figure 3-70 displays the historic vegetation management and fire disturbances since 1980 that occurred within the analysis area.

Natural disturbances are also prevalent in both the project area and analysis area, with large scale high and mixed severity fires occurring in portions of the analysis area since the early 1980s. Within the analysis area, 42,430 acres (41%) have been affected by fire disturbances. Figure 3-70 displays the general 'footprint' of those natural disturbances across the Project and analysis areas since 1980. All told, 71% of the analysis area has been affected by habitat-modifying disturbances in that time period.

An important component of forage habitat utility and effectiveness is the relationship of security cover patches for which elk can retreat into and rest and reduce their risk of detection by predators. Thomas (1979), and Skovlin et al. (2002) suggest a desirable distribution and juxtaposition of security cover to forage habitat exists that most benefits elk. Ideally, patches of each would be located relatively near and in a balance of areas that provide for sufficient forage, security cover, and minimal travel distances to access both. Smaller scale disturbances or fire events that result in a highly patchy or mosaic distribution of fire severities achieve this outcome (Skovlin et al. 2002; Lyon and Christensen 2002). Large-scale, high-severity fires do not. The Lowman/Gold Fork/Sawmill Fires from 1989 and the Rabbit Fire in 1994 resulted in undesirable outcomes relative to the patchy and mosaic distribution of foraging habitat to security cover because they left little, if any, forest stand structure (Figure 3-70). Large patches of fires disturbances are evident in the larger analysis area. However, within the project area, a much more desirable patchwork and mosaic of fire-disturbed, management-disturbed, and undisturbed forest habitats exists, and is likely enhancing the quality of forage habitat within the project area.

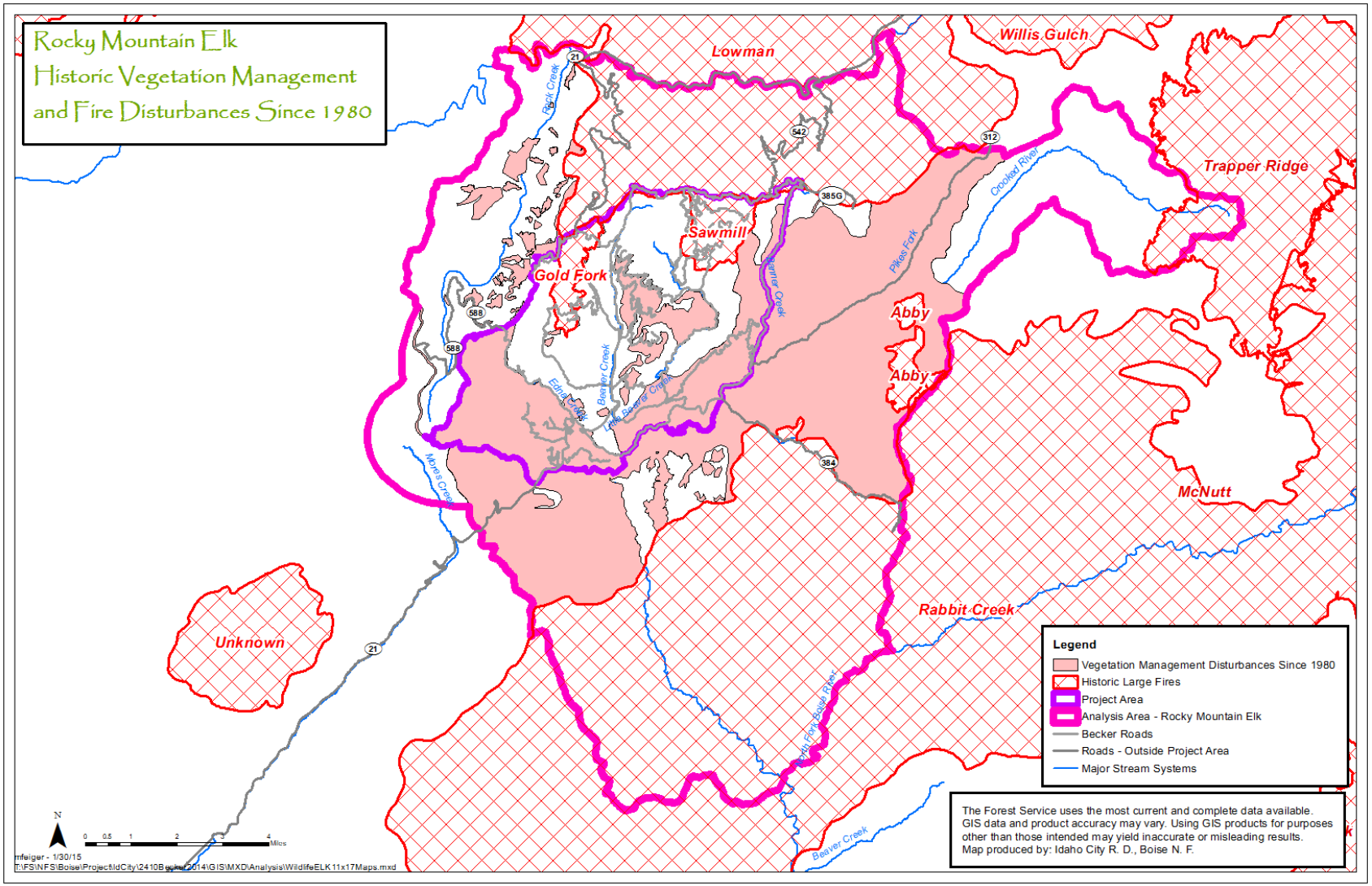


Figure 3-70. Historic vegetation management and fire disturbances since 1980

Wild and Domestic Herbivory—An additional factor that affects the quality of forage habitat for elk is the degree of wild and domestic ungulates herbivory on the landscape. Studies have found that native and domestic herbivory can affect the diversity and abundance of a wide variety of plant species in forested landscapes (Irwin et al. 1994; Riggs et al. 2000).

Shepherded sheep bands graze within the project area and larger analysis area. Because of the nature of sheep band movement on the landscape, substantial portions of the landscape are essentially ungrazed by domestic livestock. In those areas, the only herbivory that occurs is from elk and mule deer.

Noxious Weeds—Presence and abundance of noxious weeds can negatively affect forage quality and have been identified as a habitat issue in elk habitat (IDFG 2014a). Invasive plants have several negative ecological effects on elk habitat. These species displace native plants and have no or lower food value. In addition, they can alter normal ecological processes, such as nutrient and water cycling, and fire regimes (Cox et al. 2009).

The nonnative/noxious weeds technical report (project record) discusses the presence and distribution of noxious weeds. Within the project area, noxious weeds are located along NFS roads and unauthorized routes and within smaller patches of recent disturbance areas (e.g., logging landings, recent timber sale actions). Noxious weeds do not appear to affect forage habitat in condition, quality, quantity, and distribution. At the analysis area scale, noxious weeds are identified as an issue for habitat quality on winter range habitats near the South Fork Payette River on the north edge of the analysis area boundary (IDFG 2014a). Additional infestations are also present in the Rabbit Fire area, with an increased risk of establishment and spread due to that disturbance.

Direct and Indirect Effects

Alternative A

Alternative A would maintain the current transportation infrastructure present within the project area, included existing NFS roads and non-motorized trails, trailheads, and the unauthorized non-motorized trail network managed through an agreement with IDPR. Existing operational Maintenance Level designations for the road system would remain; existing routes would remain open to motorized travel in the project area. Existing routes would include specific season designations for access. No changes to management and maintenance of the existing infrastructure would occur, including management and maintenance of the unauthorized non-motorized trail network. IDPR would continue to maintain and operate those routes, including use by non-motorized recreation users. No vegetation management actions would occur under this alternative, including prescribed fire.

Disturbance Risk Analysis and Density and Distribution of National Forest System Roads and Motorized and Non-motorized Trails

Human disturbance through use of roads, trails and other recreational infrastructure can affect elk, elk habitat, and its use. Changes in elk behavior can affect their nutritional condition and their productivity. Consequences of changes in elk behavior are three-fold:

1) With repeated disturbances, elk will select habitats further from roads and trails, thus precluding or greatly reducing use of habitats closer to roads even though their quality may be high (displacement)

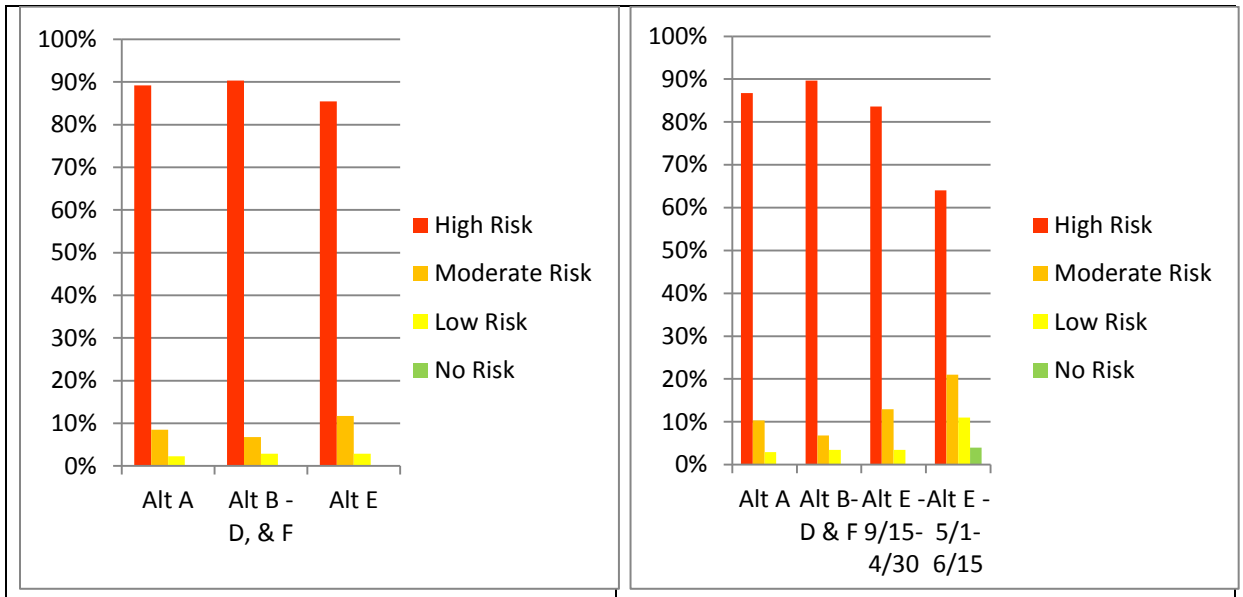
2) Time not spent foraging or resting results in a net reduction in forage consumed and energy and nutrients converted to fat reserves and overall nutritional condition over a period of time

3) Time spent in flight or alert movements increases energy consumed that would otherwise go towards fat reserves and overall nutritional condition.

Cumulatively, such effects in sufficient magnitude, intensity, and duration would lead to a reduced nutritional condition going into fall breeding seasons, winter seasons, and spring calving seasons (Cook et al. 2003; Johnson et al. 2005). This reduced nutritional condition can negatively affect winter survival and reproductive success (Cook et al. 2005; Johnson et al. 2005).

As described above, the project area was modeled for distance bands at intervals for passenger vehicles. This measure serves as an indicator for the risk of disturbance effects occurring with road and trail use (disturbance event). Elk occupying areas in the *High Risk of Disturbance* will likely be displaced and or demonstrate flight or alert behaviors in response to the disturbance event. As the distance from an elk to the disturbance event increases, the risk of displacement and or flight or alert behaviors decreases.

The greater the proportion of an area occurring within the *High Risk of Disturbance*, the greater the effects on elk inhabiting that area. As noted above, elk affected by disturbances associated with the road and trail infrastructure can be displaced from suitable habitat and or change behavior away from foraging and resting to flight and alert behaviors. These outcomes can negatively affect nutritional condition, which in turn could affect productivity. Figure 3-71 displays the distribution of habitat in the project area modeled to the different disturbance risk zones.



Disturbance Risk Analysis – Risk of Disturbance Project Area (June 16 – September 14)

Disturbance Risk Analysis – Risk of Disturbance Project Area (September 15 – June 15)

Figure 3-71. Alternative comparison: Disturbance risk analysis in the project area

As discussed above, a disproportionally high percentage of the project area resides within 600 meters of a road open to motorized travel or a non-motorized trail managed for non-motorized recreation and much of the Project area is susceptible to disturbance.

The intensity of effect of disturbance sources associated with road and trail infrastructure is a function of the type and frequency of disturbance. Figure 3-72 useful in classifying the intensity of the different disturbance sources as they compare to one another. Using the distance from disturbance source for which elk response to that disturbance is modeled, motorized travel has the greatest intensity of effect. Wisdom et al (2005a,b), Rowland et al. (2000), and Rowland et al. (2005) documented the greatest distances from a disturbance event in which effects to elk could be detected. The greater the distance in which a disturbance effect could be detected for elk, the greater the relative intensity of effect that particular disturbance source would be, and vice versa. Using Figure 3-72 as an indicator, motorized activities associated with full-sized and off-highway vehicles would have the greatest intensity of effect, followed by mountain biking, then horseback riding, and finally hiking. The frequency be which each action occurs within the project area, beyond anecdotal observations is largely unavailable. Exact numbers of full-sized motor vehicles, off-highway vehicles, mountain bikers, horseback riders, and hikers is not known. However, given the general proximity of the project area to State Highway 21 (Highway 21 bisects the project area), the infrastructure in place (trailheads and open routes available for all forms of disturbance sources identified), and the relatively close proximity to the Treasure Valley population center (60–85 miles to the Boise-Nampa-Caldwell area), it is safe to assume a relatively high frequency of use associated with the different disturbance sources is possible. Such a situation would indicate the potential for a high degree of intensity of effect to elk and access to suitable elk habitat.

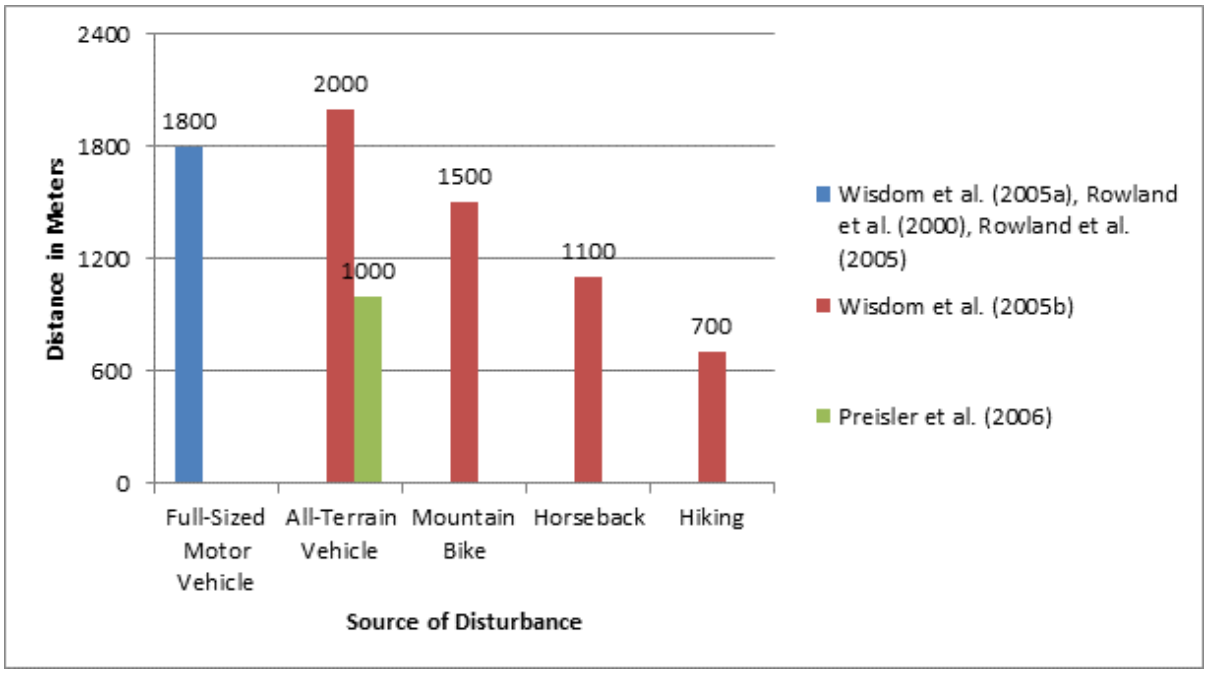


Figure 3-72. Comparison of disturbance effects from different disturbance sources—maximum distance from source

In absence of frequency data for the different disturbance sources, it is useful to look at the relative rate of occurrence the research detected effects. Research cited in this analysis found that a relatively low frequency of motorized and non-motorized disturbances can result in disturbance and displacement effects described (Naylor et al. 2009, Preisler et al. 2006; Rowland et al. 2000; Rowland et al. 2005; Wisdom et al. 2005a and 2005b). In each case, as little as one disturbance event (single hiker, mountain biker, horseback rider, ATV rider or other motor vehicle) can result in changes in behavior (increases flight/alert behavior; decreased foraging or resting behavior) and displacement away from routes. As little as one pass per day of motorized or non-motorized vehicles on a trail was found to induce behavioral changes, including increased alertness, increased movement and flight responses, and reduced foraging and resting periods. This low threshold for potential disturbance effects, coupled with the probability of a relatively high frequency of use based upon the location of the project area relative to Highway 21 and the Treasure Valley population center would indicate the intensity of effect has the potential to be high for elk occupying the project area.

This intensity of effect varies within different time frames and is relevant to the effects upon elk and their access and distribution to habitat. Two time frames of relevance include changes in intensity through a typical seven day period (calendar week) and seasonal variation within a calendar year. Within the seven day/calendar week time period, intensity varies as it relates to recreational use of the project area. This is reflective of the observed assumption that a greater density and intensity of people and their associated recreational use of open routes is greater on weekend days (Friday-Sunday) and less on early and mid-week days (Monday-Thursday). These effects, in part, reflect upon the frequency of disturbances during any one time frame, and how they contribute to the intensity of the effect. Naylor et al. found that the duration of effects of individual disturbance events were relatively short lived, with the study finding that within one to two hours after the disturbance event, normal, pre-disturbance behavior and activity resumed, although displacement from the source of disturbance did continue to occur (2009). These observations, however, were in response to a single event, whether it be a pass by a mountain biker, hiker, equestrian or motor vehicle. An increase in intensity with subsequent events within a 24 hour period would be expected to have similar effects for each event, spreading the duration of displacement and disturbance effects across longer and longer periods of any given day, depending upon the frequency and timing of those events. Similarly, the number of days, consecutive or otherwise, would also add to the duration of those effects of disturbance and displacement (Naylor et al. 2009).

Seasonally, the intensity of effects varies between summer months and spring and fall months. This is in large part due to changes in recreational effort and access to open routes, with greatest intensity during the summer months (mid-June through mid-September) when recreation presence is greatest and open route density highest; and least intensity in the spring and fall when recreation presence declines and route density is reduced (Table 3-78). As such, elk would be most susceptible to disturbance and displacement effects during the time frame from June 16 through September 14, when the greatest density of roads are available for travel (Table 3-78), and less susceptible from September 15 until snow limits access (usually late November to early December), and again in spring from roughly the end of March to June 15. During that time frame, both recreational presence and ‘effort’ are reduced, and the density of roads available for motorized access is lower. This trend is important, as the summer months listed as highest susceptibility of disturbance and

displacement effects corresponds with the time period identified as critical for acquiring fat reserves and overall nutritional condition improvement for elk (Cook et al. 2003; Cook et al. 2013).

This variation in intensity through a typical seven day period and through the seasons results in variation of effect both in disturbance of individuals and the displacement from source habitat closely associated with open routes. As expected, the greatest periods of such effects are during weekends, particularly during the summer months, while the periods of least effect would be early to mid-week and during the spring and fall seasons.

The duration of effect is considered in mid- (20 years) to long-term (greater than 30 years). The mid-term time frame captures expected changes in trend of use of the road and trail routes in the project area, while long-term time frame addresses expected changes in routes in the project area. In the mid-term, current trends of increases in recreational use of the project area would be expected. While currently not quantified, one can anticipate that increased non-motorized use of roads and trails would occur as more participants from the Treasure Valley seek additional opportunities to recreate (recreation technical report, available in the project record). Motorized recreation is likewise expected to follow similar trends. In the long term, the current motorized and non-motorized route system would likely be maintained, maintaining the current magnitude of effect and incremental increase in intensity over that time frame.

Forage Quantity, Quality, and Distribution

Existing forage habitat conditions, as considered in the context of quantity, quality, and distribution, would be maintained over the short term. Recent disturbance events would continue to provide diverse forest canopy conditions that would provide for diverse forage conditions and security cover near that forage habitat, making for an effective habitat condition across most of the project area.

In the mid-term, as forest canopies continue to develop into later seral conditions, those forest canopies would be expected to further develop, both in canopy closure and structure (project record), and as such, would likely incrementally degrade forage condition. The closure of canopies and additional conifer structure development in middle and lower canopies would restrict the productivity of forage species in the understory. Grasses, forbs, and shrub species would become less abundant, diverse, and productive, which would reduce the quantity, quality, and distribution of forage habitat for elk inhabiting the project area. These conditions would be expected to continue to develop into the long term. With less forage habitat of a reduced quality, a certain level of redistribution of elk would be expected occur, moving towards areas of earlier seral habitat conditions outside the project area.

In the long term, as forest conditions continue to develop into more advanced seral conditions, an increased risk of large-scale, uncharacteristic fire disturbances would develop (fuels technical report [project record]). Such an event is difficult, if not impossible to predict, however fire history over the past 25 years suggests such a disturbance is likely (fuels technical report [project record]). The consequences of such a disturbance as it relates to forage habitat is mixed. Such a disturbance would create an abundance of early seral forage habitat with a high degree of diversity and abundance. However, as demonstrated by recent large-fire events, such disturbances often reduce or eliminate security cover areas that are important in a mosaic mix of effective forage and cover habitat (Thomas 1979). While an

abundance of forage habitat may be present, much of it may be effectively inaccessible due to the lack of security cover. Overall, such a disturbance in the project area would be detrimental to forage habitat effectiveness and a substantial shift in elk occupancy out of the project area would be anticipated.

All Action Alternatives

Actions associated with implementing the proposed actions and associated design features (Chapter 2) could disturb and displace elk from habitat within and adjacent to those activities. Displacement effects would vary in magnitude, depending on the timing and acres of habitat disturbed on any given year. The wildlife technical report (project record) gives a general description of the expected timing and sequence of implementation of vegetation and activity and natural fuels treatments for each alternative. Approximately 13,428 acres (Alternatives B, C, E, and F) or 13,610 acres (Alternative D) would be implemented over 10–15 years. Roads and culvert treatments would be generally distributed in those areas of disturbance. Effects from activity-related disturbances would occur over the 10–15 years of implementation, resulting in short-term disturbance-related effects and possible displacement of individuals in the population, depending on the type of activity occurring.

The intensity of disturbance and displacement effects are activity specific. Vegetation treatments involving saws, mechanized harvesting equipment, and vehicles traveling existing, temporary, and currently closed roads would have the greatest intensity of disturbance effects. Intensity of effects from fuels treatments would be relatively lower given the reduced level of mechanized-related disturbances and the shorter duration of individual actions when compared to vegetation treatments. Likewise, effects from implementing transportation-related actions would be somewhat lower given that few pieces of equipment would be used at any one time.

Forage Habitat

Forage habitat condition is an important indicator for overall nutritional condition of an elk population and calving success of cow elk and calves through one year of age. Forage habitat is identified as a measure for both indicators for effects to elk. Improved forage habitat across the project area would be anticipated by implementing the vegetation management and natural fuels restoration treatments proposed in all action alternatives. As noted in the "Affected Environment" section above, forage habitat condition is generally good, with a well-distributed and diverse forage condition across the project area. However, forest vegetation development in the absence of low-severity fire disturbances has led to habitats currently outside historic ranges of variability for species diversity, canopy closure, and large tree structure (vegetation technical report, available in the project record). The treatments proposed by the action alternatives seek to reverse that trend and would reduce canopy closures and alter species composition, which would benefit forage habitat quantity, quality, and distribution. Forage diversity would also increase. Applying prescribed fire treatments would stimulate herbaceous and browse forage, most of which are positive responders to fire disturbances.

The magnitude of effect is very similar between all alternatives, with only a slight (~1%) difference under Alternative D. Alternatives B, C, E, and F would affect 13,428 acres of forested habitats through vegetation management and natural fuels restoration treatments. Under Alternative D, 13,610 acres of forested habitat would be affected by those treatments.

Thus, 69% and 70% of the project area would be affected by the action alternatives. Figure 3-73 displays the location of proposed activities that would result in beneficial disturbances for forage habitats.

The intensity of the effects would largely the same under each alternative. Alternative E would have slightly fewer effects on canopy closures because of size limitations for trees removed from upper canopy levels. However, forage improvement would not be measurably different under Alternative E as canopies would be opened sufficiently for the desired improvement.

The duration of effects would extend into the midterm to long term, as the effects would be expected to persist for 20–25 years post treatment. Project implementation would being in 2016, with portions of the proposed activities being implemented annually through 2021. This staggering implementation would result in favorable forage conditions through the 2040 in portions of the project area.

Noxious weeds can affect forage quality, quantity, and distribution, depending on the level of infestation present. As noted in the “Affected Environment” section, noxious weed infestations are generally low and not negatively affecting overall forage quality in the project area. Though proposed actions can create opportunities for establishing and distributing noxious weeds (nonnative/noxious weeds technical report [project record]), Design features related to noxious weeds require implementation of actions designed to reduce the risk of noxious weeds establishment and expansion.

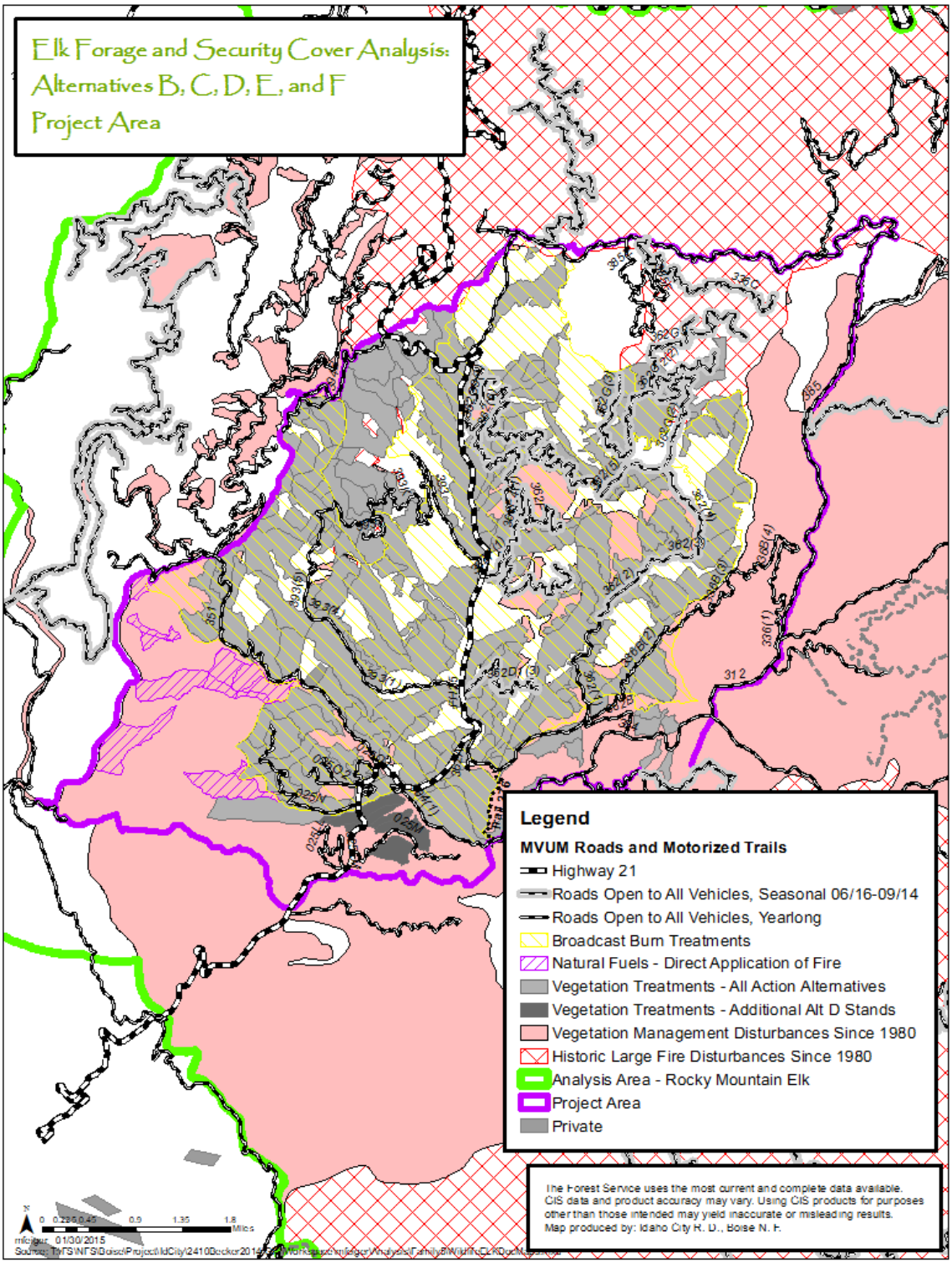


Figure 3-73. Elk forage and security cover analysis: past and proposed vegetation and fuels activities and large fire disturbances within the analysis area

Alternatives B, C, D, and F

Unique to Alternatives B, C, D, and F is the development and designation of motorized trail routes and the construction of a trailhead to support motor vehicle use of those trail segments. Implementing these actions would require using equipment and personnel to construct trail segments and or resurface existing road prisms to support trail beds on roughly 19 to 23 miles of trail proposed under these alternatives. Additional mechanized work would occur at the trailhead for all alternatives.

Effect intensity and magnitude would be limited, given that most of the routes proposed use existing road prisms and require using very little heavy equipment. Only 1.2 to 1.5 miles of trail would require equipment for constructing new trail segments. The remaining miles (17.6 to 21.8) would use minimal equipment and limited personnel with hand tools and chain saws to remove vegetation and move soil to prepare the trail surface. Constructing the trailhead would occur in a single location in an area moderately used by motor vehicles for public and administrative use.

Trail construction would take months and trailhead construction would take weeks. Disturbance and displacement would be short-term and limited to the time work occurred immediately adjacent to that habitat. Work would occur during the months of July, August, and possibly September.

Indirect disturbance and displacement would be associated with proposed transportation and recreation infrastructure development and modification, including modifying operational maintenance level classifications, decommissioning existing roads, constructing new roads, and relocating roads in the project area. Authorizing non-motorized trails (existing IDPR Park ‘N’ Ski routes) and designating motorized trail routes for motor vehicles less than 50 inches or 60 inches wide would also maintain or increase disturbance and displacement-related effects. Such effects have the potential to affect overall nutritional condition of animals in the project area.

The magnitude of effects changes slightly for both time periods considered (Table 3-80). For both indicators (Disturbance Risk Analysis and Road Density), the magnitude of effect increases roughly 1% to 3% (depending on alternative and timeframe) compared to Alternative A (Figure 3-71). This increase is reflective of a net increase in routes available for motorized and non-motorized travel for both timeframes.

The change in effect intensity would be substantial compared to the change in magnitude. Implementing Alternatives B, C, D, and F would change effect intensity in two ways:

- Through a redistribution of Risk of Disturbance areas across the project area from transportation system and access changes
- Through changes in the type of access (motorized vs. non-motorized) permitted on that transportation system during different time periods considered

The net increase and redistribution in areas of *High Risk of Disturbance* within the project area would occur because of the following actions and consequences:

- **Realignment of NFS road 392 in China Fork—**Redistributes a patch of habitat in a *Moderate Risk of Disturbance* from northeast of China Fork to southwest of China Fork as a function of the change in road segment location and the decommissioning of its current location in China Fork (year around effect) (Figure 3-75 and Figure 3-76)
- **Change from ML 2 to ML 2 Administrative Use Only for NFS road 025N—**Expands existing *Moderate* and *Low Risk of Disturbance* Areas south and south east in the general vicinity of the headwaters of Whoop 'em Up and Lamar Creeks (year around effect) (Figure 3-75 and Figure 3-76)
- **Designation of motorized trails for vehicles less than 50 inches or 60 inches wide (depending upon alternative) between Little Beaver Creek and Pikes Fork/Banner/Sawmill Creeks in the northeast third of the project area—** Eliminates the majority of a patch of *Moderate Risk of Disturbance* that occurs between Little Beaver Creek and Sawmill and Banner Creeks (seasonal effect, June 16–September 14) (Figure 3-75 and Figure 3-76)
- **Change from ML 2 to ML 2 Administrative Use Only for NFS road 394B—**Slightly expands a patch of *Moderate Risk of Disturbance* area in the headwaters of Beaver Creek and China Fork (year around effect or seasonal effect, depending upon alternative) (Figure 3-75 and Figure 3-76)

These changes would decrease miles of road open to motorized travel by 24.2 to 28.7 miles, depending upon alternative; however, with the designation of motorized trail routes, only a slight decrease in motorized access would occur under Alternatives B, C, D, and F (Table 3-80). The net reduction in route density would only be 0.1 to 0.2 mi/mi.^{2} (Table 3-80). When combined with the adoption or conversion of non-motorized routes, total route density would actually be maintained or increase by 0.1 mi/mi^2 compared to Alternative A.

The consequences of the redistribution of those routes would be the redistribution of areas in *High Risk of Disturbance* in three general geographic locations. The first, in the southwest corner of the project area, would see a reduction in the amount of *High Risk of Disturbance* areas as a result of the change in Operational Maintenance Level for the NFS Road 025N. The second, in the vicinity of China Fork of Beaver Creek, would redistribute the *Moderate Risk of Disturbance* patch from east to west of NFS Road 392. This would be a function of the relocation that road. Within the project area west of State Highway 21, a roughly net improvement (i.e. reduction in disturbance risk) would occur.

The last route, and of greatest concern, is located east of the NFS Road 362, east of Little Beaver Creek, in the NE 1/3 of the project area. It is here where the motorized trails would be designated, and would result in a substantial increase in the area in *High Risk of Disturbance*. East of State Highway 21, this redistribution of disturbance risk would result in a substantial increase in intensity of disturbance effects. This would be the result of a combination of a functional increase in motorized access and associated disturbance effects, particularly in an area that currently has little motorized access, and the overall net increase in route density in that portion of the project area.

The increase in intensity of effect would be greatest in the time frame of June 16 through September 14 (Figure 3-75), when motorized access would increase in magnitude and distribution of intensity of that effect. However, an increase in intensity would also be noted during the time frame of September 15 through June 15. This is displayed in Figure 3-76. As

noted in that figure, the amount of area in a *High Risk of Disturbance* increases with the action alternatives because of the motorized trail designation. These routes would be available to non-motorized recreation and access during the seasonal closure of those and other motorized routes that correspond with that time period. Because of the density (Figure 3-71) and distribution of those routes (Figure 3-75 and Figure 3-76), a very high percentage of the portion of the project area is within the *High Risk of Disturbance* area, and thus would be at risk of disturbance effects of all recreational access opportunities (hiking, horseback riding, mountain biking).

In addition to redistributing motorized and non-motorized access and changing the distribution of disturbance effects that would occur, access changes under these action alternatives would also indirectly effect intensity on elk nutritional condition. Designating the motorized trail would have the greatest direct and indirect effect on elk nutritional condition. These alternatives would expand motorized access into an area with little motorized access and would increase areas of *High Risk of Disturbance* in that portion of the project area to 90%. The intensity would be further increased by the type of motorized traffic (ATV versus UTV) and the anticipated increase in use of those routes which would result in more continuous or sustained periods of disturbance.

Effects vary by alternative based on the vehicle size class designated for the motorized trail system. In Alternatives B and C, motor vehicle use would be restricted to motor vehicles equal to or less than 50 inches wide (i.e., only motorcycles and ATV class vehicles would be permitted to operate on those routes). Alternatives D and F would permit vehicles less than or equal to 60 inches wide, which would expand motor vehicle access to include UTV class vehicles, which would increase the frequency of disturbance. This increase would negatively affect elk through increase displacement or reduced nutritional condition.

The duration of the effects described above would differ by the time periods described above since selected road and trail routes would be seasonally closed. Effects would occur as actions are implemented (e.g., changes in maintenance level, realignment, implementation of motorized trails) over 10–15 years. Once implemented, effects would continue.

Table 3-80. Effects indicators for elk

Indicator	Measure	Season	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Nutritional Condition	Disturbance Risk Analysis	June 16–Sept 14	H–89% M–9% L–2% N–0%	H–90% M–7% L–3% N–0%			H–86% M–11% L–3% N–0%	H–90% M–7% L–3% N–0%
		Sept 15–June 15	H–87% M–10% L–3% N–0%	H–89-90% M–7-8% L–3% N–0%			H–84% M–13% L–3% N–0%	H–90% M–7% L–3% N–0%
	Route Density–All NFS Routes (Motorized Routes ONLY)	June 16–Sept 14	4.0 mi/mi2 (2.9 mi/mi2)	4.1 mi/mi2 (2.7 mi/mi2)	4.1 mi/mi2 (2.8 mi/mi2)		3.5 mi/mi2 (1.9 mi/mi2)	4.0 mi/mi2 (2.7 mi/mi2)
		Sept 15–June 15	3.7 mi/mi2 (2.0 mi/mi2)	4.1 mi/mi2 (1.6 mi/mi2)		4.1 mi/mi2 (1.8 mi/mi2)	*3.3 mi/mi2 **2.0 mi/mi2 (1.6 mi/mi2)	3.9 mi/mi2 (1.6 mi/mi2)
	Forage Quality–Qualitative	N/A	Existing forage maintained	Proposed vegetation and fuels treatments would improve forage habitat.				
Calving Success	Disturbance Risk Analysis	May 1–June 15	H–91% M–9% L–0% N–0%	H–99% M–1% L–0% N–0%	H–97% M–3% L–0% N–0%		H–44% M–30% L–18% N–9%	H–97% M–3% L–0% N–0%
		June 16–July 1	H–95% M–5% L–0% N–0%	H–100% M–0% L–0% N–0%			H–91% M–9% L–0% N–0%	H–99% M–1% L–3% N–0%
	Forage Quality–Qualitative	N/A	Short-term: Existing forage maintained; Mid-term-forage reduced; Long-term: Reduction in early seral forage/potential improvement with wildfire	Proposed vegetation and fuels treatments would improve forage habitat.				
	Security Cover–Qualitative	N/A	Long-term: Decreased security cover with potential wildfire	Increased vulnerability due to proposed transportation system changes mitigated by design features. Vegetation treatments and prescribed fire application have the potential to reduce security cover in the short- and mid-term within the Project Area.				

Indicator	Measure	Season	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Vulnerability to Hunting Mortality	Vulnerability Analysis	Sept 15–Nov 30	79%	71%		73%	71%**	71%
	Route Density–NFS Roads and Motorized Trails	Sept 15–Nov 30	1.99 mi/mi2	1.60 mi/mi2		1.75 mi/mi2	1.60 mi/mi2**	1.60 mi/mi2
	Security Cover–Qualitative	N/A	Short-term: Maintained; Mid-to Long-term: Increased or potentially decreased with wildfire	Increased vulnerability due to transportation system changes mitigated by design features				

Note: The colors presented in the table below show a decline in existing conditions (orange), improvement from existing conditions (light green), greater improvement from existing conditions (medium green) and greatest improvement from existing conditions (dark green).

Alternatives E and F

Alternatives E and F differ from the other action alternatives in that some vegetation treatments would be conducted using helicopter yarding logging systems. Alternative E would implement 1,166 acres of helicopter yarding, while Alternative F would implement 377 acres of helicopter logging. Noise generated by helicopter logging would have a greater displacement effect than ground-based logging.

Alternative E differs from the other action alternatives in that it does not include constructing and designating motorized trails routes. As such, Alternative E would have slightly less direct disturbance on elk from OHVs than the other action alternatives.

Alternative E would have similar direct effects on nutritional condition as the other alternatives as described below:

- Non-motorized trail segments for summer use as a part of the existing IDPR-managed Park 'N' Ski trail program—Effects under Alternative E would be similar to those described under Alternative A
- Changes to the NFS open road system—Effects would be similar to those described for all action alternatives.

The primary action that differentiates this alternative from the other action alternatives would be the designation of motorized trail routes for use by motor vehicles no wider than 50 or 60 inches, depending on alternative. Alternative E would not designated any motorized trail routes and NFS road segments with dual designation would be maintained as ML 1 (no motorized access) or ML 2, Administrative Use Only (no public motorized access).

This alternative would result in a much different trend in disturbance and have very different displacement effects compared to the other action alternatives (Table 3-80). Alternative E would improve the measures related to disturbance and displacement, including the Disturbance Risk Analysis and road density. Figure 3-71 compares the Disturbance Risk Analysis all alternatives for both time frames. The percentage of area within the *High Risk of Disturbance* would decline under Alternative E compared to all of the other alternatives.

Table 3-81 and Table 3-82 display the trend in total route and open road densities, comparing Alternatives B, C, D, and F to existing conditions, and Alternative E to existing conditions. As noted, in total route density, Alternatives B, C, D, and F would result in negative trend, wild Alternative E would result in a stronger positive trend. This would be a function of the designation of the motorized trail network in the first set of Action Alternatives. That network would not be designated with Alternative E. Differences in Open Road Density in negligible between action alternatives.

Table 3-81. Trend in total route and open road densities for Alternatives B, C, D, and F compared to existing conditions

Time Frame	Trend	
	Total Route Density	Open Road Density
June 16–September 14	-	++/+++
September 15–June 15	-	+

Table 3-82. Trend in total route and open road densities for Alternative E compared to existing conditions

Time Frame	Trend	
	Total Route Density	Open Road Density
June 16–September 14	++	++/+++
September 15–April 30	+	+
May 1–June 15	++++	

Note:

+ - Improving Trend - 0.01-0.49 mi/mi^2

++ - Improving Trend - 0.5-0.99 mi/mi^2

+++ - Improving Trend – 1.0-1.49 mi/mi^2

++++ - Improving Trend - 1.50-1.99 mi/mi^2

- - Declining Trend - 0.01-0.49 mi/mi^2

-- - Declining Trend - 0.5-0.99 mi/mi^2

--- - Declining Trend - 1.0-1.49 mi/mi^2

---- - Declining Trend - 1.5-1.99 mi/mi^2

Figure 3-74 displays the disturbance risk in the project area under Alternative A. Figure 3-75, Figure 3-76, and Figure 3-77 compare action alternatives using Alternative D as a representative depiction of Alternatives B, C, D, and F. In addition to changes in the magnitude of effect as represented by changes in road density and disturbance risk, the intensity of effect also differs substantially between alternatives.

For areas west of Highway 21, the effects of Alternative E would be similar to other action alternatives. Proposed NFS road and trail system (including motorized and non-motorized) actions would have the same effects across all action alternatives with effect intensity as described above. However, east of Highway 21, a substantial difference in intensity of effect occurs between Alternative E and Alternative A and Alternatives B, C, D, and F (Figure 3-75, Figure 3-76, Figure 3-77). Implementing Alternative E would measurably reduce disturbance risk and the intensity of effect Alternative E would implement seasonal restrictions for mechanized equipment on seasonally closed NFS roads and authorized non-motorized routes east of Highway 21. These restrictions would further reduce the intensity of effects.

In addition, changing route use would further reduce intensity of effect, particularly when compared to the other action alternatives. Alternative E would reduce motor vehicle-related disturbances in the project area east of Highway 21 by reducing the miles of routes available to motorized access. The duration of effects would be otherwise similar to those described for Alternative A and the other action alternatives.

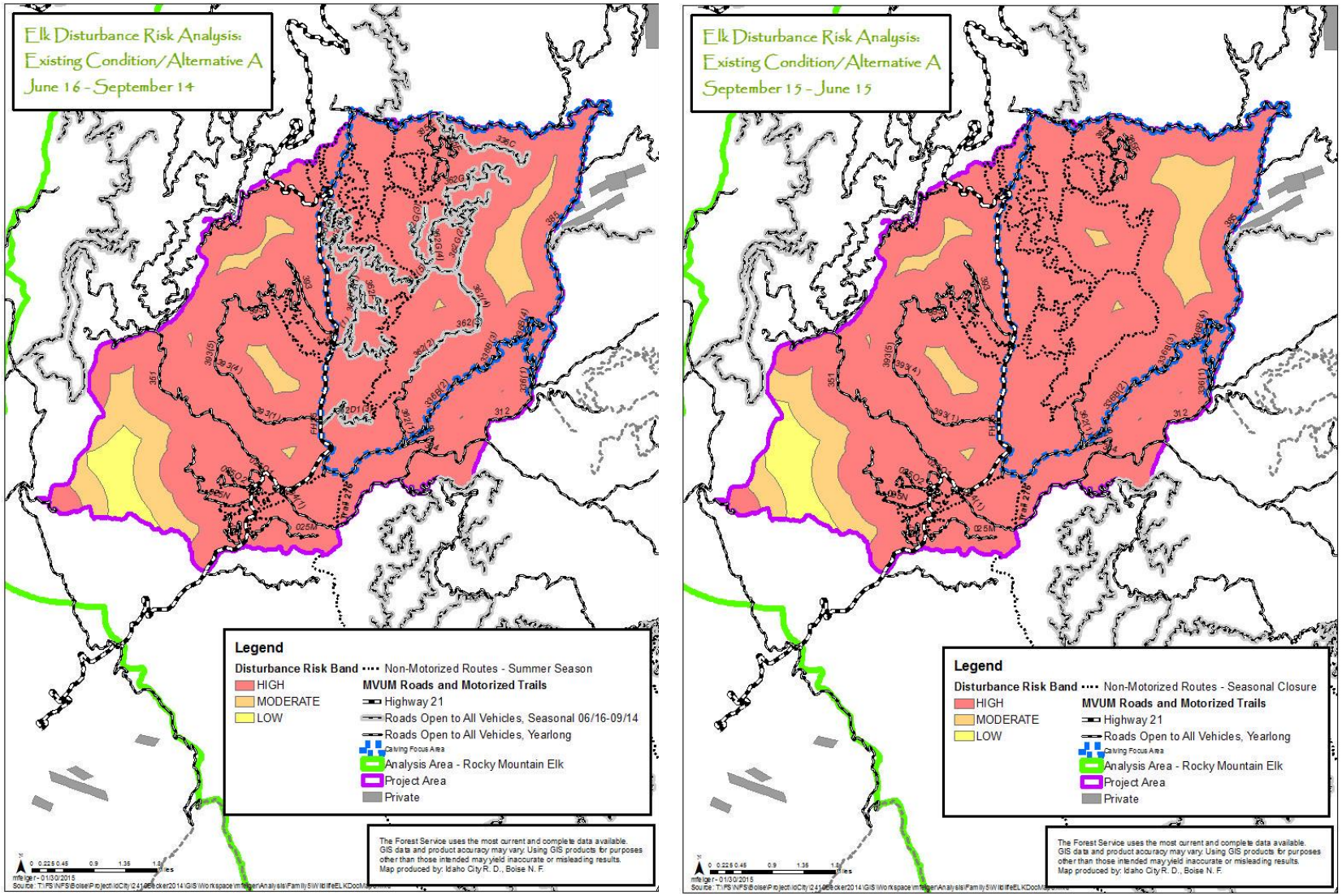


Figure 3-74. Alternative A: Disturbance risk analysis in the project area

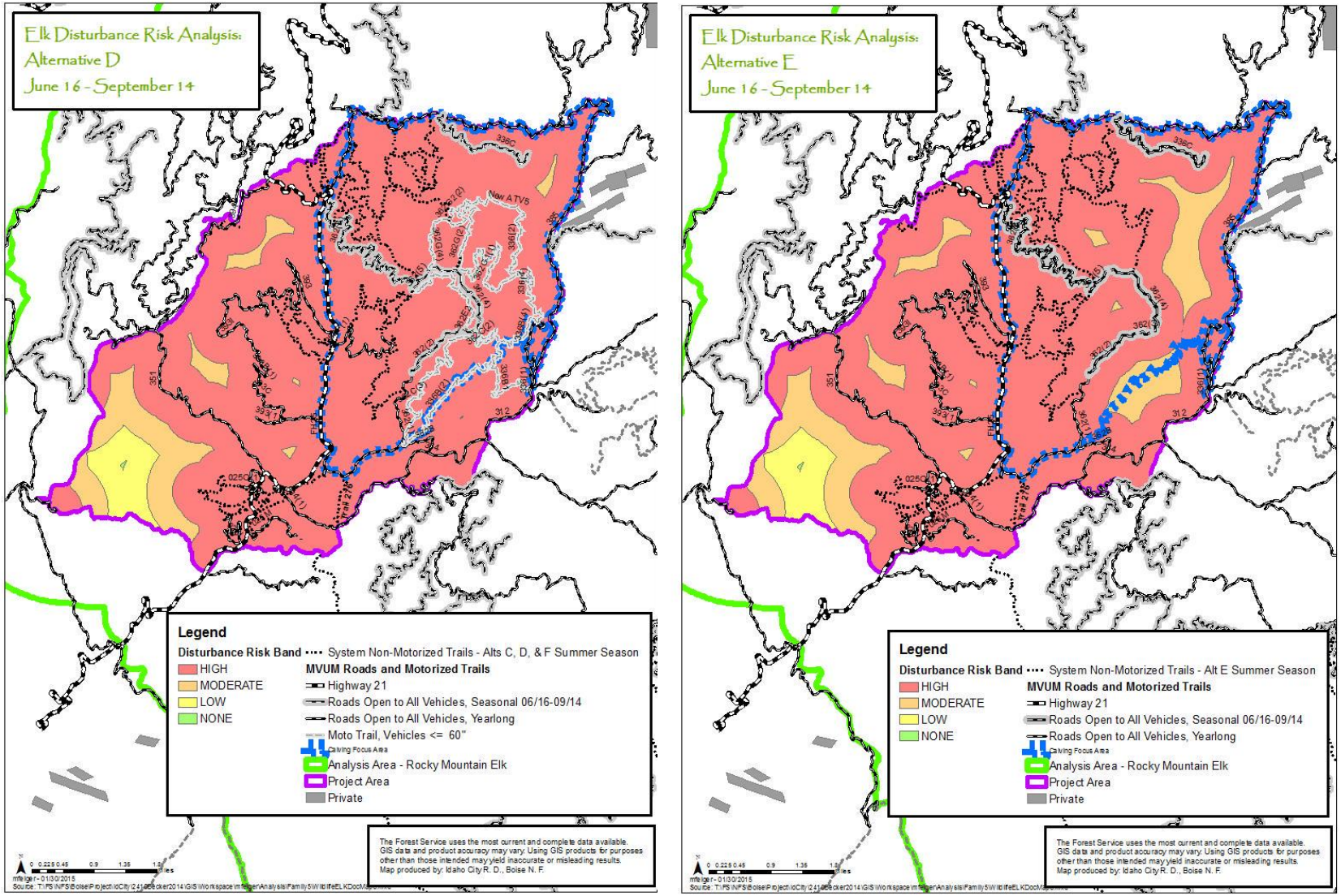


Figure 3-75. Alternative comparison: Disturbance risk analysis (June 16-September 14) in the project area

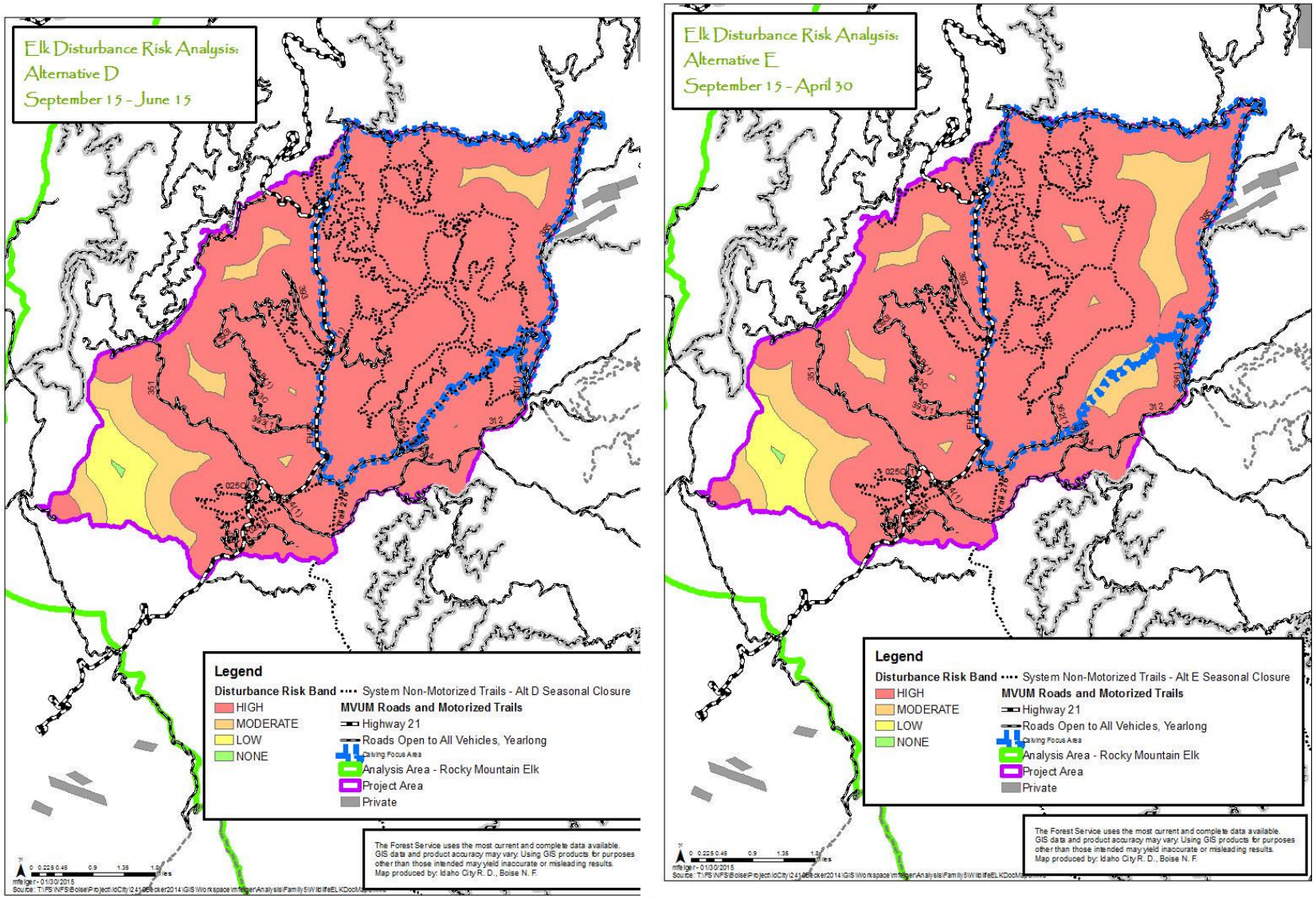


Figure 3-76. Alternative comparison: Disturbance risk analysis (September 15-April 30) in the project area

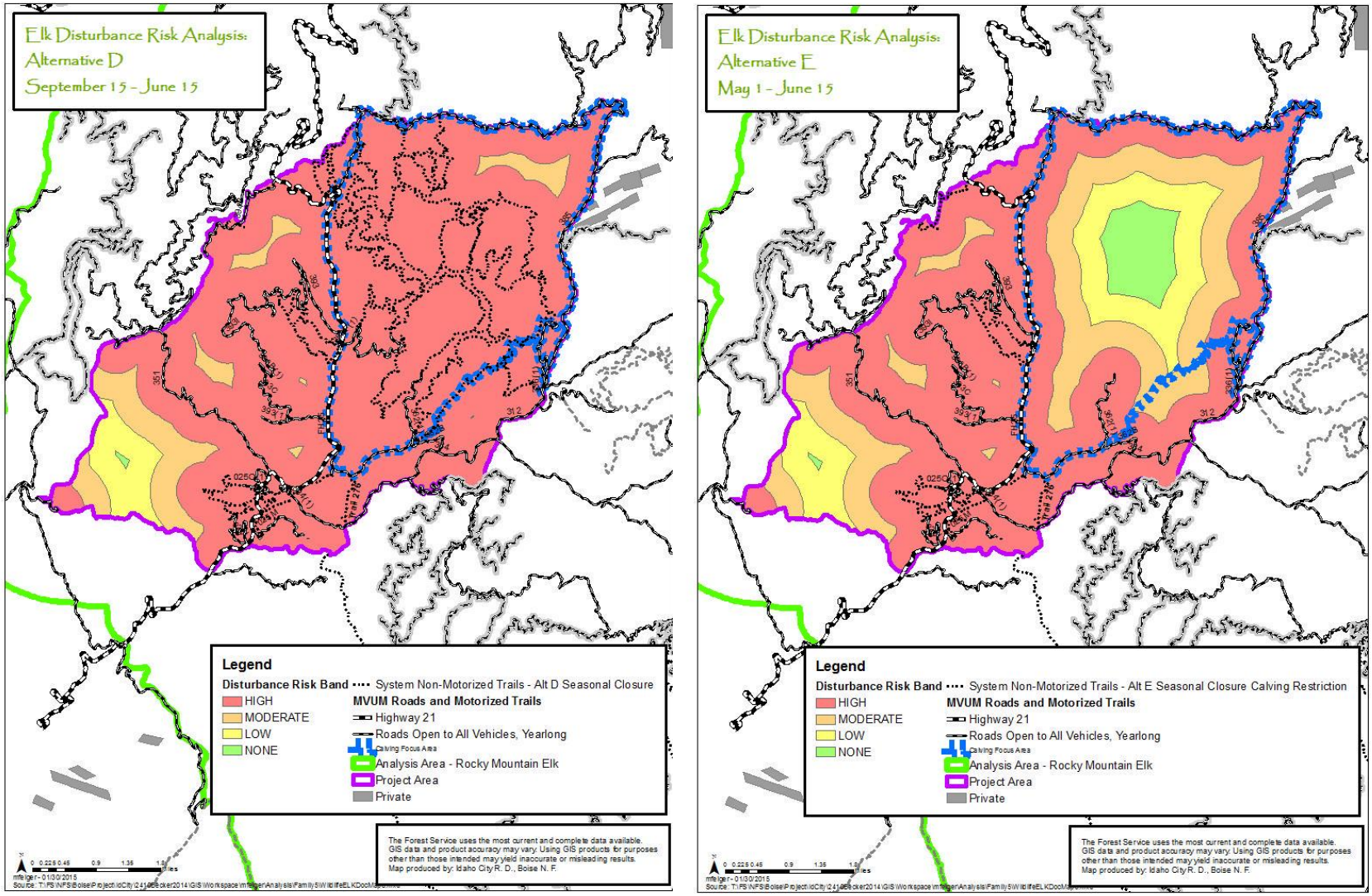


Figure 3-77. Alternative comparison: Disturbance risk analysis (May 1–June 15) in the project area

Indicator 2: Calving Success

Concern: Elk vulnerability to predation is often greatest for newborn and young calves, and calves surviving to their first year is one of the most important indicators of population trends. Nutritional condition during calf conception and nutritional condition of neonates going into their first winter are also critical factors in calving success and survival (Cook et al. 2003; Cook et al. 2013; Noyes et al. 2005). High predation on calves from black bear, mountain lion, and gray wolves could prove additive and have the potential to affect elk population recruitment (White et al. 2010; IDFG 2014a). Factors affecting predation risk, particularly soon after birth, include the quality of and access to high-quality, ground-level, security cover habitat. **Actions that reduce the quality of ground-level security cover in high-quality calving habitat and or reduce access to high-quality calving habitat have the potential to affect calving success, and thus, in part, population recruitment**.

Measures:

- Disturbance risk analysis
- Qualitative assessment vegetation treatments as it relates to security cover and forage

Affected Environment

Calving habitat must provide high-quality forage and water for lactating cows and security cover for both the cow and recently birthed calf (Skovlin et al. 2002). These features are important for the time period immediately leading up to parturition through the first several weeks of neonatal development, generally from early-mid May to the first week of July.

Areas with reduced or a lack of disturbance during parturition and early neonatal development are also important for calving success and early neonatal development (Shively et al. 2005). Disturbance of cows and calves during early neonatal development may leave calves at greater risk of predation from black bear, mountain lion, and wolves (Phillips and Alldredge 2000). Furthermore, as discussed in the "*Nutritional Condition*" section, disturbance events could displace cows and calves to poorer quality calving habitat, which may affect their ability to maintain sufficient nutritional condition to support lactation. Depending on the density and distribution of that transportation infrastructure, displacement effects could also concentrate calves into one location, making a larger proportion of the calf population vulnerable to predation.

Although not specifically addressing calving habitat function and selection at the micro-site scale, two Colorado studies examined the effect of human disturbance, most often associated with non-motorized recreational activity, on elk productivity. Both studies simultaneously compared similar areas, one receiving treatment (simulated recreational disturbance) and one maintaining annual ambient levels of human disturbance, for changes in reproductive success, measured in cow:calf ratios (Phillips and Alldredge 2000; Shively et al. 2005). The first study found a correlation between simulated recreational disturbances and a measurable decline in reproductive success, with measurable declines in calf survival noted in the treated area when compared to the untreated control area (Phillips and Alldredge 2000). The second study focused on the 2 years following the Phillips and Alldredge (2000) study, where no treatments were applied to either test area, to measure the response of reproductive success. Shively et al. (2005) found that within 2 years, elk productivity returned to pre-treatment levels and was comparable to the untreated unit over the 5-year test period. This effort further

strengthened the conclusions that the simulated recreational disturbance caused the decline in calf production, and thus elk productivity.

Calving Habitat—Calving habitat in the project area includes terrain and topographic features of the landscape, security cover and forage, and road and trail infrastructure that serve as vectors for disturbance. Combined, these features influence the abundance, distribution, and effectiveness of calving habitat for elk.

Potential calving habitat was modeled using slope as the initial criteria based on research that indicates gentler slope conditions are preferred (Skovlin et al 2002). Key calving areas on the Idaho City Ranger District are typically found in conjunction with slopes <15% (Thomas 1979). Small benches and similar microsites along slopes up to 30% may also be used in landscapes dominated by steep topographical relief, similar to the project and analysis areas. Figure 3-78 shows the distribution of modeled calving habitat with slopes of 0% to 15% and 15% to 30%. The majority of modeled habitat occurs between 15% and 30% slope (Figure 3-78). Within the project area, gentler slopes are concentrated along the upper 1/3 of the slopes in the headwaters of Beaver Creek, Little Beaver Creek, and Sawmill Creek; ridge systems between Beaver Creek and lower Little Beaver Creek and Sawmill Creek; and ridge systems between China and Gold Fork drainages of Beaver Creek. Numerous, distributed small patches of modeled calving habitat also occur. While individual elk may calve at smaller microsites within the project area, the larger blocks noted above are more likely to be used by multiple cows during parturition if they are accessible during the month-long calving period (mid-May to mid-June). Given the abundance of habitat modeled in the 15%–30% range, modeled habitat is likely a substantial overestimation of effective calving habitat because of terrain and topography. In the steeper slopes, only a fraction of that ground can likely be used as calving habitat in the few places where benches or other shallow topographic features are available to support calving. Visually, the majority of modeled calving habitat occurs east of Highway 21, south and west of NFS road 385, and north of the lower reaches of Beaver Creek (Figure 3-78). The area bound by Highway 21 to the west; NFS road 385 to the north and east; and segments of NFS roads 336, 336B, and 362 to the south is identified to serve as a driver for discussing calving habitat and as bounds for describing effects of specific actions on that habitat. Figure 3-79 documents the extent of that area, described further in this analysis as the ‘focus area’.

Security Cover and Forage Habitat—Diverse security cover and forage conditions are present within the focus area, in part, because of disturbances that have occurred in that area, including endemic insect and disease effects, past vegetation management (including timber harvest), and wildfire (Sawmill Fire 1989). Forage is provided by a variety of herbaceous and shrub species, including elk sedge, pine grass, aspen, alder, willow, snowberry, service berry, nine-bark, bitterbrush, and other species. In moderate-to-lower forested canopy closures, these resources are abundant and well distributed. The near-ground verticle structure from the shrub and small trees also provides security cover for neonatal calves. Other structure, including down log habitat, also provides high-quality security cover for calves. The overal stuctural condition of calving habitat is good.

Recent research suggests that cow elk select for specific features in forage and predation risk for where parturition will occur. Pitman et al. (2014) and Rearden et al (2011) suggest that forage quality and proximity to forage, as well as open and extended sight distances (presumably to better detect potential predators), are important factors in parturition site

selection, indicating the importance of the mosaic diststribution of different forested habitat conditions.

Road, Trail, and Other Recreation Infrastructure—Disturbance associated with road, trail, and other recreational infrastructure can affect habitat selection and behavior (see *Nutritional Condition* discussion above), which could affect calving activity and success. Researchers found coorelations between human recreational disturbance and reproductive success (Phillips and Alldridge 2000; Shively et al. 2005). Figure 3-79 further displays the location of modeled calving habitat as it relates to the disturbance risk analysis in the focus area. Along with the disturbance risk analysis, the existing road, trail, and recreational infrastructure is also displayed. Within the focus area, the majority of modeled calving habitat exists within the *High Risk* disturbance band (Figure 3-79). Those habitats are highly susceptable to disturbance and or displacement effects from high road and trail density and distribution. The yurts managed by IDPR and numerous dispersed recreation sites scattered through out the area add to the disturbance.

Figure 3-81 displays modeled calving habitat across the Analaysis Area, underlayed by the disturbance risk analysis assessment for that area. Several evident patches of calving habitat outside the project area occur with varying relationships to road and trail infrastructure and disturbance risk. Most notable are patches in the headwaters of Willow Creek and patches to the south and north of lower Willow Creek which occur within high disturbance risk areas associated with open roads or motorized trails. Another patch, between Banner Creek and Pikes Fork, occurs in an area where seasonally closed roads reduce the risk of disturbance during much of the spring calving period. East of the lower reaches of Crooked River, a concentration of modeled calving habitat associated with the *Low* and *No Risk* of disturbance exist due to seasonal road closures. A strong overlap exists between modeled calving habitat and areas in both scales of analysis within the *High Risk* of distrubance, indicating that some of the best calving habitat is also highly susceptable to human disturbance (Figure 3-80 and Figure 3-81).

Elk Calving Use of Project Area—In a study in the Sawtooth Zone, 754 cow elk were detected from 2009–2011 during May, June, and early July (primary calving and early neonatal calf development time frame) (IDFG 2014b). Five individual elk were detected in the project area during that time. While individual detections were not field validated for calving habitat selection or calving events, all individuals were of breeding age and assumed likely to calve in those years of detection. The dataset does not represent a complete and comprehensive indicator of cow elk distribution or habitat selection in the project area so drawing conclusions as to what habitat features and factors influence habitat use is difficult. However, the data do suggest some trends and preferences in habitat selection, particularly for calving habitats. Activity was concentrated away from roads and trails in an area adjacent to, but not including, a high density of modeled calving habitat. This distribution pattern may be a function of several factors, including disturbance effects of road and trail use. Pitman et al. (2014) and Reardon et al. (2011) would also suggest that habitat selection is also a function, with both studies finding cows selecting calving sites that provide an abundance of forage and areas where long site distances were present. The area of concentrated use is associated with the Sawmill Fire scar. That disturbance created high quality calving habitat through forage habitat stimulated by that disturbance and the openings created by forest canopy mortality.

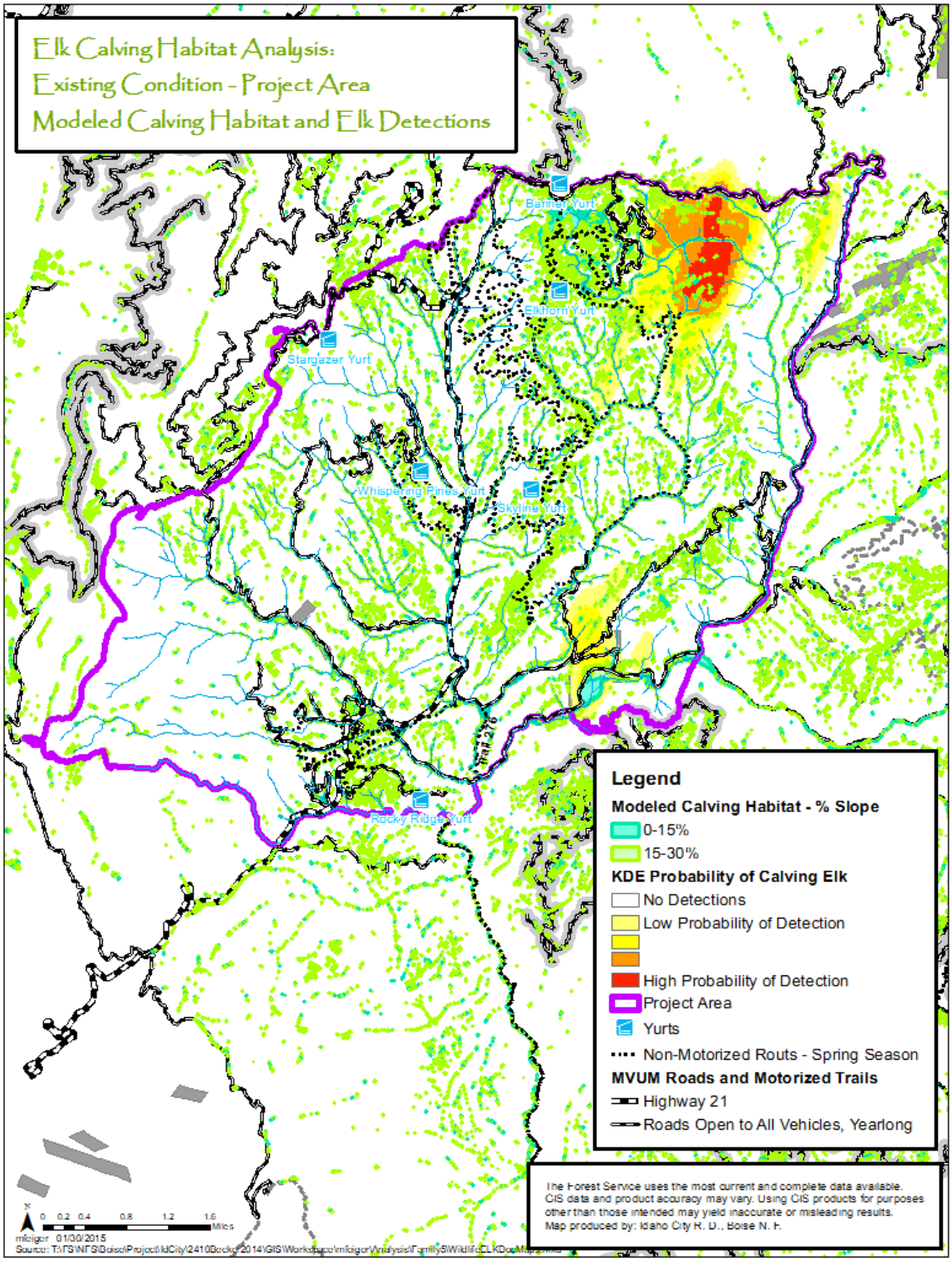


Figure 3-78. Elk calving habitat within the analysis area

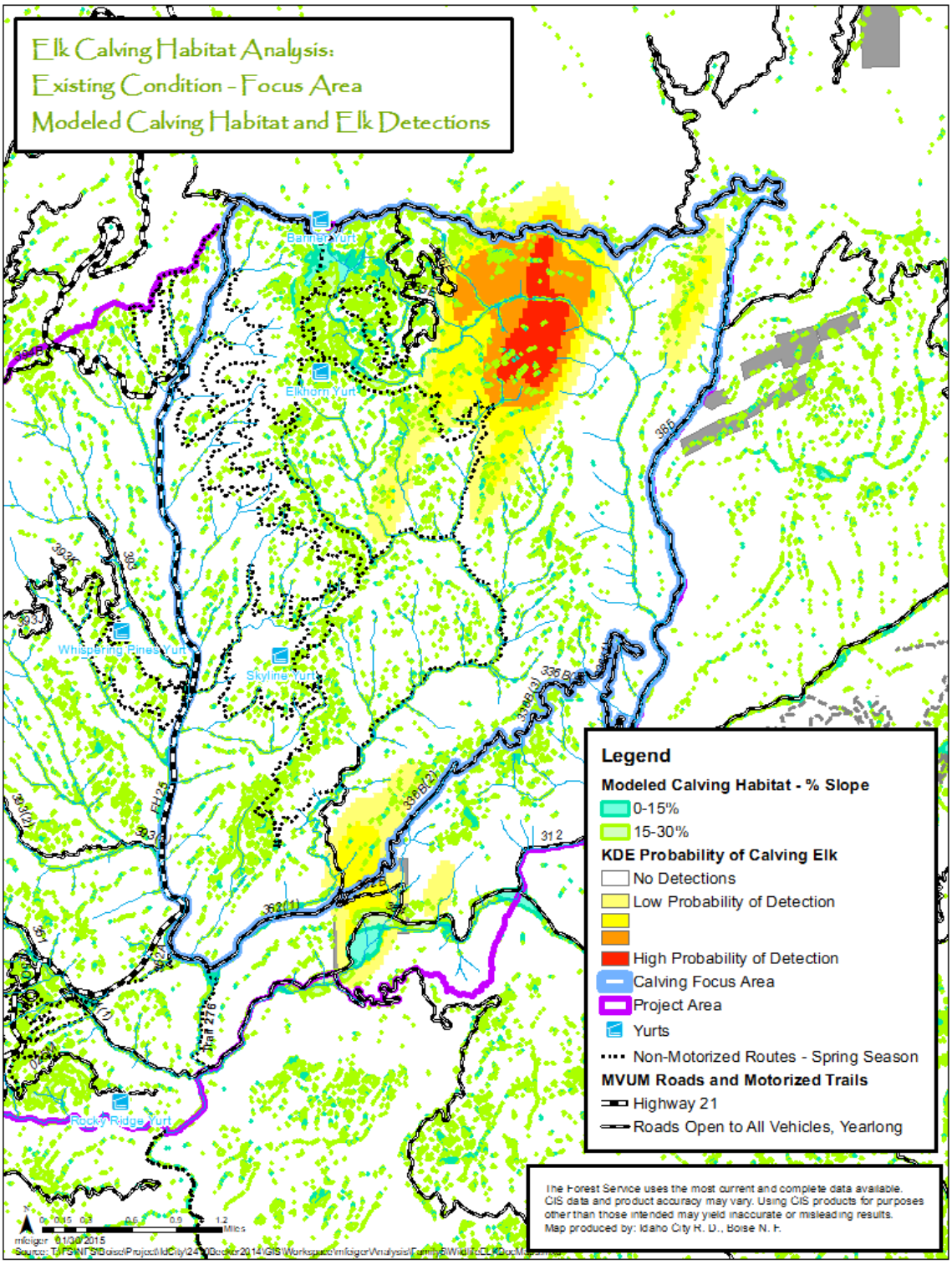


Figure 3-79. Elk calving habitat within the focus area, May 1–June 15

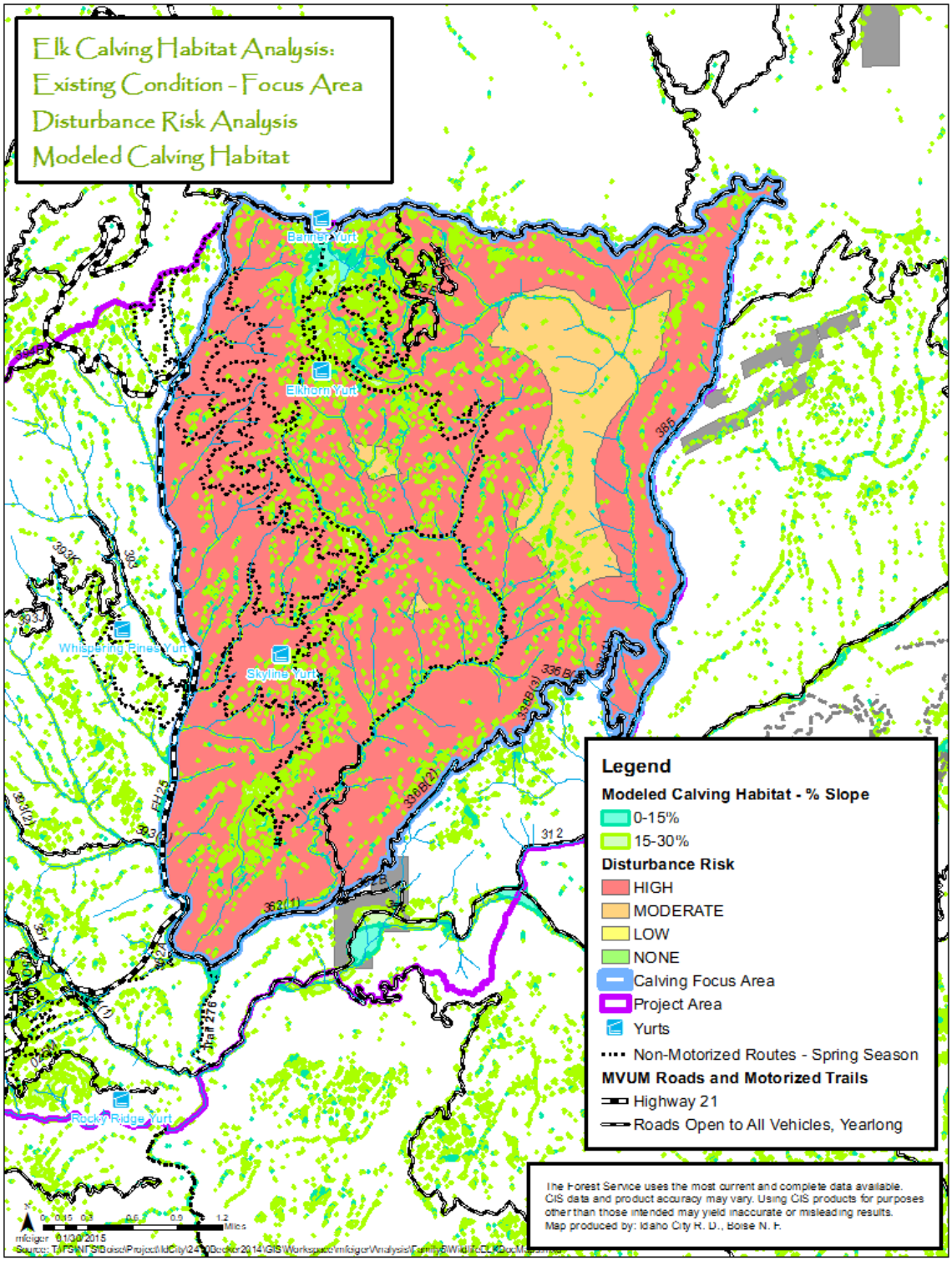


Figure 3-80. Overlay of elk calving habitat and disturbance risk assessment in the focus area (May 1-June 15)

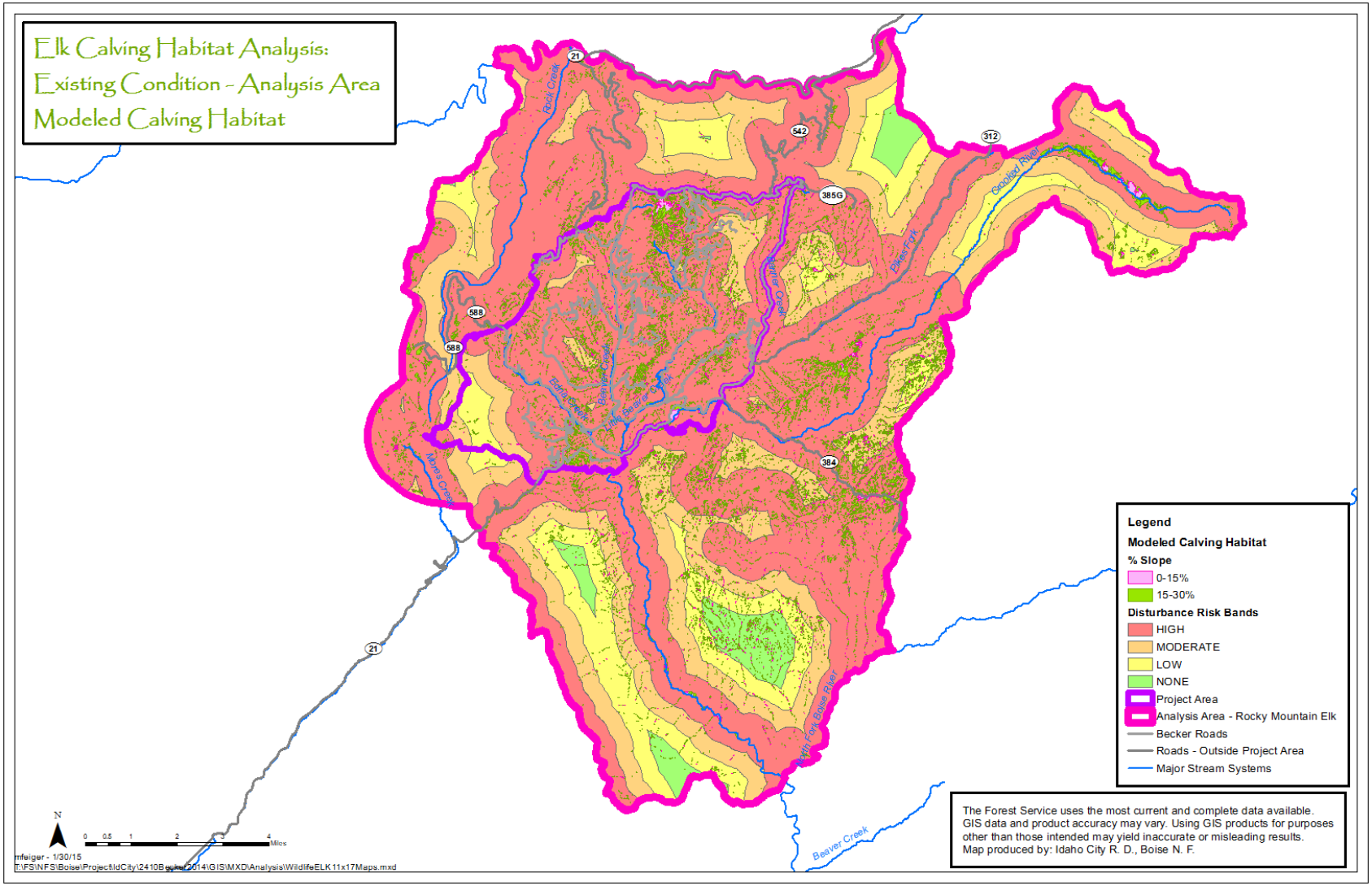


Figure 3-81. Overlay of elk calving habitat and disturbance risk assessment in the project and analysis areas, May 1–June 15

Direct and Indirect Effects

Alternative A

Disturbance Risk Analysis

Please see the previous section for a detailed discussion of the disturbance effects of the motorized and non-motorized transportation system (roads and trails) and associated motorized and non-motorized traffic and recreational use on elk and their distribution in elk habitat.

In spite of low motorized route densities within the focus area, Disturbance Risk would still be considered high (Figure 3-80) because of the unauthorized non-motorized routes that are managed by IDPR present throughout most of the focus area, with the greatest density in the northern half of that area. In analyzing those routes for the risk of disturbance, in addition to open motorized routes and seasonally closed motorized routes, a high degree of risk for disturbance would continue to exist within the focus area from non-motorized users (Figure 3-80). The magnitude of effect, in the form of areas of High Disturbance of risk, is substantial. Approximately 91% of the focus area is within a *High Risk of Disturbance* area from May 1 through June 15 (primary calving period), and 95% of the focus area is located in that *High Risk of Disturbance* area from June 16 through September 14, which covers the tail end of calving season and the important neonatal development period (Cook et al 2013). The percentage of area within the *High Risk of Disturbance* area is greater than the project area in its entirety, further emphasizing the magnitude of effect associated with the road and trail infrastructure associated with calving habitat.

In addition to the road and trail infrastructure present in the focus area, three yurts managed by IDPR are also present, with occupancy occurring during the spring and summer when parturition and neonatal development occurs. These structures are also located near modeled calving habitat (Figure 3-79). Yurt use often corresponds with use of connected roads and trails, which adds to the disturbance effects that calving elk may experience.

As noted in the *Nutritional Condition* section, relative intensity is somewhat reduced during the primary calving season period due to reduced public recreation effort and seasonal road closures on otherwise open routes. The frequency of such disturbance events is also an important component of the overall intensity. While specific data on the frequency of users, routes utilized, and the miles of routes where activity occurs within any given timeframe during the peak calving season (May 1 through June 15) is not known, non-motorized use is likely relatively low and likely associated with later-season weekends (May 15 through June 15). Intensity of effects is likely further reduced for trail segments located in the interior of the focus area many miles from primary access points on motorized routes.

However, intensity of effect to calving elk and calves is of concern. First, some of the highest quality calving habitat (Figure 3-79) is associated with a high density of unauthorized non-motorized routes and is closer to NFS road 385. Two yurts are also in the same area. These factors would likely increase intensity of effects through greater and more concentrated access to that habitat by non-motorized recreational activity. Second, the trend in use of the non-motorized trails, particularly by mountain bike enthusiasts, would be expected to increase in the short to long term. As population centers in the Treasure Valley continue to grow, so does the popularity of outdoor recreation sports. Changes in technology,

including the popularity of fat bikes, with wider, high-floatation tires that allow over snow travel, are also expanding mountain bikes use. Fat bikes, in particular, are allowing for earlier season use. Such a trend could increase the intensity of effects associated with the trail system in the project area. Increases in the intensity of use of those trail networks would increase the risk of disturbance effects upon calving and neonatal elk.

Research documented in the "Affected Environment" section identified recreational disturbance during calving season as having detrimental effects on reproductive success. As noted in the "Nutritional Condition" section above, non-motorized travel can disturb elk, causing changes in their behavior and activity and potentially displacing individuals. Disturbance and displacement responses may put neonates at greater risk of predation, which is identified as a primary factor in neonate mortality (Phillips and Alldredge 2000). An increase in recreation-related disturbance within the focus area could potentially affect the productivity of calving elk using those habitats.

Forage and Security Habitat

Trends in forage habitat under this alternative, as described in the "Nutritional Condition" section above, would be applicable to the focus area over the short, mid and long term. As described for the project area, short-term forage habitat conditions would be expected to be maintained. Over the mid to long term, as forest canopy conditions continue to develop with expected increasing stand densities and canopy complexities, declines in forage habitat quantity, quality, and diversity would be expected with potentially detrimental effects to calving elk and neonates.

Security habitat for calving and neonatal elk would similarly be affected over the mid to long term. As later seral forest habitat conditions develop, availability of those areas providing openings with longer sight distances would diminish. Existing low-density forested habitats would develop higher canopy closures and canopy structure, further reducing the quality of calving habitat.

As noted in the "Nutritional Condition" section above, as well as the vegetation and fire and fuels technical report (project record), the risk of an uncharacteristic large-scale, high-severity fire would increase over the mid to long term. Such a disturbance would impact forage and security cover. While an early seral habitat condition would result, which would improve forage habitat conditions and provide longer sight distances that would be selected by calving elk (Rearden et al. 2011, Pitman et al. 2014), the lack of a mosaic of older seral forest habitat adjacent to early seral patches may limit use of those larger disturbance patches.

All Action Alternatives

Design Features WR-12, WR-13, WR-14, and WR-15 would be implemented to reduce or eliminate the risk of effects to calving elk in the focus area where calving habitat and calving activity is most abundant and active. Actions and activities would be restricted or excluded during from May 1 to June 15 when the bulk of parturition occurs. Work on the transportation system would be largely excluded during that time period due to road conditions (generally wet and not available for maintenance or management actions), further reducing direct effects to calving elk.

Disturbance Risk

See the disturbance risk discussion above under “Nutritional Condition”.

Forage Habitat

See the forage discussion above under “Nutritional Condition.”

Security Cover

Vegetation Treatments—Proposed thinning actions would modify the forest canopy at all levels. The magnitude of the effects would vary little between alternative, with Alternatives B, C, E, and F affecting 43% and Alternative D affecting 44% of the project area and associated security cover habitat. Figure 3-73 displays where those vegetation treatments would occur.

Short-term loss of security cover would occur under each treatment with the intensity varying by type of treatment. Thinning with no product removal would have the least effect on overall security cover, as only small-diameter trees would be targeted. Such treatments account for 46%–47% of all proposed treatments, depending on alternative. The intensity of effects from the remaining treatments, including thinning, mixed treatments with product removal, and thinning with optional miscellaneous wood product removal, would be greater as more canopy cover is removed. Individual conifers would be removed at most, if not all, levels of canopy, which would decrease security cover effectiveness. Such treatments account for 53%–54% of the treatments proposed, depending on alternative. Across the project area, 43%–44% of habitats providing some level of security cover would be affected by these treatments.

Effect intensity would be moderated by regenerating hardwood understory vegetation (e.g., nine-bark, choke and bitter cherry, aspen, Scouler’s willow) that would partially replace cut conifer trees within 3–5 years. While not as effective as conifer tree screening, particularly in fall and early spring, such replacement of cover would maintain a degree of effective security cover.

In the mid to long term, conifer reproduction would gradually replace lower level canopy security cover to near-existing conditions in the treated stands.

The duration of effects would vary between treatments and implementation schedule proposed under each alternative. Proposed actions would take 10–15 years to implement, which would affect the timing and duration of the indirect effects.

Natural Fuels Treatments—The natural fuels treatments described in Chapter 2 would primarily affect ground- and near-ground-level vegetation, including hardwoods and small conifers and down logs that serve as cover habitat. The effects would be the same for all action alternatives because no functional difference in natural fuels treatments exists between alternatives (Figure 3-73). A total of 11,094 acres (57%) of the project area would be affected over 5–7 years.

Effect intensity would be moderated by the expected patchy, mosaic pattern of burn effects and the low-intensity of the burns. The actions would reduce security cover through lost vegetation screening in the short term, with replacement of consumed vegetation occurring within 3 to 5 years through hardwood regeneration. Down logs would be reduced, depending

on timing of the burn events (fall versus spring) and the size of the logs affected; replacement of down logs through fire-induced mortality would be also occur.

The duration of effects would span through the midterm. Implementation would occur 3–4 years post decision and would continue through 2023–2024, depending on the sequence of vegetation treatments.

Alternatives B, C, D, F

The indirect disturbance and displacement effects of Alternatives B, C, D, and F on calving cow and neonatal elk would be similar to those described in the "Nutritional Condition" section above. As noted above, changes to roads open to motorized travel and the addition of motorized trail routes would redistribute the risk of disturbance associated with motorized and non-motorized travel. As noted in Table 3-80 that shift would increase the area within the *High Risk of Disturbance* and shift a percentage of project area away from *Moderate Risk* towards a *High Risk of Disturbance*.

During the calving period (May 1 through June 15), the percentage of area within the *High Risk of Disturbance* would increase within the focus area (Figure 3-82) to 97%–99%. This increase is a function of designating the motorized trail routes under these alternatives (Figure 3-76). Even though these routes would be closed to motor vehicles seasonally, they would still provide routes for other recreational access, including hiking, horseback riding, and mountain biking. And, they would provide access into areas that have largely been inaccessible to recreational disturbance, thus increasing the risk of disturbance.

From June 16 to September 14, the magnitude of effects would increase as seasonally closed roads and designated motorized trails are opened. Under these alternatives, 100% of the focus area would be at *High Risk of Disturbance* (Figure 3-82) during a time when such effects could be most detrimental to elk productivity (Cook 2002; Cook et al. 2003; Cook et al. 2013). Figure 3-75, Alternative D displays the distribution of disturbance effects within the blue-highlighted Focus Area that would be a function of the designation of the motorized trail.

Even though the magnitude effects between the two time frames (May 1 through June 15 and June 16 through September 14) are similar for these action alternatives Figure 3-82 the intensity of effects would be different. Disturbance associated with road and trail infrastructure would primarily be non-motorized, the effects of which are less intense (Wisdom et al. 2005b), from May 1 through June 15 (Figure 3-76). Comparatively, effects would be greater from June 16 through September 14, when motorized access would be permitted (Figure 3-75). However, effects would be greater during both time frames than under Alternative A (Figure 3-74). The duration of effects for the focus area would be similar to those described in the "Nutritional Condition" discussion above.

Alternatives E and F

Alternative E would reduce the miles of open road through changes to maintenance levels for NFS roads 362F, 362G network, and 336B and through the conversion of NFS road 362F4 to a non-motorized trail segment. Overall, these changes would reduce motorized traffic disturbance on calving and neonatal elk (Figure 3-82).

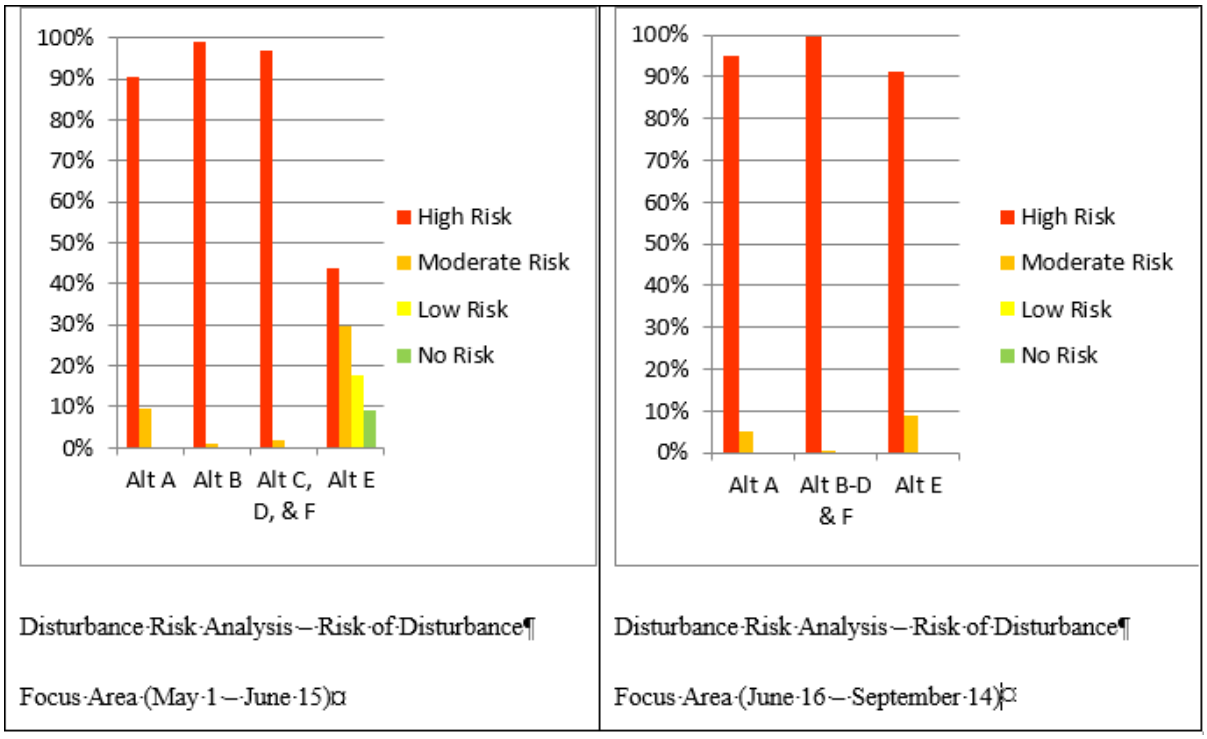


Figure 3-82. Alternative comparison: Disturbance risk analysis in the focus area

Alternative E would result in much lower magnitude of effects when compared to Alternatives B, C, D, and F (Figure 3-82), primarily because motorized trail routes would not be designated under Alternative E and seasonal mechanized travel restrictions would be implemented on seasonally closed NFS roads and all non-motorized routes within the focus area from May 1 through June 15 (Figure 3-82). A 45%–47% reduction in the *High Risk of Disturbance* area in the focus area would occur under Alternative E (Figure 3-82).

Alternative E would have the greatest improvement in effect intensity on calving success and result in the highest quality and condition of calving habitat.

Indicator 3: Vulnerability to Hunting Mortality

Concern: Stalling et al. (2002) cite numerous studies linking bull age class distribution to changes in pregnancy rates, date of conception and subsequent calving, length of rut, and rut synchrony. All of these factors affect reproductive success and productivity. Sufficient mature bulls present in a population are an important component of that equation. Vulnerability to hunting mortality is identified as a primary factor affecting age class distribution of bulls (Stallings et al. 2002). Accessibility through open roads and motorized trails is considered a primary and important indicator for vulnerability. **Actions which affect motorized access to elk habitat have the potential to affect bull vulnerability to hunting mortality.**

Measures:

- Vulnerability Analysis
- Route Density of NFS Roads, and Motorized Trails
- Qualitative Assessment Vegetation Treatments as it Relates to Security Cover

Affected Environment

Vulnerability Analysis

Road and motorized and non-motorized trail density serves as a measure for both risk of disturbance and vulnerability to hunting mortality (Christensen et al. 1993; Lyon and Christensen 2002; Stallings et al. 2002; Rowland et al. 2005). Road and motorized/non-motorized trail density is defined as the miles of measured routes per square mile of area, and provides a relative measure of change in access by human activity.

Greater hunter densities increase the risk that an elk will be detected and killed. Areas likely to have greater densities of hunters are most closely associated with roads. As such, in assessing vulnerability to hunting mortality, a one-half mile buffer was established along all routes open to motor vehicle traffic from September 15 to November 30, a time frame covering the majority of hunting seasons affecting elk. This measure serves as a relative comparison between alternatives of risk of hunting mortality as it relates to motorized access.

Hunting mortality plays an important role in the dynamics of elk populations. Harvesting bulls can affect distribution of bulls in different age classes (Stalings et al. 2002; Noyes et al. 2005; IDFG 2014a). The distribution of breeding bulls in those age classes, specifically the presence, or lack thereof, of older bulls (age 4–5+), affects reproductive success in multiple ways (Noyes et al. 2005). Timing of conception (and thus parturition) and pregnancy rates are positively affected by the presence of older bulls in a breeding population (*ibid*). Older bulls also result in more synchronous births, reducing the overall population vulnerability to neonatal predation pressures (IDFG 2014a). Conversely, a lack of older bulls results in later conception dates, lower pregnancy rates, and less synchronous breeding (Noyes et al. 2005), all of which are less desirable for a successful and productive elk population.

Elk vulnerability can be described as the susceptibility of elk to hunter harvest during the fall hunting period. One of the by-products of vulnerable elk populations is a younger age class distribution and lower bull densities within a population (Stallings et al. 2002; IDFG 2014a). Both scenarios are detrimental to a productive population. Several factors contribute to the vulnerability of elk to hunting, including hunter access and density, security habitat and cover, topography, and weather. Of those factors, distribution of security cover and habitat, and hunter access and density could be affected by activities proposed.

Security Cover and Habitat

Security cover is described as vegetation and habitat features “that provide elk with security or a means of escape from the threat of predators or harassment” (Skovlin et al 2002, p. 540). Cover comes in the form of forest and shrub in densities and arrangements that provide a screening effect. Complexity in topography adds to the need of complex vegetation structure to provide effective cover. Traditional methods of measuring hiding cover, such as maintaining 90% coverage of a standing elk at 200 feet (Thomas 1979; Skovlin et al. 2002) focus on near-ground vegetation. In managed stands, or habitats with complex topographic features, such near-ground vegetation may not provide adequate screening effects. Middle and upper forest canopies are also important components of that habitat feature.

Cover habitat in the analysis area varies depending on past management actions, fire and other natural disturbances, and natural openings. Stands in PVGs 2, 3, 4, and 7, where

management actions have not occurred recently, provide sufficient cover habitat for elk. Structural diversity and stand density, coupled with abundant near-ground vegetation, provides for quality cover habitat. Stands in PVG 1, stands recently managed, or stands disturbed by fire or insect, provide substantially less screening habitat and may not effectively function as security cover.

Elk are likely more secure when using larger stands of escape cover (McCorquodale et al. 2003, p. 255). Terrain and topographic features may also serve to provide security and escape (Skovlin et al. 2002). A combination of vegetative cover, topography and terrain, and distance from roads and trails comprise security habitat. Security is an essential management consideration in elk habitat and is a necessary component of a landscape that will support viable elk herds over time.

For this analysis, security habitat is represented as a non-linear block of at least 250 acres of forested habitat that is 0.5 miles or more from an open, motorized road or trail during any portion of the hunting season (September to mid-November). Figure 3-83 and Figure 3-84 display the spatial result of the vulnerability analysis conducted for the Project and Analysis Areas. Areas in orange are within 0.5 miles of an open motorized route (road or trail) from September 15 to November 30, which captures the bulk of elk hunting seasons managed by IDFG in GMU 39. The unshaded areas represent security areas where a combination of security cover and distance from open roads provide security habitat with a reduced risk of hunting mortality. Only 21% of the project area meets the distance component of security habitat. Security habitat occurs in two primary patches located at opposite ends of the project area. One patch occurs in the upper reaches of Sawmill and Little Beaver Creeks and is created through the seasonal closure of portions of NFS roads 362, 362G1, 362G2, 362G3, and 336C. The second patch resides in the west end of the project area between Pilot Peak and Edna Creek in the Headwaters of Whoop ‘em Up and Lamar Creek. These patches, due to their size, topography, and vegetative condition, are more likely to provide refuge for elk during the hunting season.

At the larger analysis area scale, only 37% of that area is greater than 0.5 miles from an open motorized route. As with the analysis area, the larger Cumulative Effects Area displays areas of security, most of which are created through seasonal closures on roads and motorized trails. The largest of these occurs around the lower half of the Crooked River watershed and includes areas draining out of the Little and Big Owl Creeks into the North Fork Boise River.

Another factor in the effectiveness of security habitat includes the influence of recent disturbances on the effectiveness of the security cover component of that habitat. As previously noted, recent fire disturbances can negatively affect security cover. Substantial portions or entire blocks of security habitat have had recent large-scale, high-severity fire disturbances (Figure 3-84). These disturbances have likely reduced the effectiveness of those security habitats.

Hunter Access and Density

Hunter access to a landscape and the density of hunters influence hunter success and vulnerability of elk to hunting mortality (IDFG 2014a). The greater access hunters have to a landscape, primarily through motorized routes, the greater the density of hunters present on that landscape and the greater likelihood elk will be detected and killed (Stallings et al.

2002). As such, open motorized route density and distribution on a landscape prove effective indicators of that component of vulnerability.

Open motorized road and trail density and the percent of the analysis area within 0.5 miles of an open motorized road or trail are used to assess hunter access and density in both the Project and analysis areas. Open roads and trails are buffered by 0.5 miles based on the assumption that hunter density is highest near motorized access features, and elk occupying these habitats are more vulnerable to being harvested. Motorized trails were included in this analysis to take into account the use of OHVs during the hunting season. While non-motorized use of trails and roads was not included in this analysis, at least one recent study (Hayes et al. 2002) found that open and closed roads acted cumulatively to increase mortality of elk. Hunters were still utilizing closed roads, either illegally with full-size vehicles or via other motorized and non-motorized methods. This analysis uses open motorized density due to the preponderance of studies implying a connection between motorized access and vulnerability of elk.

Open road density in the project area from September 15 to November 30 is 1.99 mi/mi^2. As previously noted, this density is greater than the recommended range provided by the IDFG Elk Management Plan (IDFG 2014a). Currently, 79% of the project area is within 0.5 miles of a motorized road or trail that is open during some portion of the elk hunting season (Table 3-83). Elk occupying these habitats are vulnerable to harvest. Figure 3-83 displays the distribution of those vulnerable areas.

At the analysis area scale, road densities are slightly improved at 1.96 mi/mi^2. However, the percentage of areas within 0.5 miles of an open motorized routes decreases to 63%, indicating a shift in distribution pattern compared to the project area (Table 3-83). Figure 3-84 displays the distribution of areas of vulnerability across the analysis area.

Table 3-83—Current elk vulnerability indicators for the Project and Analysis Areas

Analysis Area	Open Motorized Road and Trail Density	Vulnerable Area (Habitat within 0.5 Miles of an Open Motorized Road or Trail)		Security Habitat	
		Acres	Percent Analysis Area	Acres	Number of Patches ≥250 acres[a]
Project Area	1.99 mi/mi^2	15,202	79%	4,125	2
Analysis Area	1.96 mi/mi^2	64,719	63%	38,552	8

[a]Includes small patches within the analysis area that are connected to security habitat outside the analysis area and the larger patch as a whole would meet the security habitat definition (non-linear, ≥250 acres).

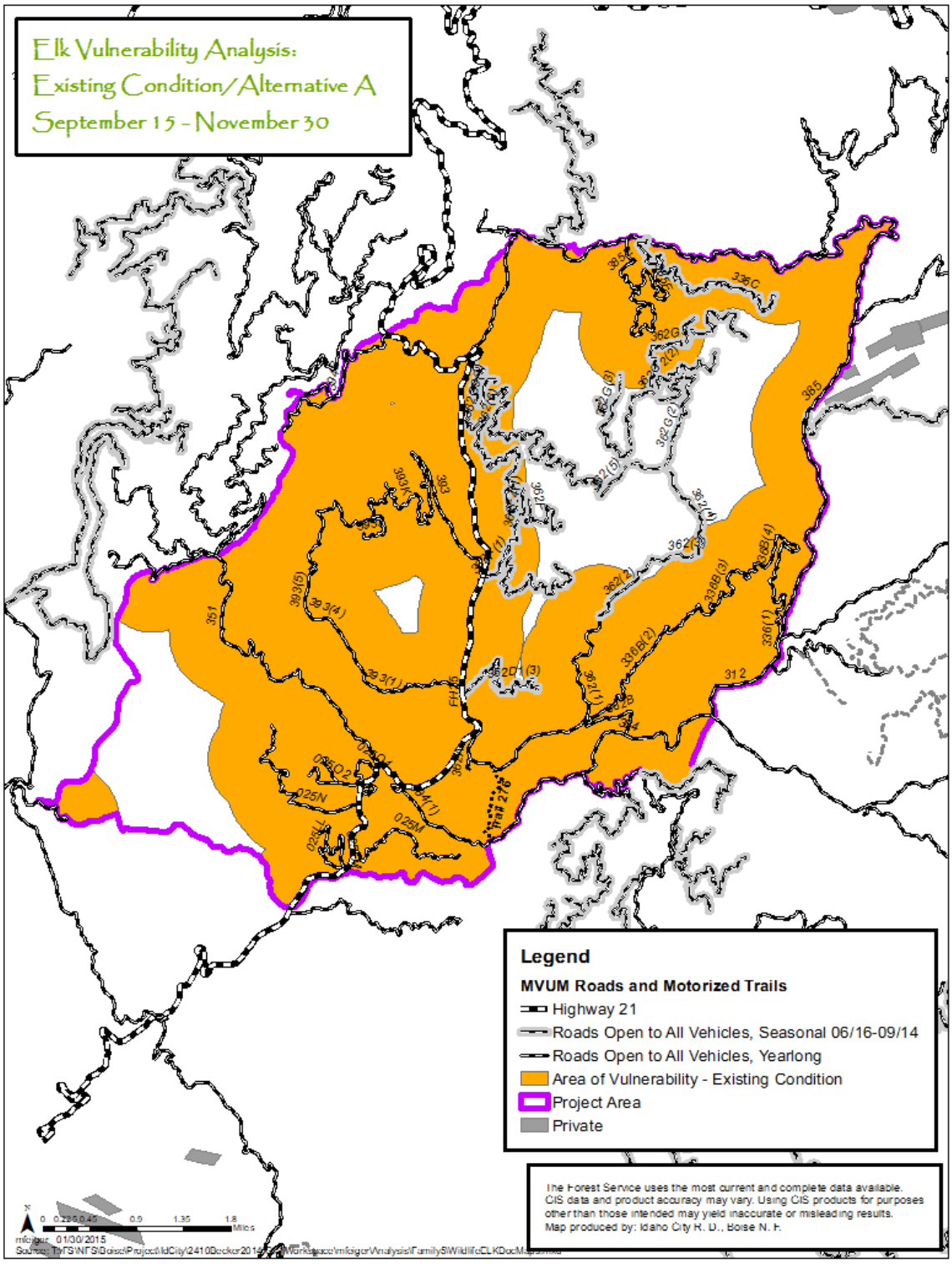


Figure 3-83. Elk vulnerability analysis for the project area

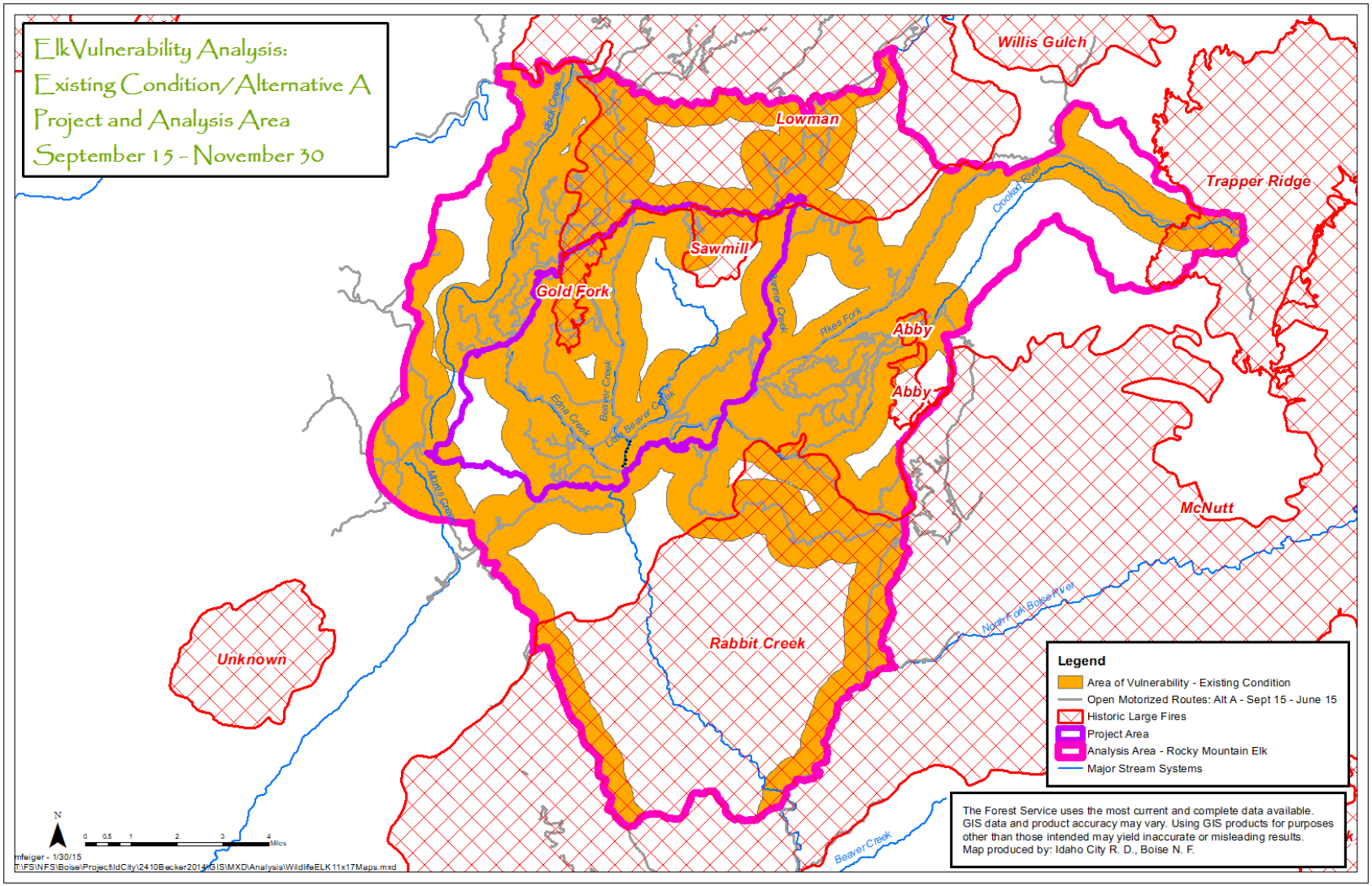


Figure 3-84. Elk vulnerability analysis for the analysis area overlain with historical fires

Direct and Indirect Effects

Table 3-80 summarizes the indicators and measures considered for the analysis of effects to elk and elk habitat and the consequences of the considered alternatives on those measures. The table, through the use of colors described in the legend below, demonstrates the trend in indicators and associated measures as they would respond to the actions proposed in each alternative. As noted in Table 3-80, the action alternatives, with the exception of Alternative E, would result in negative trends for those measures associated with changes to the motorized transportation system (Disturbance Risk Analysis, Vulnerability Analysis, and Route Density). The addition of motorized trail routes in the eastern one-third of the project area would result in this negative trend, as it would effectively neutralize changes to motorized route densities from open road closures and changes in designation and would expand the area where motorized (and non-motorized) travel would be facilitated, thus imparting disturbance effects on elk and elk habitat.

Elk and elk habitat under Alternative E, which would not designate the motorized trail system, would benefit with reduced effects and an improving trend in those indicators (i.e., Nutritional Condition and Calving Success) and measures. This trend would be from reducing the route density and distribution of roads open to motor vehicles and routes available to non-motorized routes. This alternative would also implement seasonal mechanized travel restrictions to non-motorized access, in addition to motorized access, on seasonally closed roads and non-motorized trails in a large portion of the project area important to calving elk. These restrictions would further reduce the effects of disturbance to elk during a particularly critical time period.

With the Vulnerability to Hunting Mortality indicator, all action alternatives would have a general positive trend. Differences between alternatives in specific open road proposals affect the degree of the positive trend. Of note, Alternative E again would result in the greatest positive trend as a result of the lack of designation of the seasonally closed motorized route. With the other action alternatives, there would be an increased risk in unauthorized motorized route access with those motorized trails, as well as greater facilitated access to non-motorized users.

Across all action alternatives, Forage Condition (Nutritional Condition and Calving Success indicators) improve. This improvement would be from vegetative disturbance that would enhance forage species. Security cover (Calving Success and Vulnerability to Hunting Mortality indicators), on the other hand, would decline from a short term reduction in vegetation cover associated with mechanical and natural fuels treatment effects.

Alternative E does not adopt a motorized trail route, and thus does not create infrastructure that could otherwise be used by unauthorized motor vehicles during the closure period. While such use is not authorized by the subsequent decision for this project, nonetheless, that use may occur with Alternatives B, C, D, and F, resulting in greater disturbance and displacement affects than accounted for in this analysis and applied assumptions of compliance.

Alternative E contains an additional component, restricting mechanized travel on a portion of the non-motorized trail system and seasonally closed roads from May 1–June 15. The impact on distribution of habitat in the different disturbance risk bands is displayed in the Calving Success Indicator, Disturbance Risk measure.

Alternative A

Security Cover and Habitat—In the short term, Alternative A would maintain the existing security cover and habitat described in the "Affected Environment" section. No changes to the canopy structure and density are proposed under this alternative. Additional security cover would develop as stand densities and canopy complexities increase over the mid to long term. Such conditions should reduce the vulnerability of elk to hunting mortality. The sustainability of those cover conditions, however, may be limited. As noted in the "Nutritional Condition" section, an elevated risk of uncharacteristic fire would develop over the mid to long term. A disturbance similar to the Lowman and Rabbit Creek Fires would reduce or eliminate security cover over large patches of landscape and increase vulnerability to hunting mortality. Ultimately, such a disturbance would likely change distribution of elk within the project area.

Security habitat would be maintained under this alternative. Existing seasonally closed roads would be maintained, limiting access to areas within the project area. As displayed in Figure 3-83, several large blocks of security habitat would be maintained through the foreseeable future.

Hunter Access and Density—This alternative would maintain existing conditions as they are described in the "Affected Environment" section as they affect hunter access and density and the vulnerability of elk to hunting mortality. Figure 3-83 and Table 3-80 display and summarize the measures used to assess this indicator. Elk residing near open roads during hunting season may be at an increased risk of detection and hunting-related mortality. The intensity of effect would be expected to be relatively high, given the proximity of the project area to Highway 21 and the Treasure Valley. Such access would likely result in slightly higher densities of hunters accessing this area. The duration of effect would continue into the future until such time as changes in the transportation system are implemented.

All Action Alternatives

Implementing vegetation treatments can affect vulnerability of elk to hunting mortality by changing access patterns and increasing access to areas where motor vehicle access currently does not exist. However, Design Feature WR-15 would restrict public access to those temporary roads, roads otherwise closed to public access, or other routes that could provide motor vehicle access. Further, Design Features TS-6 and TS-7 would decommission temporary roads or otherwise return them to closed status such that those added routes would not be available to public motor vehicle access. These design features would effectively mitigate any risk of increased vulnerability to hunting mortality from transportation-related activities proposed for all action alternatives.

See the security cover discussion under the "Calving Success" section above.

Alternatives B, C, D, and F

Alternatives B, C, D, and F would reduce the total miles of routes open to motor vehicle access from September 15 through November 30, thus improving trends in 2 of the 3 measures for this indicator (Table 3-80). The percentage of the project area within 0.5 miles of an open motorized route would decrease by 8% for Alternatives B, C, and F and 6% under Alternative D (Figure 3-85). Similarly, open road density would decline for these

alternatives. Open road density would decrease to 0.39 mi/mi^2 under Alternatives B, C, and F and to 0.24 mi/mi^2 under Alternative D. Reducing these measures reduces elk vulnerability to hunting mortality.

Comparing Alternatives A and D, a shift in vulnerability would occur across the project area (Figure 3-85). The greatest shift would occur west of Highway 21 because of the realignment of NFS road 393 and the change in maintenance level for NFS road 025N. East of Highway 21, subtle differences between action alternatives would occur, depending on the status of NFS road 362F. In general, Alternatives B, C, and F would result in a greater reduction in risk of hunting mortality in that portion of the project area than Alternative D.

Designating motorized trails under Alternatives B, C, D, and F would increase elk vulnerability to hunting mortality. Even though the trail segments would be closed to motor vehicle access during most of the elk hunting seasons, they would provide easier access for non-motorized travel.

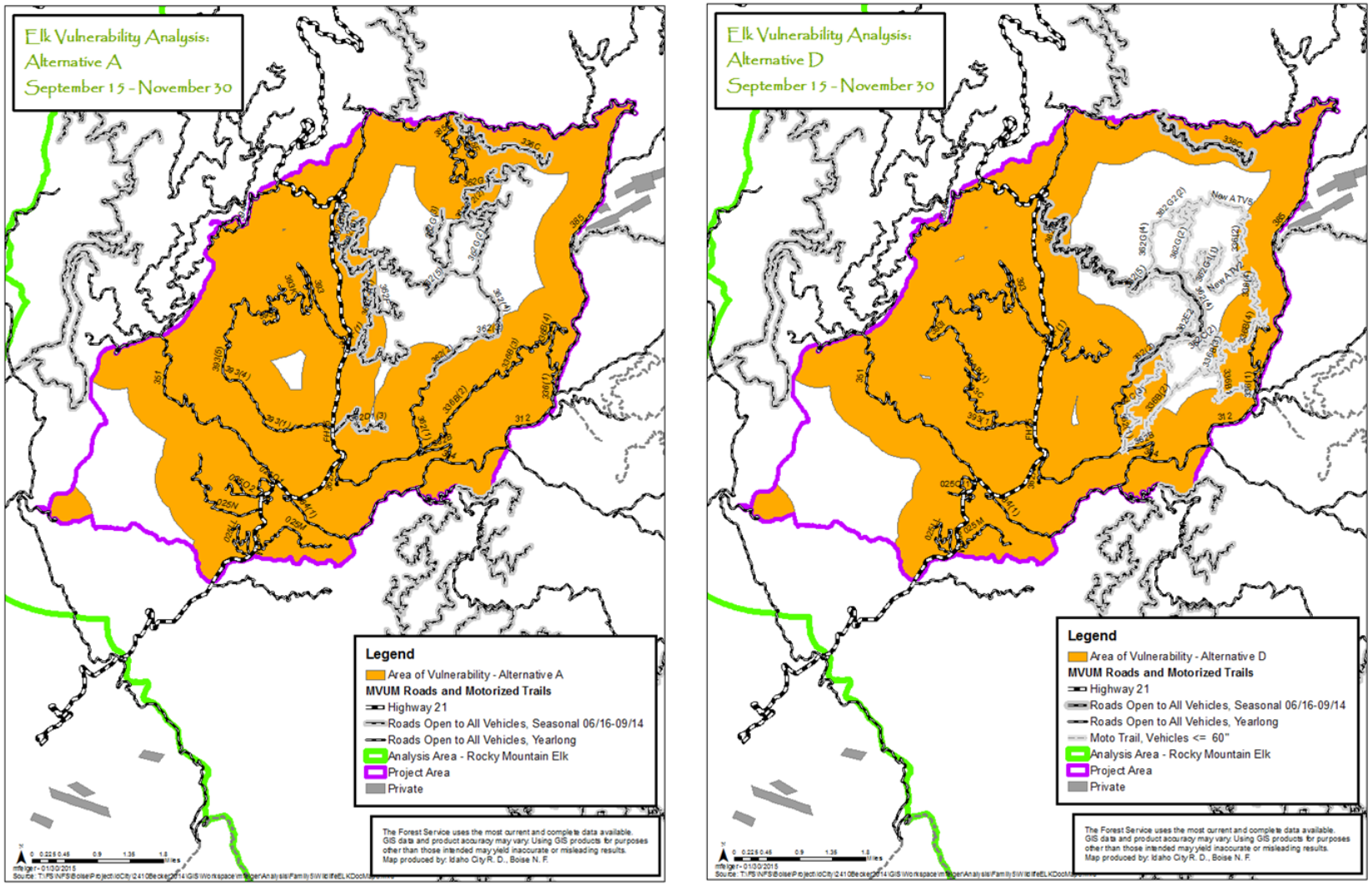


Figure 3-85. Alternative comparison: Vulnerability analysis (September 15–November 30) in the Project area

Alternatives E and F

Effects from Alternative E to elk vulnerability to hunting mortality would be similar to those described for Alternatives B, C, D, and F (Figure 3-86). Motorized access, a key component of elk vulnerability to hunting mortality, would largely be the same across all alternatives, with the exception of Alternative D. Alternative E, however, would have a reduced intensity of effect because this alternative would not designate motorized trail routes.

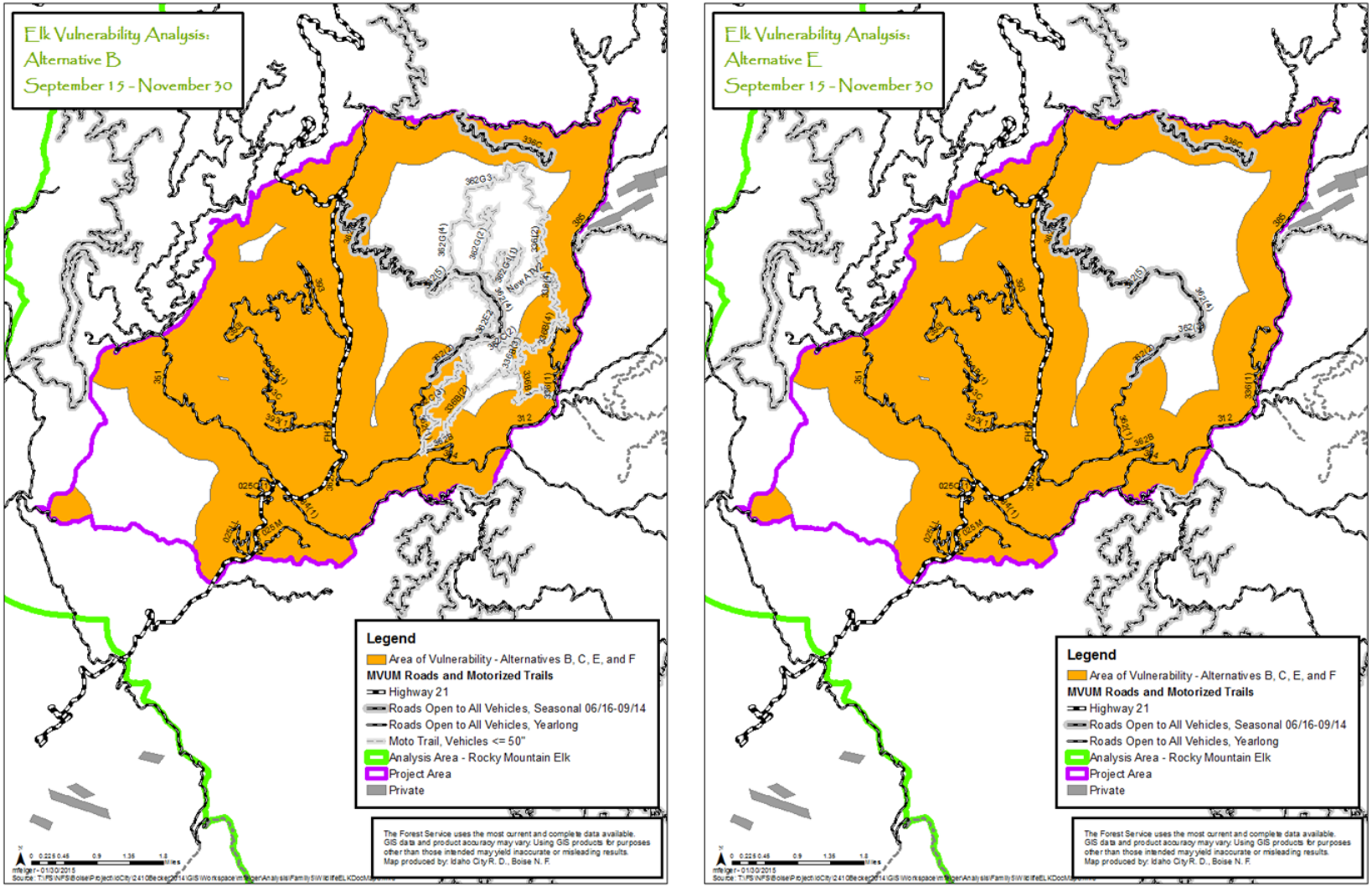


Figure 3-86. Alternative comparison: Vulnerability analysis (September 15 – November 30) in the project area

Cumulative Effects

The analysis area displayed in Figure 3-88, Figure 3-89, Figure 3-90, and Figure 3-91 is the geographic area for which cumulative effects of the proposed actions are considered. This represents the area in which elk would reasonably be expected to reside within a calendar year and includes summer, winter, and spring transitional ranges. This analysis area includes portions of the following 5th HUC watersheds: Crooked River (1705011102); Middle North Fork Boise River (1705011103); Lowman (1705012006); and Upper Mores Creek (1705011207).

Within this area, past, present, and reasonably foreseeable future actions were considered. Past activities, including several timber and salvage sales, reforestation, timber stand improvements, the firewood program, construction and maintenance of roads and motorized trails, and fire suppression, have contributed to the existing condition. Several large wildfires have recently occurred, including the 1989 Lowman, Gold Fork, and Sawmill fires (14,903 acres). The 1994 Rabbit Creek Fire affected 14,215 acres, the 2007 Trapper Ridge Fire consumed roughly 1,198 acres, and the 2009 Abby Fire consumed 885 acres of the analysis area. Ongoing activities include operation and maintenance of Highway 21, motorized and non-motorized recreation, outfitter and guide special use permits, and the Rock Creek timber sale. Reasonably foreseeable future actions include the Rocky Road Vegetation Management Project, the Lowman Wildland-urban Interface project, Further details regarding those actions are discussed in Appendix B.

Alternative A

No actions would be implemented with selection of this alternative. As such, this alternative would not contribute cumulative effects to elk or elk habitat within the Project or analysis area.

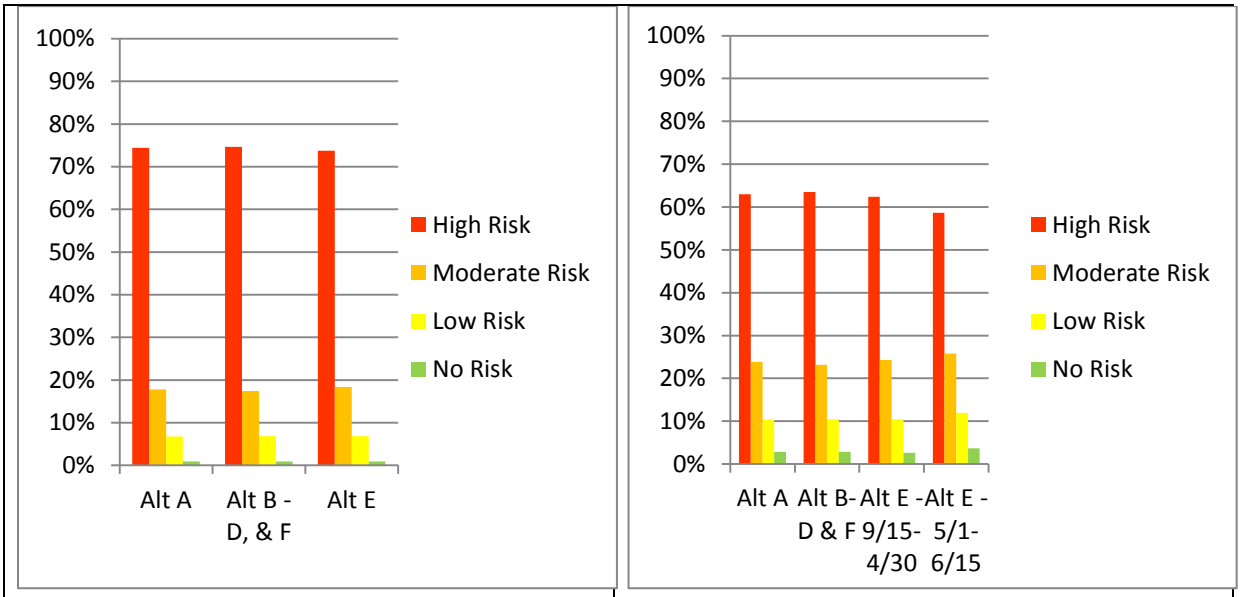
Action Alternatives

Alternatives B, C, D, and F would add measurably to cumulative effects of disturbance, particularly during summer months, as these alternatives would add the motorized trail routes to the landscape. Figure 3-87 displays the ranking of each alternative in disturbance area percentages within the analysis area. Similar to that of the project area, at the analysis area scale, these action alternatives would result in a measurable increase in risk of disturbance area affected. In both seasonal timeframes, these alternatives result in an increase in area within High Risk of Disturbance. For Alternative E, at the project area and Analysis Area scale, the proposed actions would indirectly and cumulatively decrease the percentage area within the High Risk of Disturbance, and redistribute that to the Moderate and Low Risk of Disturbance areas.

Relative to cumulative vulnerability to hunting mortality indicator, all action alternatives would result in positive cumulative effects to that indicator, as each action alternative would reduce the miles of open road available to motorized travel and access when compared to existing conditions. Of the action alternatives, Alternative E would have the greatest positive cumulative effect, as it would not designate the motorized trails. Alternatives B, C, D, and F would increase access opportunities through the designation of the motorized trail system, which would facilitate non-motorized access (motorized trail routes would be seasonally

closed to motor vehicle access during hunting season) to an area not as easily accessible currently, and thus increase hunting mortality risk.

Consequently, Alternatives B, C, D, and F would result in negative cumulative effects to elk and elk habitat (Nutritional Condition and Reproductive Success) and positive cumulative effects associated with vulnerability to hunting mortality, while Alternative E would positively cumulatively affect elk and elk habitat across all three indicators.



Disturbance Risk Analysis – Risk of Disturbance Analysis Area (June 16 – September 14)

Disturbance Risk Analysis–Risk of Disturbance **Analysis Area (September 15–June 15)**

Figure 3-87. Alternative comparison: Disturbance risk analysis in the analysis area

Alternatives B, C, D, and F would add incremental levels of indirect effects of spring use of mountain bike and other recreational use of the non-motorized trails, which would be cumulative to spring bear hunting trips authorized under outfitter guide SUPs in the areas. Other SUPs may also result in incremental increases in cumulative disturbance when considered with these alternatives. Alternative E would have fewer cumulative effects due to the timing restrictions for non-motorized activities during calving periods in the areas east of State Highway 21 and north of Beaver Creek Cabin.

Effects of the Rock Creek timber sale, Rocky Road Vegetation Management Project, and Lowman Wildland-urban Interface projects would be similar to those considered and analyzed in this action. Cumulatively, the action alternatives would add incremental direct and indirect effects to elk and elk habitat. These positive and negative cumulative effects would include direct disturbance effects and indirect habitat effects (cover, forage quality, and condition).

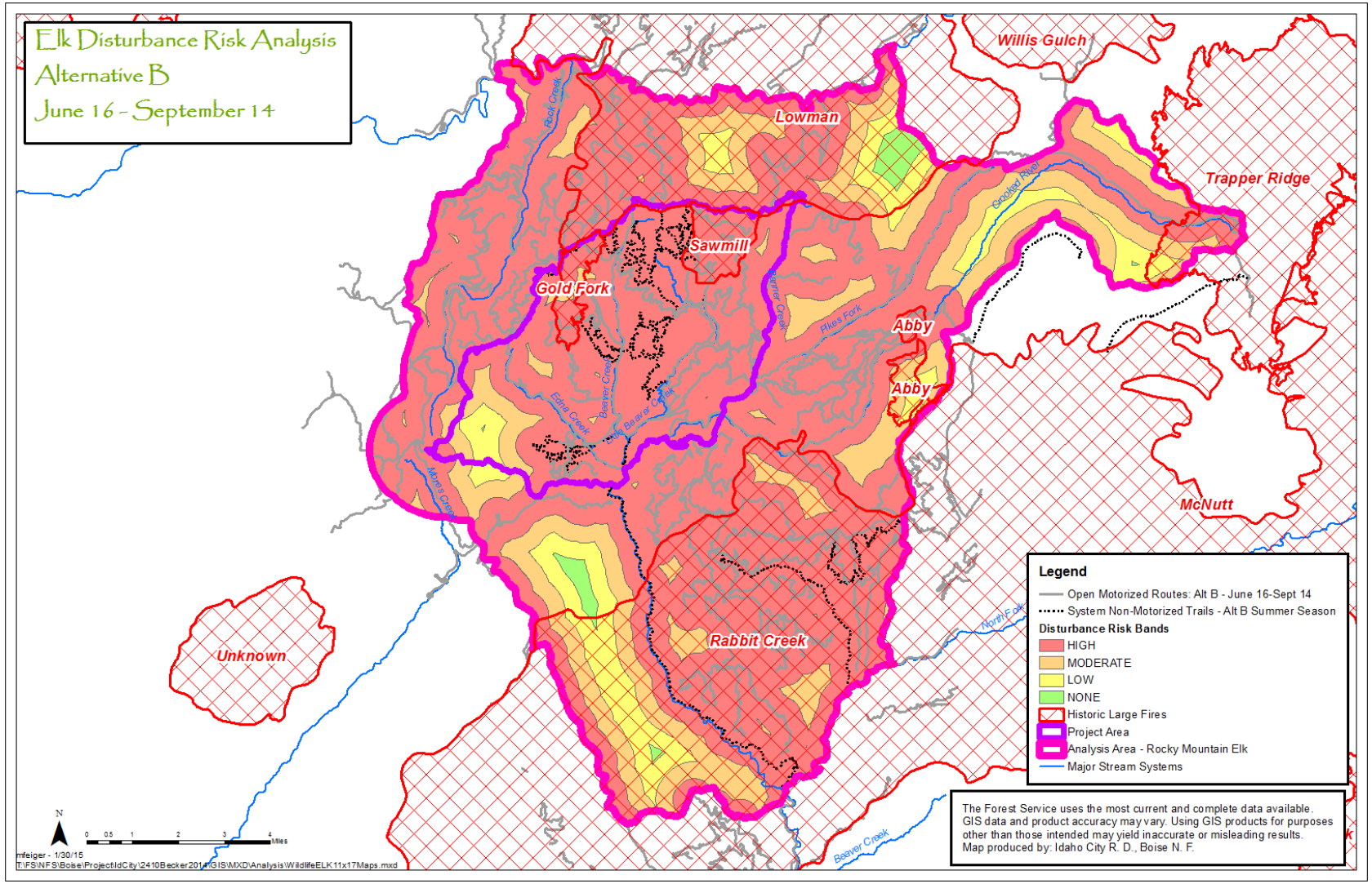


Figure 3-88. Alternative B: Disturbance risk analysis (June 16–September 14) for the analysis area

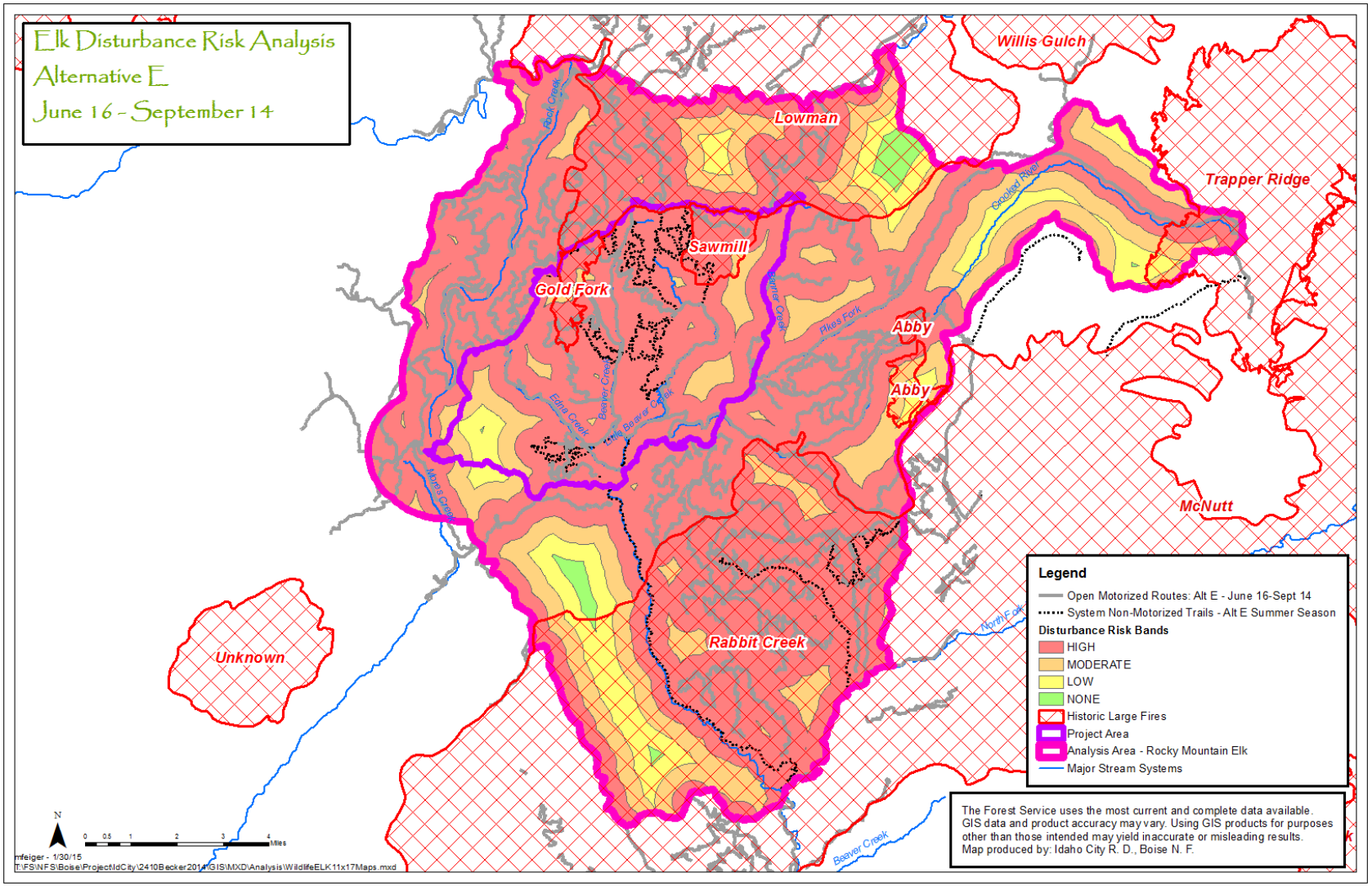


Figure 3-89. Alternative E: Disturbance risk analysis (June 16–September 14) for the cumulative effects analysis area

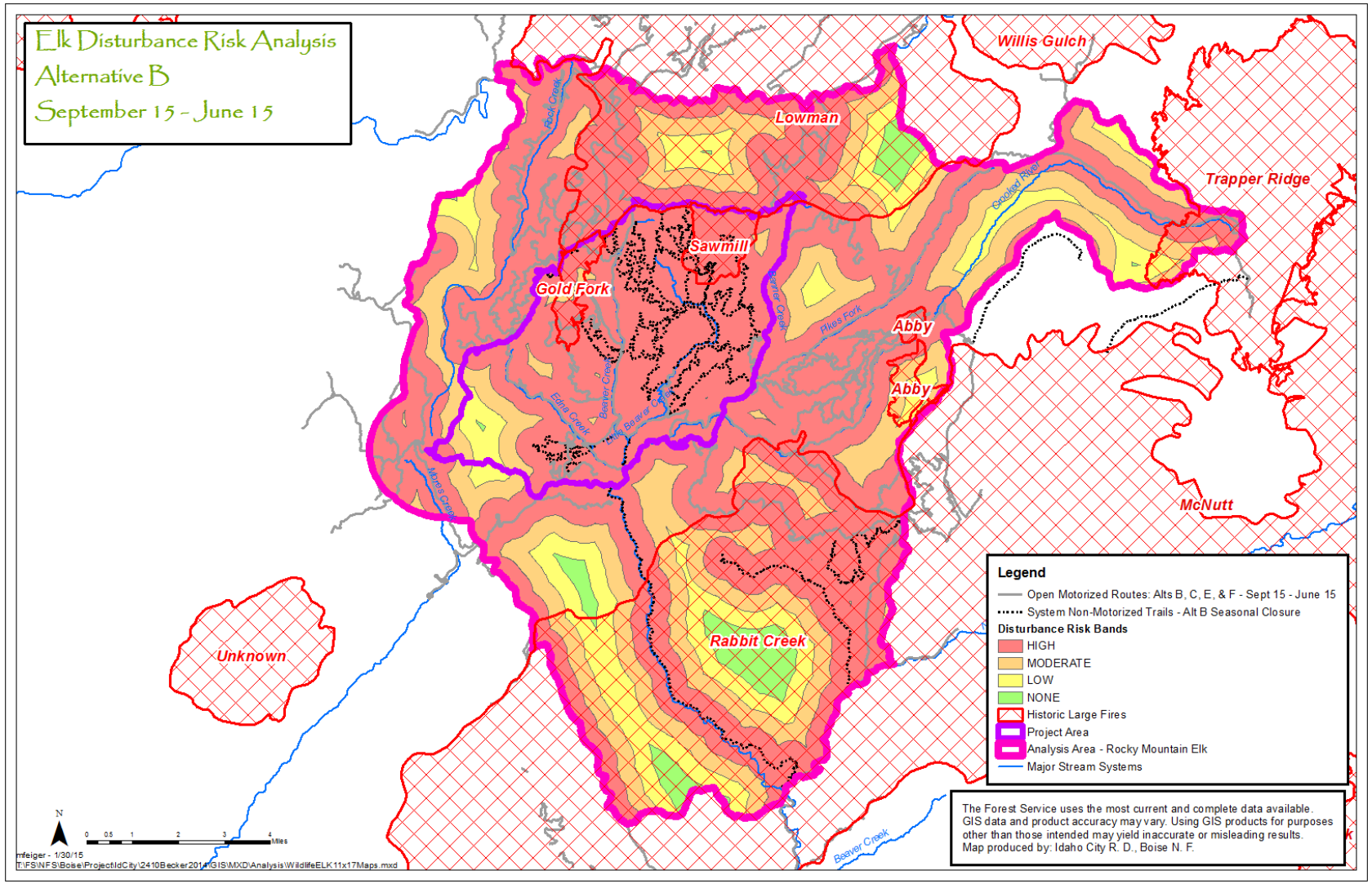


Figure 3-90. Alternative B: Disturbance risk analysis (September 15–June 15) for the cumulative effects analysis area

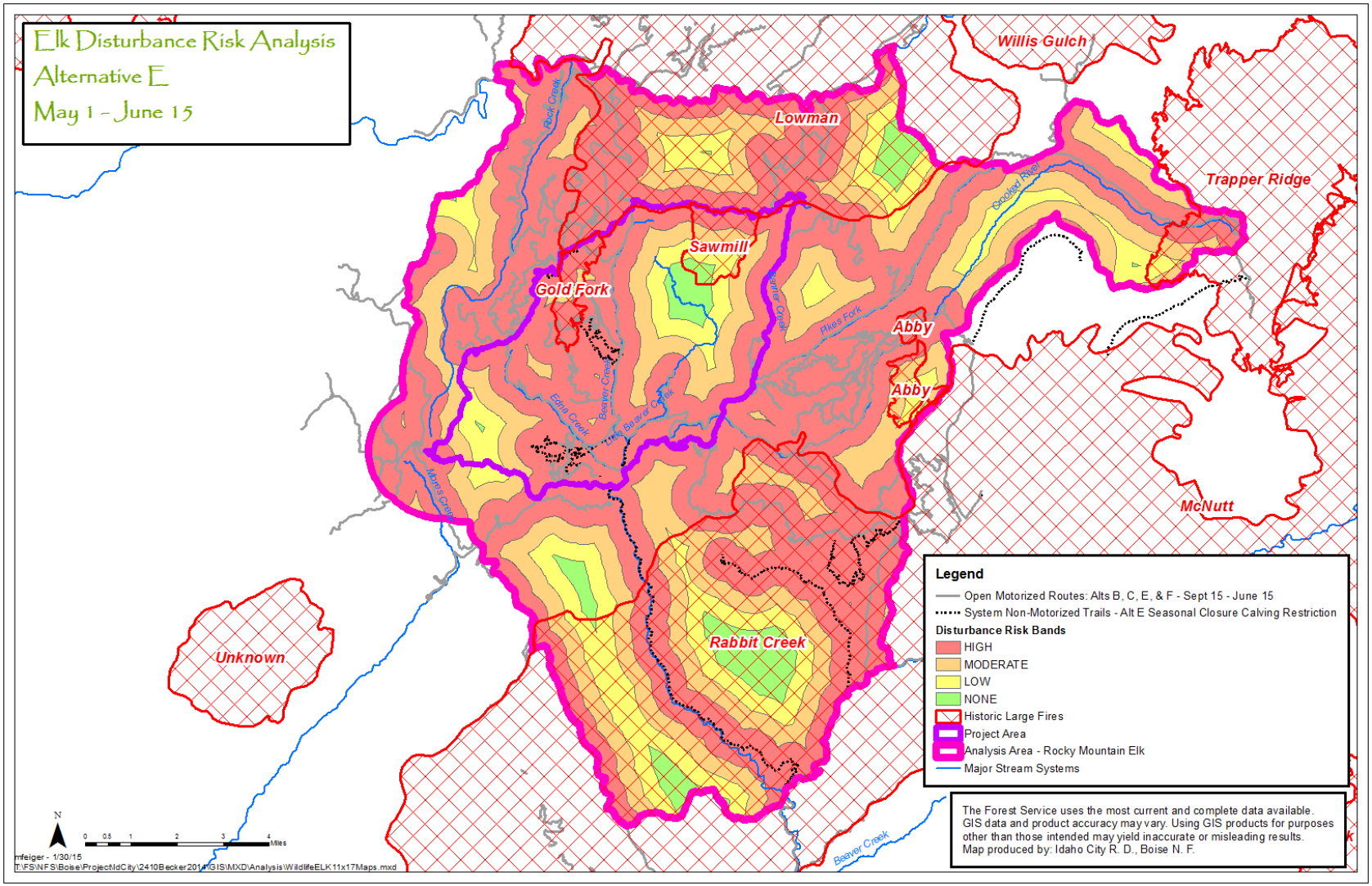


Figure 3-91. Alternative E: Disturbance risk analysis (May 1–June 15) for the cumulative effects analysis area

Gray Wolf

Gray wolf is a sensitive species on the Forest. While this species was formerly listed and protected under the ESA, wolves in Idaho were delisted and are now classified as a game species.

Gray wolves use a wide array of forested and non-forested habitats. They have large home ranges and make seasonal movements in pursuit of their primary prey (ungulates). The primary threat to wolves is human-caused mortality. In fact, human factors have been the greatest source of documented mortality for wolves in Idaho (Mack et al. 2010), with 99% of documented Idaho wolf mortality in 2014 human caused (IDFG/NPT 2014, pp. 49 and 52). Natural deaths are likely underestimated due to the difficulties of documenting mortality in wolves without collars. Roads, trails, and their associated human use and development increase the potential for human-wolf conflict as does the presence of livestock. Mack and others (2010) suggest that the social carrying capacity for wolves will likely be below the biological carrying capacity in Idaho, and that, ultimately, the citizens of Idaho, not habitat, will determine the number of wolves that persist in the state.

Affected Environment

The project area is the primary area considered for the analysis of direct and indirect effects to gray wolves from the actions associated with this Project. In considering the cumulative effects, a larger Analysis Area was used. This area is the same as that considered for Rocky Mountain elk and is fully described in the “Cumulative Effects” section for elk.

The Project area lies in the Sawtooth wolf management zone, exclusively within GMU 39. The Analysis Area also encompasses portions of GMUs 33 and 36. At the end of 2011, 10 packs remained in the zone, 4 of which were classified as breeding pairs (i.e., an adult male and a female wolf that have produced at least two pups that survive until December 31 of the year of their birth).Wolves are known to occur within the Project and Analysis Area and may be present throughout the year. In 2014, the project area was largely occupied by the Breadwinner pack (IDFG/NPT 2014, pp. 50)

Human Use and Development

The project area consists of primarily of NFS land. Developments include the Edna Creek and Whoop ‘em Up Campgrounds, Beaver Creek Cabin, and IDPR yurts. Special uses outfitter guide special use permits for hunting. Primary spring-through-fall recreational activities are camping, fishing, hunting, berry-picking, fuelwood gathering, and OHV riding. Highway 21 and the NFS road 384 provide access to other popular recreational areas.

The North Fork and Boise Basin sheep and goat allotments are active within the Project and Analysis Areas. Historically, wolf packs occupying both areas have caused livestock depredations.

Winter activities include snowmobiling and hunting, with a skiing, hiking, or snowshoeing occurring throughout much of the project area, largely facilitated by the groomed and un-groomed non-motorized routes managed by IDPR (Park ‘n’ Ski). Highway 21 is a maintained (plowed) State highway and forms the southern boundary of the analysis area. Snowmobiling is generally restricted to roads and trails built on old roads, though some off-road/trail activity occurs. Portions of the project area are excluded from motorized over-snow travel

through a Primitive Non-Motorized Recreation management designation (recreation technical report, available in the project record). Several roads and an area at the southern end of the Analysis Area are closed to over-snow vehicles by special order to reduce impacts to wintering big game.

Road and route densities are important in that they provide context for human access to gray wolf habitat. High levels of access can contribute to increased risk of human-related mortality, including authorized and unauthorized hunting mortality and collision-related mortality. Road and non-motorized trail densities are high in the project area, particularly during the summer (Table 3-84 and Table 3-85). Desired road densities for Rocky Mountain elk are identified in Table 3-84 and Table 3-85 below to provide context of a desired versus existing conditions for route densities.

Table 3-84. Summary open road and open route densities, project area

Time Frame	Motorized Routes Only	Motorized and Non-Motorized Routes	Desired Density (IDFG 2014a)
June 16–September 14	2.88 mi/mi^2	3.95 mi/mi^2	0.7–1.7 mi/mi^2
September 15–June 15	1.99 mi/mi^2	3.54 mi/mi^2	

Table 3-85. Summary open road and open route densities, analysis area

Time Frame	Motorized Routes Only	Motorized and Non-Motorized Routes	Desired Density (IDFG 2014a)
June 16–September 14	2.96 mi/mi^2	3.36 mi/mi^2	0.7–1.7 mi/mi^2
September 15–June 15	1.96 mi/mi^2	2.47 mi/mi^2	

Road and trail densities are used as the primary indicators of habitat condition for wolves. The current road and trail density is 3.95 miles per square mile of habitat, which is considered high (Table 3-84). All trails within the project area are non-motorized. While wolves may use roads and trails for ease of travel, this use also exposes them to increased mortality risks during hunting season from poaching and collisions with vehicles. Higher road densities also increase the likelihood of disturbance at den sites.

Location of roads and trails is also important. Roads that are concentrated in one portion of habitat rather than spread out through a wider area may have less of an impact. An area of influence is used to describe the amount of habitat affected by roads and trails. A 0.5-mile buffer surrounding all roads and motorized trails open to motor vehicle traffic has been used to define the ‘area of influence’ and assumes that most human activities occurs within this distance of roads and trails. Currently, 15,202 acres or 79% of the analysis area is within 0.5 miles of a road or trail during the summer, indicating roads and trails are widely distributed throughout the analysis area (Table 3-86).

Table 3-86. Acres and percentage of the Area of Influence within 0.5 miles of a road or trail

Time Period	Acres	Percent Analysis Area
June 16-Sept 14	18,044	93%
Sept 15-June 15	15,202	79%

Ungulate Prey

Maintaining habitat for prey (primarily elk and deer) is also an important management consideration.

Environmental Effects

Direct and Indirect Effects

Environmental consequences to gray wolves and wolf habitat focuses on the effects from changes to the motorized transportation system, including the number of miles of NFS roads open to all motor vehicles and the miles of motorized trails designated as open to specific classes of motor vehicles. Changes in this infrastructure can affect wolf populations through disturbance effects to individuals (particularly important during breeding neonatal development time periods) and the risk of mortality through authorized hunting seasons. Other transportation-related actions, including designating additional primitive non-motorized over-snow travel areas, authorizing non-motorized over-snow routes and constructing non-motorized trailheads would not affect this species. Actions proposed under Alternatives B through F associated with vegetation management, fuels treatments, culvert replacements, and implementation of transportation actions would result in short-term direct effects and are briefly discussed. However, these actions would not detrimentally modify wolf source habitat.

The “Environmental Effects” section for Rocky Mountain elk discusses the same indicators and measures as this analysis. Specifically, the discussions under “Vulnerability to Hunting Mortality” and the component of “Hunter Access and Density” address potential effects to gray wolves.

The potential for human-conflict and human-caused mortality is directly related to human development and access. Road and trail densities are used as indicators for risks. The area of influence is used to describe the extent of impacts throughout the analysis area.

Alternative A

Alternative A would maintain the current transportation infrastructure within the project area, including the existing miles if NFS roads and non-motorized trails, number of trailheads, and the unauthorized non-motorized trail network managed through an agreement with IDPR. Existing Maintenance Level designations for the road system would remain, which would maintain the miles of routes open to motorized travel in the project area. Specific season designations for access would remain. No changes to management and maintenance of the existing infrastructure, including the unauthorized non-motorized trail network would occur. IDPR would continue to maintain and operate those routes, including those used by non-motorized recreation users, as described in their existing agreement with the Forest Service. No vegetation or fuel management actions would occur under this alternative.

Implementing this alternative would have no direct effects to grey wolf.

The magnitude, duration, and intensity of short-term and long-term effects would be maintained under this alternative. As noted in Table 3-87, there would be no change during the time frame of June 16 to September 14. Under Alternative A, 93% of the project area would be within 0.5 miles of an open motorized route during the summer; that percentage

would be reduced to 79% during fall and spring. No short-, mid-, or long-term change would occur under this alternative to conditions or risk of mortality.

Table 3-87. Road and trail densities and area of influence by alternative

Time Period	Alternative	Road Density (mi/mi2)	Motorized Trail Density (mi/mi2)	Non-motorized Trail Density (mi/mi2)	Total Road/Trail Density (mi/mi2)	Area of Influence	
						(acres)	(percent analysis area)
June 16–Sept 14	Alternative A	2.9	0.0	1.1	4.0	18,044	93%
	Alternative B	1.9	0.8	1.3	4.0	17,451	90%
	Alternative C and D	2.1	0.7	1.3	4.1	17,614	91%
	Alternative E	1.9	0.0	1.5	3.4	16,344	85%
	Alternative F	2.1	0.6	1.4	4.1	17,541	91%
Sept 15–June 15	Alternative A	2.0	0.0	1.7	3.5	15,202	79%
	Alternatives B, C, and F	1.6	0.0	2.3–2.5	3.9–4.1	13,795	71%
	Alternative D	1.8	0.0	2.3	4.1	14,171	73%
	Alternative E	1.6	0.0	1.7	3.3	13,795	71%
May 1–June 15	Alternative E	1.6	0.0	0.4	2.0	N/A	N/A

All Action Alternatives

As noted above, all action alternatives would functionally implement the same actions, particularly in relation to vegetation, fuels, culvert replacements, and general transportation actions. The “Elk” Section describes the direct effects associated with those actions. In the short term, disturbance and displacement effects would be anticipated for any wolves occupying habitats adjacent to those activities. However, Design Features WR-12, WR-13, WR-14, WR-15, TS-6, and TS-7 proposed to mitigate disturbance effects to elk would also benefit occupying wolves, particularly during breeding and neonatal development seasons.

Design Features WR-15, TS-6, and TS-7 would specifically limit access to portions of the project area during project implementation. These design features would further reduce the risk of hunting mortality, particularly as that risk is associated to other disturbance effects that would make wolves more vulnerable.

Indirectly, as noted in the “Elk” section, changes to vegetation structure and density through mechanical vegetation treatments and application of prescribed fire could increase risk of hunter-related mortality through a reduction in security cover. Lower-story stand densities and structure complexity would increase sight-distances of hunters in the forested habitats, and in doing so, would make wolves more vulnerable to detection during authorized hunting seasons. In part, changes to the transportation system mitigate some of those effects by incrementally reducing the density and distribution of motorized routes in the project area.

Alternatives B, C, D, and F

In addition to the direct and indirect effects described for all action alternatives, Alternatives B, C, D, and F would implement the construction and designation of 18–23 miles of motorized trails open to vehicles ≤50 inches or 60 inches wide, depending on the alternative. These alternatives would add to the direct and indirect effects of disturbance and increases the risk of hunting mortality for wolves, in much the same vein as described for elk (see the "Elk" section).

Compared to Alternative A, open road density decreases under Alternatives B, C, D, and F by 0.8–1.0 mi/mi^2 during the summer, and 0.2–0.4 mi/mi^2 in the fall and spring (Table 3-87). However, implementing the motorized trail routes reduces routes opens to motor vehicles by only 0.1–0.2 mi/mi^2 during the summer, a negligible reduction in motorized access compared to the existing condition. During the fall and spring, some of the effects from motorized trails would be mitigated through seasonal closures. This mitigation is reflected in both the change in miles of open roads and the percent of the project area within 0.5 miles of an open road (Table 3-87). That measure decreases with each of these action alternatives, reducing from existing conditions by 6%–8%, depending on alternative. The closures would be in effect from September 15 through the following June 15, which would reduce disturbance effects from motorized access and risk of hunter-related mortality. However, they would still contribute to total route density (Table 3-87), resulting in an increase in total route density when compared to Alternative A. They, in effect, would increase both motorized and non-motorized access to a portion of the project area that is less accessible under current conditions across all seasons considered.

Alternatives E and F

Alternative E and F would have slightly different direct effects associated with implementing mechanical vegetation treatments, specifically those associated with product removal. Under both alternatives, a portion of the treatments would be conducted using helicopter yarding systems, which would reduce the total miles of temporary and reopened ML 1 roads. This reduction would incrementally reduce the risk of effects related to temporary roads. However, overall disturbance and displacement would likely be greater under Alternatives E and F because of greater effect associated with helicopter disturbance. Of the two alternatives, Alternative E proposes the most acres of helicopter logging. As such, Alternative E would have the greatest reduction in disturbance and displacement effects when compared to Alternative F and the remaining action alternatives.

Alternative E

Under Alternative E, motorized trail routes would not be constructed or designated. Where existing motor vehicle routes (ML 1 and ML 2) would be converted or dual designated as a motorized trail under Alternatives B, C, D, and F, Alternative E would maintain current ML 1 routes and designate other routes as ML 2—Administrative Access Only or decommission route segments. As noted in Table 3-87, this difference would result in a substantially greater reduction in motorized and all-route densities compared to the other alternatives. This difference is particularly true during a portion of the breeding season and early neonatal development period (May 1–June 15), where the total route density reduction would be 1.7 mi/mi^2. Concurrently, this alternative would also result in the greatest reduction in risk of

hunting mortality through the reduction in percent of the project area within 0.5 miles of an open road. During fall, winter, and spring hunting seasons, hunting risk in that area would be reduced by 8% from existing conditions (Table 3-87). This alternative would also not adopt the motorized trail routes, thus further limiting non-motorized access to the project area and reducing that risk of mortality. The consequences of this change are described in more detail in the "Rocky Mountain Elk" section. Alternative E would result in the greatest reduction in risk of disturbance and displacement effects and vulnerability to hunting mortality of all action alternatives.

Cumulative Effects

The cumulative effects analysis area for grey wolf was the same as that used for Rocky Mountain elk (Figure 3-65). This larger Analysis Area encompasses a reasonable landscape pertinent to a wolf pack that has historically occupied the project area and represents a reasonable territory area for typical wolf packs on the Idaho City Ranger District.

The "Cumulative Effects" section discusses cumulative effects from the action alternatives on Rocky Mountain elk. Components of that analysis addressing disturbance and displacement effects and vulnerability to hunting mortality are applicable to gray wolf. That section also includes information regarding applicable past, present, and reasonably foreseeable future actions.

Alternative A

The absence of actions contributing to direct and indirect effects to wolf and wolf habitat preclude this alternative from having any cumulative effects.

Action Alternatives

All action alternatives would result in cumulative effects to wolves and wolf habitat. All action alternatives would affect vulnerability to hunting mortality through the manipulation of forest cover that would otherwise serve as security cover for hunted wolves. The cumulative reduction in security cover would increase vulnerability to hunter-related mortality. The relative difference between alternatives would be incremental.

Alternatives B, C, D, and F would result in increased cumulative effects to disturbance and displacement effects compared to the existing condition due to the designation of motorized trail routes. Such designation would increase access to areas not currently accessed by motorized or non-motorized routes and increase wolf vulnerability to hunting mortality.

Alternative E, in contrast to the other action alternatives, would measurably decrease the cumulative effects of disturbance and displacement and vulnerability to hunting mortality by reducing the miles of routes open to motor vehicles and reducing the overall density of routes available to motorized and or non-motorized travel.

Determination

Implementing Alternatives B, C, D, E, and F **may impact individual wolves, but would not lead toward a trend of federal listing or loss of viability.**

The degree of impact varies between action alternatives, with Alternatives B, C, D, and F resulting in additive cumulative effects from the designation of the motorized trail routes, as well as direct and indirect effects associated with many of the proposed actions.

Alternative E would reduce the cumulative effects of disturbance and displacement associated with motorized traffic and access by reducing the miles of open motorized routes available for that traffic, as well as the net routes open to motorized and non-motorized travel.

3.5.2.5 Family 7—Forests, Woodlands, and Sagebrush

Species in Family 7 use a complex pattern of forest, woodlands, and sagebrush cover types (Wisdom et al. 2000). A distinguishing feature of the family is that most species have specialized requirements for nesting and roosting which often limits population size and distribution.

Two sensitive species are members of Family 7: spotted bat and Townsend's big-eared bat. Townsend's big-eared bat was selected as a focal species.

Townsend's Big-eared Bat (Sensitive, Focal Species)

The Townsend's big-eared bat is a year-round resident of the Interior Columbia River Basin and is considered a forest generalist within the subalpine, montane, upland woodland, and riparian woodland community groups (Wisdom et al. 2000). This species uses caves, mines, and buildings for roosting where they aggregate in large colonies. Townsend's big-eared bats forage for moths in sagebrush, bitterbrush, and open ponderosa pine forests. The distribution of this species is patchy due to their specialized roosting requirements. Primary threats are related to human disturbance and loss of roost sites and hibernacula. Big-eared bats are negatively affected by the presence of roads which increase the potential for harassment of bats at roosting sites and hibernacula (Wisdom et al. 2000).

On the Forest, vegetative communities that could provide source habitat conditions include PVGs 1, 2, 3, 4, 5, 6, and 7 in all size classes and the low canopy cover class; and nonforested vegetation types (e.g., low sagebrush, mountain and Wyoming big sagebrush, montane shrub, and shrub-forest transition) (Geier-Hayes and Nutt 2008). In addition, PVGs 8 and 9 could provide source habitat when outside their HRV. These types provide source habitat when located within the maximum foraging distance (15 miles) from roost (caves, mines, and other suitable structures) locations.

Affected Environment

The analysis area for Townsend's big-eared bat is the entire project area since the entire area is within the maximum foraging distance of potential roost sites. All stands with proposed vegetation treatments under the action alternatives are included in the 19,327-acre analysis area.

The species has not been documented in the analysis area. The closest observation is located approximately 22 miles southwest of the project area.

The majority of the analysis area is capable of providing habitat for Townsend's big-eared bats. The analysis area does not contain the non-forest vegetation types described for source habitat.

One underground mine and one building structure exist within the project area that could potentially provide roosting habitat for this species. Neither the building nor mine has been surveyed to determine whether big-eared bats use them for an evening roost or maternal roost site. Numerous additional potential roosting sites occur within 15 miles of the project area, further increasing the potential the project area could serve as foraging habitat. Few of these additional sites have been surveyed for bat presence or occupation. Of those surveyed, none have resulted in detections of Townsend's big-eared bats.

Due to the presence of potential roosting sites within 15 miles and potential roost sites within the project area itself, Townsend's big-eared bats may be using the analysis area for foraging and/or roosting activities. Source habitat occurs in conjunction with open forest conditions. Riparian areas have been indicated as a preferred foraging habitat in part because the diverse plant communities often provide an abundant and diverse source of insect prey. Riparian areas are common throughout the analysis area with Beaver Creek being the largest and providing more open habitats for foraging above the stream. Dobkin et al. (1995) reported that Townsend's big-eared bats generally occur in more open habitats and that little foraging activity occurred in more densely forested areas.

Environmental Effects

Direct and Indirect Effects

Alternative A

Short- and long-term source habitat would decline under Alternative A due to increasing stand densities. Some fluctuation in declines or increases in source habitat would be expected in mid- to upper-elevation PVGs under historical processes and conditions. However, lower elevation PVGs that historically may have provided source habitat would trend toward denser canopy conditions without disturbance processes that would have maintained open habitat conditions for long periods of time. Since no activities are proposed under this alternative, no risk of disturbance to roosting bats would exist should they be present.

Action Alternatives

No known roost sites exist in the proposed vegetation management units, and potential roosting sites, such as wooden buildings or old mine adits within the analysis area would not be directly affected by activities proposed under the action alternatives. Design Feature WR-1 would help avoid or minimize disturbance to reproductive individuals from implementing proposed activities should a roost site be discovered. Therefore, any effects to this species would be expected to occur in foraging habitat only.

Potential effects to foraging habitat from vegetation management, road construction and maintenance, recreation, or prescribed burning activities include noise, disturbance, and vegetative disturbance. Impacts from noise and disturbance are not expected based on the nocturnal foraging habits of this species, excluding it from human interactions during project activities that would occur during daylight hours. Altering the vegetative landscape from project activities could potentially affect the foraging habitat of the Townsend's big- eared bat.

Forest management practices have the greatest benefits to bats when they promote diverse structural conditions, maintain a diversity of snags in various stages of decay, retain large

diameter snags, maintain or restore riparian habitat, and create edge or small-to-medium canopy gaps for foraging (Taylor 2006, Keinath 2004, Hester and Grenier 2005). Under all action alternatives, the proposed vegetation management activities would retain large tree stands in the large tree size class; create more open canopy conditions; create edge or small-to-medium canopy gaps through the use of intermediate harvest treatments to thin trees larger than 8 inches dbh in the stand but generally less than 20 inches dbh, achieve desired stand densities and species composition suitable to the fire regime and habitat type, and retain snags that do not pose a safety hazard to operators. Prescribed burning activities under the action alternatives would break-up horizontal and vertical fuel continuity to reduce the chance of uncharacteristic stand replacement fires. Prescribed fire treatments are expected to reduce the overall surface fuel load while increasing the canopy base height to trend towards or maintain high frequency/low intensity fire regimes. Within the mixed severity fire regimes, prescribed fuel treatments are expected to reduce fuel loads to decrease the likelihood of a landscape scale wildfire.

All action alternatives treat the same amount and number of acres with the exception of Alternative D, which treats 182 acres more than Alternatives B, C, E or F. Given that Townsend's big-eared bats will forage within a 15-mile radius of a roost site, this acreage difference is not a consequential change. In summary, source habitat under the action alternatives would be expected to increase in the short term due to the reduction in canopy cover associated with proposed vegetation treatments. Source habitat would be less abundant by 2044 as open canopy stands would begin to close over time.

Cumulative Effects

All Alternatives

Past actions affecting vegetation composition and structure include timber and salvage sales, noncommercial thinning, wildfire, and fire suppression. Road construction results in habitat loss but also creates edges along which bats may forage. No reasonably foreseeable future action was identified. Ongoing actions potentially impacting Townsend's big-eared bats are described below.

Beaver Creek Guard Station (Ongoing)—Building provides potential roost site within the analysis area. Activities proposed within the action alternatives would not add to nor affect any potential roost site and would instead decrease canopy cover conditions of certain forested stands and improve the suitability of the habitat for foraging activity by this bat species. Therefore, no cumulative effects of the proposed activities combined with the Beaver Creek Guard Station are expected on the Townsend's big-eared bat.

Underground Mining (Ongoing)—One underground mine has been identified within the project area as potential roosting habitat for this bat species. Activities proposed under the action alternatives would not add to nor affect this potential roost site. Activities proposed under the action alternatives would instead decrease canopy cover conditions of certain forested stands and improve the suitability of the habitat for foraging activity by this bat species. Therefore, no cumulative effects of the proposed activities combined with the underground gold mine effects are anticipated on this species.

Determination—Implementing Alternatives B, C, D, E or F **may impact individual Townsend's big-eared bats but would not lead toward a trend of federal listing.**

3.5.2.6 Family 13—Riverine Riparian and Wetland

Source habitat for species in Family 13 occurs in conjunction with riverine riparian and wetland areas. Some species within the family also use non-riverine riparian and wetland habitats. Adjacent forests and woodlands provide nesting sites for some species.

Two sensitive species are members of this family: bald eagle and Columbia spotted frog. Spotted frog was also selected as a focal species for the project. Both species have a close association with riparian and aquatic habitats (described in the fisheries section). Relevant watershed indicators have been identified and correlate to conservation principles identified in the Forest's WCS (USDA Forest Service 201a, Appendix A). Each indicator is presented as a relative risk to species persistence in the analysis area. The desired condition is the low risk category. These watershed condition indicators are discussed in detail in sections 3.8 and 3.9.

The analysis area includes the two 6th HUs that comprise the Clear Creek watershed (5th HU): Lower Clear Creek (170501200701) and Upper Clear Creek (170501200702). The use of watershed boundaries provides consistency between resources evaluating the effects to riparian habitat and riparian associated species.

Columbia Spotted Frog (sensitive, Focal Species)

Columbia spotted frog is a sensitive species on the Forest. Because it also serves a variety of functional roles within the community and is associated with habitat elements used by other species in the family, Columbia spotted frog was selected as a focal species.

Columbia spotted frogs are aquatic and typically occur in or near permanent bodies of water such as lakes, ponds, slow moving streams, and marshes (Gomez 1994). The frogs generally occur along the marshy edges of such sites where emergent vegetation (e.g., grasses, sedges, cattails) is fairly thick and where an ample amount of dead and decaying vegetation occurs. Some occupied sites may also have a layer of algae or small vegetation (e.g., duckweed) on the surface of the water. During summer, they may travel away from breeding sites but are still typically associated with aquatic sites with vegetated margins (Gomez 1994). Given the altitudinal range of the species, occupied aquatic sites may be surrounded by a wide variety of terrestrial vegetation, including mixed coniferous and subalpine forests, grasslands, and shrub-steppe communities.

Patla and Keinath (2005) describe three seasonally occupied habitats. Breeding sites are used for egg deposition and larval development. These sites consist of stagnant or slow-moving water with some shallow (10–20 centimeters deep) water available. Emergent vegetation (sedges) is usually present. Foraging habitat is used by all post-larval stages of frogs for prey acquisition. These sites can occur as ephemeral pools in forests and meadows, intermittent and perennial streams, edges of rivers, riparian zones, and lake margins and marshes. Over-wintering sites are wet, well-oxygenated, and protected from freezing temperatures. While some sites may be suitable for all three activities, in many areas, these sites are spatially separated, requiring frogs to migrate between sites within the course of a year.

Key features of source habitat for the Columbia spotted frog include the aquatic site itself, its banks and bank-side vegetation, and the conditions of the surrounding uplands. These features can be correlated with watershed pathways used to assess the watershed conditions. Pathways of relevance to the Columbia spotted frog include watershed condition, water

quality, channel conditions/dynamics, and flow/hydrology. No special habitat features have been identified for the Columbia spotted frog.

Affected Environment

The analysis area includes the two 6th HUs that comprise the Crooked River watershed: Middle Crooked River and Pikes Fork. Using watershed boundaries provides consistency between resources evaluating the effects to riparian habitat and riparian-associated species since effects are expected to be contained within the watershed.

No formal amphibian surveys have been conducted in the analysis area. Site visits were made to proposed culvert replacements and replacements where in-stream work would occur, but no spotted frogs were observed during the visits.

Source Habitat

Perennial and intermittent streams occur within the analysis area. Most streams are swift moving and have moderate-to-high gradients atypical of habitat described in the literature. Floodplain development is limited by the often steep V-profile of drainages and marshy stream edges and side pools are rare. Suitable habitat is not extensive but does occur in conjunction with some side channels or where pools form along benches. Springs, seeps, and ephemeral ponds are not common but also occur within the analysis area.

RCAs have been defined for the analysis area and include intermittent and perennial streams, springs, seeps, ponds, and wetlands. Site potential tree heights are used to define RCAs. These heights vary depending on the PVG and are described in Design Feature WF-1 (Chapter 2). One site potential stream height was the RCA buffer distance used for intermittent stream channels and two site potential tree heights was used for perennial streams. Because the project area contains a wide array of PVGs, the dominant PVG based on the most recent vegetation data was used to delineate RCAs (see section 3.9.5.3).

Because the spotted frog is primarily an aquatic species, the watershed condition indicators identified for the Aquatic Conservation Strategy (USDA Forest Service 2010a, Appendix B) were used to reflect habitat condition and trends for spotted frogs. The indicators used to describe the baseline condition for spotted frogs are in Table 3-88. These indicators are tied to Conservation Principles 8 and 9 (USDA Forest Service 2010a, Appendix E) and can be cross-walked to risk to the species. Indicators Functioning Acceptably (FA), are low risk to the species, whereas indicators Functioning at Risk (FR) are in the moderate risk class, and those rated as Functioning at Unacceptable Risk (FUR) are in the high risk category. Few indicators are currently within desired conditions (i.e., FA). Most indicators are classified as moderate (FR) to high (FUR) risks to the species. Indicator ratings vary between the two 6th HUCs for the following indicators: temperature, disturbance, chemical contaminants, streambank condition, floodplain connectivity and disturbance regime.

Roads and motorized trails impact spotted frogs through habitat loss and fragmentation, collisions, and by creating barriers to movements. Road Density and Location is FUR for both subwatersheds as they both exceed the desired condition of <0.7 miles per square mile (mi/mi^2) (Table 3-88)—road density for the Middle Crooked River subwatershed is 5.7 mi/m^2; while the Pikes Fork subwatershed is 6.48 mi/m^2.

The RCA WCI for both subwatersheds is FR. Past land management activities—logging, road construction, and mining—have contributed to fragmented habitats and altered hydrologic, sediment and temperature regimes. Some of these influences have recovered over time, however, roads and fish barriers at stream crossings continue to hinder attainment of desired conditions. Both subwatersheds have had very little fire in the past several decades and are at high risk of uncharacteristic wildfire due to fuels conditions and missed fire cycles. This increased risk of wildfire has also contributed to the Disturbance Regime risk rating (Table 3-88).

Temperature, Sediment, and Chemical Contaminants/Nutrients are the WCIs for water quality. Temperature is FUR for the Middle Crooked River subwatershed and FR for the Pikes Fork subwatershed (Table 3-88). Monitoring data from the USFS Rocky Mountain Research Station indicates maximum weekly maximum temperatures (MWMT) average 15 °C with a minimum of 12.9 °C and a maximum of 19.6 °C for both subwatersheds. Data in the Pikes Fork subwatershed have a mean of 14 °C with a minimum of 9.5 °C and a maximum of 19.1 °C. The data indicate cooler water in the headwaters areas with warmer water in lower reaches exceeding desirable salmonid life stage ranges. Stream surveys indicate that surface fine sediment <6 mm in size is elevated. Sediment data in the Middle Crooked River subwatershed from the Forest Aquatics Database, PIBO, and BURP show average surface fines to be 31%, 40%, and 46%, respectively. Within the Pikes Fork subwatershed, sediment data are limited to mostly Forest Aquatic Database (n = 28) and have a mean of 53% with a range of 1% to 94%. GRAIP_Lite sediment analysis indicates that 278 tons/year and 194 tons/year of road related sediment is being delivered to streams in Middle Crooked River and Pikes Fork subwatersheds, respectively. Thus, this WCI is FUR for both subwatersheds (Table 3-88). Chemical Contaminants/Nutrients is the only water quality WCI functioning appropriately for either watershed (Table 3-88). No 303(d) listed streams or TMDLs occur within either subwatershed, and sources of chemical contamination are limited in both subwatersheds with a couple exceptions. The area includes an active sheep grazing allotment; however, areas of over use or water quality contamination by sheep have not been encountered during field visits within the analysis area. Numerous mining claims also occur throughout the analysis area, yet few are large-scale mines with the exception of the Banner Mine. Adit and spring discharge with elevated levels of arsenic/cadmium/chromium/lead/mercury/silver that exceed state groundwater and drinking water standards has been documented at the Banner Mine in the Pikes Fork subwatershed (IDEQ 2008). The Pikes Fork subwatershed is FR (Table 3-88) due to this adit discharge.

While the Pikes Fork subwatershed has a FA rating for Streambank Condition, field visits indicate the condition of the proposed Pikes Fork trailhead site is having localized and measurable negative effects on this WCI. No foreseeable future project has been proposed to correct this disturbance, which is adjacent to bull trout designated critical habitat. High road density has contributed to a rating of FR for Stream Bank Condition in the Middle Crooked River subwatershed and the ratings for Floodplain Connectivity and Drainage Network Increase for both subwatersheds (Table 3-88).

No active surface water diversions occur in either subwatershed. Past vegetation management and fires have resulted in 4% and 5% Equivalent Clearcut Area (ECA) for Middle Crooked River and Pikes Fork subwatersheds, respectively; which is well below the amount required to detect changes in water yield. High road densities within these areas may route water to

the channel faster and increase peak flows from precipitation events. However, stream hydrographs are dominated by spring snowmelt and not precipitation event flows, so it is unlikely that the largest peak flows are significantly altered by increased drainage network from roads. Therefore, Change in Peak/Base Flows for these subwatersheds is F

Table 3-88. Baseline conditions of watershed indicators relevant to Columbia spotted frog

Pathway	Pathway Indicator	Desired Condition	Middle Crooked River Subwatershed	Pikes Fork Subwatershed
Watershed Condition	Road Density and Location	Total road density <0.7 miles/square mile in the subwatershed and no roads within the RCA	FUR	FUR
	Riparian Conservation Areas (RCAs)	RCAs within the subwatershed have historic and occupied refugia for listed, sensitive or native/desired nonnative fish species which are present and provide adequate shade, large woody debris recruitment, sediment buffering, connectivity, and habitat protection to minimize adverse effects from land management activities (>80% intact).	FR	FR
	Disturbance Regime	Disturbance resulting from land management activities are negligible or temporary. Streamflow regimes are appropriate to the local geomorphology, potential vegetation and climatology resulting in appropriate high quality habitat and watershed complexity that provide refugia and rearing space for all life stages or multiple life-history forms. Ecological processes are within historical ranges. Resiliency of habitat to recover from land management disturbances is high.	FUR	FR
Water Quality	Temperature	The 7-day average maximum temperature in a reach during the following life history stages: incubation 2–5 °C, rearing 4–12 °C, spawning 4–9 °C. Temperature does not exceed 15 °C in areas used by adults during migration (no thermal barriers).	FUR	FR
	Sediment	In areas of spawning and incubation, substrate fines (< 0.85 mm) and surface fine (≤ 6mm) should not be more than 12%.	FUR	FUR
	Chemical Contaminants/ Nutrients	Ideal conditions show low levels of chemical contamination from agricultural, industrial, and other sources. Also, ideal conditions show no excess nutrients and no 303(d) water quality limited water bodies.	FA	FR
Channel Conditions and Dynamics	Width/Depth Ratio	Average wetted width/maximum depth ratio in scour pools in a stream reach is ≤ 10.	FA	FA
	Stream Bank Condition	More than 90% of any stream reach has stable banks.	FR	FA
	Floodplain Connectivity	Within RCAs, floodplains and wetlands are hydrologically linked to the main channel. Overbank flows occur and maintain wetland/floodplain functions.	FUR	FR
Flow/ Hydrology	Change in Peak/Base Flows	Watershed hydrograph indicates peak flow, base flow, and flow timing characteristics comparable to an undisturbed watershed of a similar size, geomorphology and climatology	FR	FR
	Drainage Network Increase	Zero or minimum change in active channel length correlated with human disturbance	FUR	FUR

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A would have no direct or indirect effects on Columbia spotted frog. Current watershed condition indicators trends would continue. Some indicators (temperature, width to depth ratio, and stream bank condition) may improve over the long term. These indicators are tied to vegetation structural components, specifically canopy cover (temperature) and large woody debris (width/depth ratio, streambank condition), which are projected to increase in the future. Other indicators are expected to degrade due to continued input of sediment and modification of drainage networks from roads located within riparian areas. While some conditions improve slightly or continue to result in degraded conditions under Alternative A, changes would not be significant enough within the 30-year analysis period to alter the risk ratings.

Action Alternatives

Vegetation treatments are proposed within project=defined RCAs for Alternatives B through F, including commercial thinning, pre-commercial thinning, noxious weed treatments, and fuels treatments. Several transportation activities would occur within RCAs, including road decommissioning, road closure, changes in road maintenance level, numerous road improvement sites, and 23 AOP culvert removals or replacements. Alternatives also include proposed trail construction and relocation within RCAs. Treatment within RCAs is generally the same for all action alternatives with the following exceptions: Alternative D propose slightly more acres of vegetation management treatment; Alternatives E and F propose more miles of road decommissioned, closed, or removed from RCAs, and/or with a change in maintenance level to a lower level of use.

Direct impacts could result from activities implemented in RCAs during the period when spotted frogs are most likely to be active (April–October). Injury or death from falling trees or equipment would be unlikely due to the limited amount of activities implemented within RCAs and the patchy nature of source habitat (i.e., limited overlap of suitable habitat and RCA activities). The more likely scenario would be that foraging activity of some frogs may be briefly disrupted as workers move through RCAs.

Relevant indicators and effects are detailed in the wildlife technical report (available in the project record). In general, the action alternatives have similar anticipated effects with one exception. Sediment/turbidity would be negatively affected in the temporary and short term in the Middle Crooked River watershed for all alternatives except Alternative E where negative impacts would only occur temporarily. This difference in effect is because Alternative E does not propose a motorized loop trail system. Under all action alternatives, short-term and long-term positive impacts are anticipated due to changes in road densities in RCAs and changes in road location. The Middle Fork Crooked River subwatershed would have the greatest improvement and Alternative E would result in the greatest reduction in both road density and RCA road density. Several activities implemented within RCAs are ground disturbing or impact vegetation. Design Features FH-7, FH-8, FH-27, FH-28, FH-29, TS-1, and TS-4 have been included to minimize sediment delivery and facilitate vegetation

recovery following project implementation. Equipment use increases the potential for fuel or oil to enter riparian areas and herbicide treatments may also occur in these areas. Design Features FH-1, FH-2, and FH-3 have been included to avoid or minimize the potential for chemical contamination within RCAs.

While individuals and habitat may be negatively impacted in the temporary or short-term, watershed conditions would be maintained in a degraded condition or improved over the long term as a result of project activities. However, improvements would not be significant enough to change the risk ratings in either subwatershed; therefore, the functionality ratings identified in Table 3-88 would remain the same for each action alternative.

Cumulative Effects

Alternative A

There would be no cumulative effects under Alternative A, as no actions would be implemented.

Action Alternatives

Past actions have been considered in describing the affected environment, and the effects of ongoing actions are reflected in the baseline conditions in Table 3-88. No reasonably foreseeable future action has been identified that could potentially affect spotted frogs.

Proposed motorized trail and road work would have an additive effect to ongoing effects. Sediment generated from these linear landscape features can reduce water quality. Design features have been incorporated to minimize this potential cumulative effect.

Camping and fishing can also impact spotted frog habitat. Where these activities are concentrated in riparian areas, they affect vegetative communities adjacent to the water source and alter structure of the soils (e.g., compaction, erosion, streambank margins) and composition and structure of the plant community (density, species composition and growth form), which contribute to a loss or degradation of habitat. Impacts are generally localized and are reflected in the watershed condition risk ratings. Activities proposed in the action alternatives have incorporated design features to reduce negative impacts to soil, water, and riparian vegetation near water sources and are, therefore, not expected to be additive to ongoing effects.

Legal activity under general firewood permits does not impact frogs as it occurs outside of RCAs (with the exception of road use as noted above). However, a certain level of illegal fuelwood gathering occurs within RCAs. Additionally, campers are allowed to collect firewood anywhere for campfire use. Many bring chainsaws and cut trees, including those within RCAs, which results in a loss of large CWD with subsequent effects on watershed indicators. Large CWD plays a role in sediment capture, nutrient cycling, creation of pools, and hiding and escape cover for spotted frogs. Management proposed in RCAs under the action alternatives is designed to retain sufficient live trees to provide for future large CWD recruitment and would not cumulatively add to the loss of large CWD.

The Idaho City Ranger District’s annual program incorporates a variety of treatments to control noxious weeds, including the use of herbicides. Applicators are trained and follow application guidelines which are intended to minimize impacts to non-target plants and animals, such as the Columbia spotted frog. However, water quality can be affected, although

the potential is low based on the Chemical Contaminant watershed indicator. When noxious weed infestations are reduced or prevented from expanding, spotted frogs benefit through the maintenance of native plants and insects that provide cover, foraging areas, and prey within riparian areas. Design features to reduce the risk of spread or establishment of noxious weeds associated with proposed activities under the action alternatives minimize the risk of this occurring and would not cumulatively add to the ongoing effect of noxious weeds in the project area.

Determination

Implementing Alternatives B, C, D, E and F "may impact individual spotted frogs but would not contribute to a trend of federal listing".

3.6 TRANSPORTATION SYSTEM

3.6.1 Analysis Scale, Data Sources, and Methodology

A Transportation Analysis Process (TAP) report was completed for the project area in 2014 to recommend roads likely and unlikely needed for Forest Management and Travel Access Management (USDA Forest Service 2014b). The transportation specialist used the TAP recommendations, the environmental and Forest management reasons identified for these recommendations, and input from the Interdisciplinary Team and comments received during scoping to identify the Minimum Road System (MRS) and compare the alternatives.

The analysis area for direct, indirect, and cumulative effects to the transportation system is the 19,327-acre project area.

3.6.2 Analysis Indicators

Effects to the transportation system were measured using the following analysis indicators:

- Changes to the transportation system, including miles of road construction, reconstruction, realignment, decommissioning, conversion of unneeded roads to trails, and reduction in annual road maintenance costs associated with progressing toward the Minimum Road System
- Changes to miles of unauthorized road within the project area
- Temporary road construction to support forest product removal operations
- Miles of authorized trails co-located on closed National Forest System (NFS) roads Tranportation

3.6.3 Transportation System

3.6.3.1 Affected Environment

The Environmental Assessment (EA) for the Idaho City Ranger District Motorized Wheeled Vehicle Travel Management Plan was completed in 2009 to implement the Forest Service's Travel Management Rule (36 CFR §261.13, 2007), which required the designation of routes for motorized vehicle use. Motorized travel is only permitted along these designated routes and off-road within 300 feet to access dispersed campsites where indicated on the Motor Vehicle Use map (MVUM).

Within the project area, 51.7 miles of NFS roads are currently open to all vehicles, yearlong. Another 26.9 miles of NFS roads are designated as seasonally open from June 16 through September 14. All routes open for public motorized use are identified on the Idaho City Ranger District MVUM and displayed Map 2 in Appendix J.

The existing transportation system in the project area has three operational maintenance levels (MLs): ML 1, ML 2, and ML 3 (Table 3-89). ML 1 is assigned to intermittent service roads during the time they are closed to vehicular traffic. Basic custodial maintenance is performed as needed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. ML 2 is assigned to roads open for public or permitted use by high-clearance vehicles. Passenger car traffic is not a consideration on ML 2 roads. ML 3 is assigned to roads that are open and maintained for travel by a prudent driver in a standard passenger car. However, user comfort and convenience area not considered priorities. Map 1 in Appendix J displays the existing NFS roads within the project area.

Table 3-89. Existing National Forest System road miles by Maintenance Level (ML) within the project area

Maintenance Level	Miles
ML 1	73.7
ML 2	72.5
ML 3	6.1
Total miles	152.3

Annual road maintenance activities, such as surface blading, culvert and ditch cleaning, and roadside brushing, occur on NFS roads within the project area. Primary routes, including NFS roads 312, 362, and 384, receive annual maintenance, while other routes receive maintenance when funding is available or critical work must be completed.

The Idaho Department of Parks and Recreation (IDPR) grooms approximately 20.5 miles of ski trail on existing NFS roads as part of the Park N' Ski trails system. Snowmobile trail grooming within the project area is performed by Boise County on 8.2 miles of NFS roads 351 and 384 during the winter.

Approximately 8.4 miles of Idaho State Highway 21 lies within the project area and is under the jurisdiction of the Idaho Department of Transportation (ITD). Maintenance crews from ITD perform recurring tasks, such as snow plowing, ditch cleaning, and waste disposal of cutbank slough material in drainage ditch lines, pavement repair, sign maintenance, and drainage improvements.

3.6.3.2 Environmental Effects

Direct and Indirect Effects

The existing transportation system within the project area was developed over time to provide access routes for Forest management activities. The Becker TAP analyzed the road system with respect to risks and benefits in order to recommend changes that would achieve the MRS. Recommendations suggested reducing the number of open system road miles to address undesirable effects to big game habitat, water quality, and other resources. In

addition, the TAP recommended opportunities to convert unneeded roads to other uses, such as trails, to enhance the recreational experience.

The proposed changes to the transportation system listed within the action alternatives below are based on recommendations from the TAP and from public comments received during scoping. See Figure 3-92 below for the locations of roads recommended by the Becker TAP as likely or unlikely needed for future Forest management.

The analysis area for direct and indirect effects to the transportation system is the 19,327 acre project area.

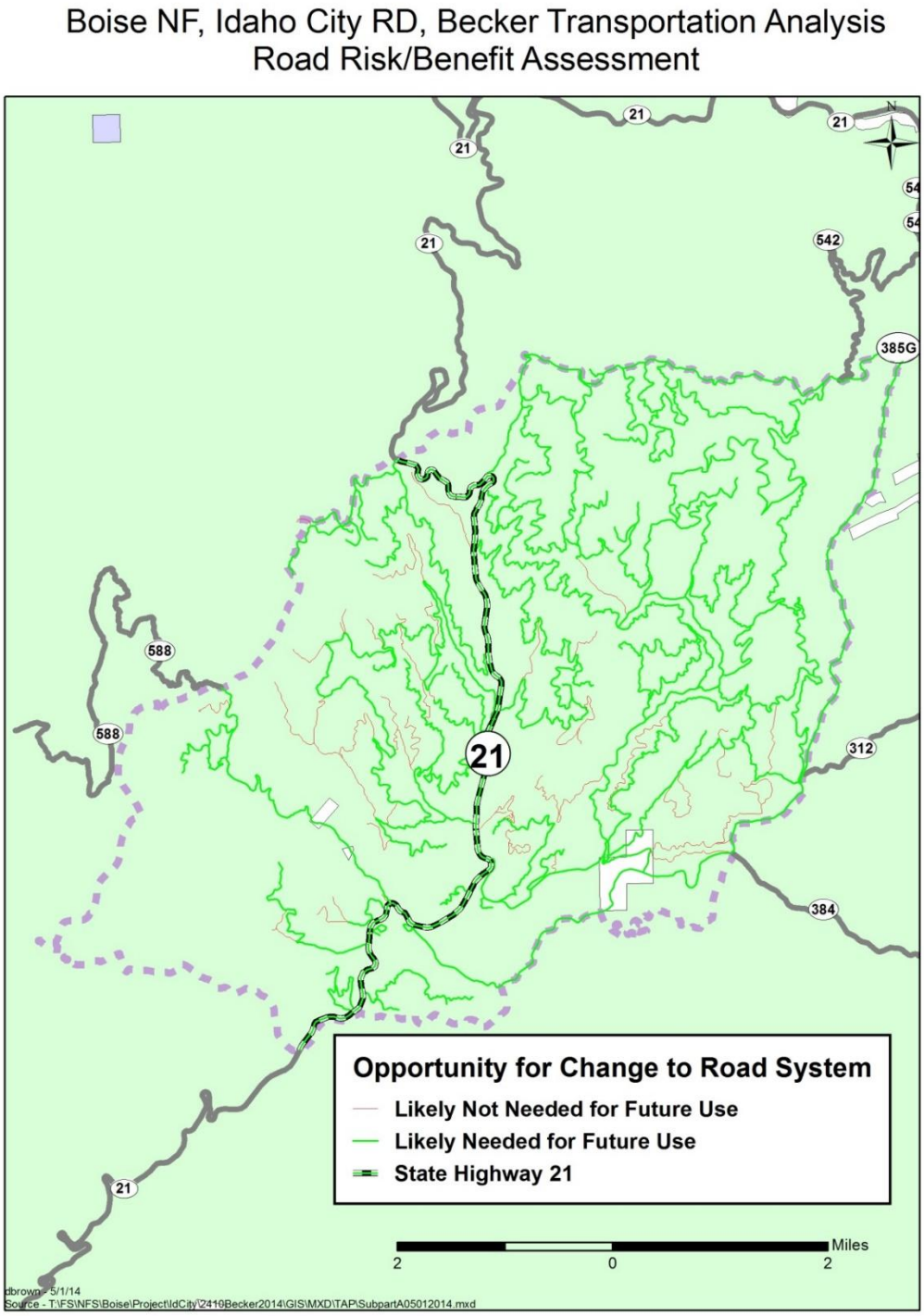


Figure 3-92. Needs assessment for the National Forest System roads from the Becker Transportation Analysis process

Alternative A

This alternative does not propose any changes to the existing transportation system within the project area; therefore, it would not progress toward the recommended MRS by implementing recommendations from the Becker TAP, nor would this alternative reduce road mileage open to public motorized use as recommended by the TAP to reduce the negative effects to big game habitat, water quality, and other resources. Because this alternative does not propose decommissioning any roads, Alternative A would not meet Purpose #2, which states the need to improve watershed conditions by reducing motorized route-related impacts to water resources, fish, soil, and wildlife (and associated habitats) while providing for a safe and efficient transportation system to meet long-term management needs. This alternative would not reduce annual road maintenance costs; maintenance costs would remain at $133,776, annually. Because NFS road 393 would not be relocated under this alternative, road miles within the Riparian Conservation Area (RCA) would not be reduced. Finally, no miles of NFS roads would be decommissioned or converted to trail under this alternative. Thus, environmental effects from undesirable road locations in RCAs and unauthorized motorized use would not be reduced and recreational opportunities would not be enhanced.

All Action Alternatives

All of the action alternatives would reduce the total miles of NFS roads in the project area as a way to achieve the MRS; reduce the number of miles of NFS roads open to all motorized vehicles in order to decrease road-related impacts to big game habitat, sediment delivery to streams, and the spread of noxious weeds; and decrease the annual road maintenance costs. The sections below describe the differences between each action alternative.

New construction of 1.2 miles of NFS roads (Table 3-90) would occur under all action alternatives to facilitate the relocation of NFS road 393 to ultimately reduce road miles within the RCA along China Fork Creek. With the relocation, 1.1 miles of NFS road 393 would be decommissioned, 0.9 miles of which is located in the RCA directly adjacent to China Fork Creek (Table 3-90). The decommissioning would occur only after the relocation has been completed, reducing the mileage within the RCA by 0.3 miles, while still providing needed connectivity for the transportation system.

Table 3-90. Relocation of National Forest System (NFS) road 393, new road construction, and decommissioning actions common to all action alternatives

Road Segment	Length (miles)	General Location/Description
New construction 1	0.6	Connects NFS road 393 to NFS road 393C
New construction 2	0.6	Connects NFS road 393B to NFS road 393I
NFS road 393	1.1	Decommission 1.1 miles of NFS road 393 along China Fork Creek, which includes 0.9 miles in the Riparian Conservation Area

All action alternatives would include reconstructing approximately 1.8 miles of closed ML 1 road to ML 2 road to facilitate the relocation of NFS road 393 (Table 3-91). The action alternatives would change the designation of these roads from “closed to all motorized use” to “open to all motorized use, yearlong. The reconstruction work would include removing earthen barriers and waterbars, removing vegetation, reshaping the road surface, installing

culverts where necessary, and constructing drivable dips. These road segments have been kept in storage and closed to all motorized use for years.

Table 3-91. Relocation National Forest System (NFS) road 393 and reconstruction of Maintenance Level (ML) 1 roads under all action alternatives

Road	Length (miles)
NFS road 393B	0.3
NFS road 393C	1.0
NFS road 393I	0.5
Total	1.8

Movement toward the Minimum Road System

All action alternatives implement recommendations from the Becker TAP to reduce the 152.3 miles of NFS roads within the project area. Reductions range from 24.2 miles under Alternatives B, C, and D to 27.1 miles under Alternatives E and F, or 15% to 18% (Table 3-92 through Table 3-96). Alternatives E and F reduce road mileage by about 3 miles more than Alternatives B, C, and D. This reduction assumes that roads not used for helicopter logging in Alternatives E and F would not be needed in the future as the same area could be feasibly helicopter logged again.

Implementing the MRS would be achieved by all action alternatives, which is an important project component with respect to attaining restoration objectives. The Becker TAP identified roads likely and unlikely needed for future use to meet long-term management needs and was used to inform this project analysis. Purpose #2 states the need to improve watershed conditions by reducing motorized route-related impacts to water resources, fish, soil, and wildlife (and associated habitats) while providing for a safe and efficient transportation system to meet long-term management needs. Reducing the total miles of NFS roads within the project area addresses the need to improve watershed conditions while also considering long-term needs for the transportation system to remain viable through the future.

Table 3-92. Alternative B—Change in National Forest System road miles by operational maintenance level (ML)

Operational Maintenance Level	Alternative A	Alternative B	Change
ML 1—Closed to all motorized use	73.7	53.4	–20.3
ML 2—High-clearance vehicles	72.5	43.8	–28.7
ML 2 Admin—Closed to public motorized use	0	24.8	+24.8
ML 3—Suitable for passenger cars	6.1	6.1	0
Totals	152.3	128.1	–24.2

Table 3-93. Alternative C—Change in National Forest System road miles by operational maintenance level (ML)

Operational Maintenance Level	Alternative A	Alternative C	Change
ML 1—Closed to all motorized use	73.7	53.4	–20.3
ML 2—High-clearance vehicles	72.5	48.3	–24.2
ML 2 Admin—Closed to public motorized use	0	20.3	+20.3
ML 3—Suitable for passenger cars	6.1	6.1	0
Totals	152.3	128.1	–24.2

Table 3-94. Alternative D—Change in National Forest System road miles by operational maintenance level (ML)

Operational Maintenance Level	Alternative A	Alternative D	Change
ML 1—Closed to all motorized use	73.7	53.4	–20.3
ML 2—High-clearance vehicles	72.5	48.3	–24.2
ML 2 Admin—Closed to public motorized use	0	20.3	+20.3
ML 3—Suitable for passenger cars	6.1	6.1	0
Totals	152.3	128.1	–24.2

Table 3-95. Alternative E—Change in National Forest System road miles by operational maintenance level (ML)

Operational Maintenance Level	Alternative A	Alternative E	Change
ML 1—Closed to all motorized use	73.7	50.5	–23.2
ML 2—High-clearance vehicles	72.5	43.8	–28.7
ML 2 Admin—Closed to public motorized use	0	24.8	+24.8
ML 3—Suitable for passenger cars	6.1	6.1	0
Totals	152.3	125.2	–27.1

Table 3-96. Alternative F—Change in National Forest System road miles by operational maintenance level (ML)

Operational Maintenance Level	Alternative A	Alternative F	Change
ML 1—Closed to all motorized use	73.7	50.5	–23.2
ML 2—High-clearance vehicles	72.5	48.3	–24.2
ML 2 Admin—Closed to public motorized use	0	20.3	+20.3
ML 3—Suitable for passenger cars	6.1	6.1	0
Totals	152.3	125.2	–27.1

Changes in Public Motorized Access

The Becker TAP recommended reducing road miles open to public motorized use to reduce the negative effects to big game habitat, water quality, and other resources. Reducing the miles of road available for public motorized use is a tradeoff between the needs of the natural resources present and the public's desire for unrestricted access. The reductions proposed were identified through a risk–benefit analysis where public motorized access was considered. Access to developed facilities (e.g., trailheads and campgrounds) and major

arterial routes received a high benefit rating. Public access for general activities (e.g., wood gathering, hunting, dispersed camping, and driving for pleasure) received a low benefit rating. However, those general use activities are still important and would continue to exist within the project area.

Currently, 78.6 miles of NFS roads are open to public motorized use. NFS roads open to public motorized use by highway legal vehicles would be reduced from 24.2 miles under Alternatives C, D, and F to 28.7 miles under Alternatives B and E, or 31% to 36% (Table 3-97 through Table 3-101). Alternatives B and E would reduce open road mileage by about 4.5 miles more than Alternatives C, D, and F because Alternatives B and E address big game disturbance concerns by prohibiting public motorized access yearlong on NFS roads 394B and 362F, which currently allow seasonal access to the Skyline Yurt through the summer use period and yearlong access to the Stargaze Yurt.

Alternatives C and F address concerns voiced by the Idaho Department of Parks and Recreation (IDPR) about the yearlong access restriction in the proposed action (Alternative B) as scoped. They proposed implementing seasonal restrictions on those roads instead of closing them yearlong. The period of open public motorized access would be from June 16 through September14 to allow use through the summer months.

Alternative D would remove the seasonal use restriction on NFS road 362F and maintain the current yearlong public access on NFS road 394B. This alternative fully addresses the concern expressed by the IDPR that restrictions on motorized access to the yurts would reduce public demand for those yurts because hauling water, bedding, and food over 2 miles from the trailheads would be difficult. This decrease in demand would be especially true for families with small children or those individuals with limited mobility who would like to be able to enjoy a memorable stay at those yurts. The four other yurts in the system—Banner Ridge, Whispering Pines, Elkhorn, and Rocky Ridge—have public access routes, which are acceptable to IDPR and would not be altered under any of the alternatives.

Table 3-97. Alternative B—Change in miles of public motorized use on National Forest System roads

Public Motorized Use	Alternative A	Alternative B	Change
Open yearlong to all motorized use	51.7	40.0	–11.7
Open seasonally to all motorized use	26.9	9.9	–17.0
Closed yearlong to public motorized use	73.7	78.2	+4.5
Totals	152.3	128.1	—

Table 3-98. Alternative C—Change in miles of public motorized use on National Forest System roads

Public Motorized Use	Alternative A	Alternative C	Change
Open yearlong to all motorized use	51.7	40.0	–11.7
Open seasonally to all motorized use	26.9	14.4	–12.5
Closed yearlong to public motorized use	73.7	73.7	0
Totals	152.3	128.1	—

Table 3-99. Alternative D—Change in miles of public motorized use on National Forest System roads

Public Motorized Use	Alternative A	Alternative D	Change
Open yearlong to all motorized use	51.7	44.5	–7.2
Open seasonally to all motorized use	26.9	9.9	–17.0
Closed yearlong to public motorized use	73.7	73.7	0
Totals	152.3	128.1	—

Table 3-100. Alternative E—Change in miles of public motorized use on National Forest System roads

Public Motorized Use	Alternative A	Alternative E	Change
Open yearlong to all motorized use	51.7	40.0	–11.7
Open seasonally to all motorized use	26.9	9.9	–17.0
Closed yearlong to public motorized use	73.7	75.3	+1.6
Totals	152.3	125.2	—

Table 3-101. Alternative F—Change in miles of public motorized use on National Forest System roads

Public Motorized Use	Alternative A	Alternative F	Change
Open yearlong to all motorized use	51.7	40.0	–11.7
Open seasonally to all motorized use	26.9	14.4	–12.5
Closed yearlong to public motorized use	73.7	70.8	–2.9
Totals	152.3	125.2	—

Reducing Annual Road Maintenance Costs

The Becker TAP recommended reducing the miles of road open to public motorized use to reduce annual road maintenance costs. A reduction in annual road maintenance costs is needed in light of the reality of less appropriated dollars being available to perform road maintenance on the National Forests. The reduction in costs is not the primary driver for a reduction in the overall road system miles, as the largest benefits realized are those related to the protection of natural resources.

Costs would be reduced by $19,780 under Alternatives C and D; $19,668 under Alternative F; $22,705 under Alternative B; and $22,893 under Alternative E (Table 3-102 through Table 3-106). Alternative E shows the largest reduction, while Alternatives C, D, and F are nearly equal and show the least reduction in annual costs; a maximum difference of about $3,100 annually exists between the alternatives.

Table 3-102. Alternative B—Reduction in annual road maintenance costs

Operational Maintenance Level	Current Mileage	Final Mileage	Annual Cost per Mile	Current Annual Maintenance Cost	Final Annual Maintenance Cost	Change in Annual Cost
ML 1	73.7	53.4	$65	$4,791	$3,471	–$1,320
ML 2	72.5	43.8	$1,350	$97,875	$59,130	–$38,745
ML 2 (admin use only)	0	24.8	$700	$0	$17,360	+$17,360
ML 3	6.1	6.1	$5,100	$31,110	$31,110	$0
	152.3	128.1	—	$133,776	$111,071	–$22,705

Table 3-103. Alternative C—Reduction in annual road maintenance costs

Operational Maintenance Level	Current Mileage	Final Mileage	Annual Cost per Mile	Current Annual Maintenance Cost	Final Annual Maintenance Cost	Change in Annual Cost
ML 1	73.7	53.4	$65	$4,791	$3,471	–$1,320
ML 2	72.5	48.3	$1,350	$97,875	$65,205	–$32,760
ML 2 (admin use only)	0	20.3	$700	$0	$14,210	+$14,210
ML 3	6.1	6.1	$5,100	$31,110	$31,110	$0
	152.3	128.1	—	$133,776	$113,996	–$19,780

Table 3-104. Alternative D—Reduction in annual road maintenance costs

Operational Maintenance Level	Current Mileage	Final Mileage	Annual Cost per Mile	Current Annual Maintenance Cost	Final Annual Maintenance Cost	Change in Annual Cost
ML 1	73.7	53.4	$65	$4,791	$3,471	–$1,320
ML 2	72.5	48.3	$1,350	$97,875	$65,205	–$32,760
ML 2 (admin use only)	0	20.3	$700	$0	$14,210	+$14,210
ML 3	6.1	6.1	$5,100	$31,110	$31,110	$0
	152.3	128.1	—	$133,776	$113,996	–$19,780

Table 3-105. Alternative E—Reduction in annual road maintenance costs

Operational Maintenance Level	Current Mileage	Final Mileage	Annual Cost per Mile	Current Annual Maintenance Cost	Final Annual Maintenance Cost	Change in Annual Cost
ML 1	73.7	50.5	$65	$4,791	$3,283	–$1,508
ML 2	72.5	43.8	$1,350	$97,875	$59,130	–$38,745
ML 2 (admin use only)	0	24.8	$700	$0	$17,360	+$17,360
ML 3	6.1	6.1	$5,100	$31,110	$31,110	$0
	152.3	125.2	—	$133,776	$110,883	–$22,893

Table 3-106. Alternative F—Reduction in annual road maintenance costs

Operational Maintenance Level	Current Mileage	Final Mileage	Annual Cost per Mile	Current Annual Maintenance Cost	Final Annual Maintenance Cost	Change in Annual Cost
ML 1	73.7	50.5	$65	$4,791	$3,283	–$1,508
ML 2	72.5	48.3	$1,350	$97,875	$65,205	–$32,670
ML 2 (admin use only)	0	20.3	$700	$0	$14,210	+$14,210
ML 3	6.1	6.1	$5,100	$31,110	$31,110	$0
	152.3	125.2	—	$133,776	$113,808	–$19.968

Relocating National Forest System Road 393

Construction of 1.2 miles of NFS road would occur to facilitate the relocation of NS road 393 in order to reduce road miles within the RCA along China Fork Creek. The newly constructed sections would be designed and constructed as single lane outsloped road with turnouts, with slash filter windrows at the toe of fill, and grass seed mix and straw mulch applied to new slopes.

With the relocation, 1.1 miles of NFS road 393 would be decommissioned, 0.9 miles of which is located in the RCA directly adjacent to China Fork Creek. The decommissioning would take place only after the relocation has been completed.

The relocation of NFS road 393 would address Purpose #2, which states the need to improve watershed conditions by reducing motorized route-related impacts to water resources, fish, soil, and wildlife (and associated habitats) while providing for a safe and efficient transportation system to meet long-term management needs.

Decommissioning National Forest System Roads

The decommissioning of unneeded roads is an effective tool to reduce the environmental effects of undesirable road locations in RCAs and unauthorized motorized use. Decommissioning results in reduced sediment delivery to streams, improved wildlife habitat, decreased spread of noxious weeds, and a reduced effect on soil productivity. The need to decommission authorized NFS roads under Purpose 2 is addressed by all the action alternatives, which propose road decommissioning based on recommendations from the Becker TAP.

Miles of NFS road decommissioned would differ slightly: 22.8 miles under Alternatives B, C, and D; 23.6 miles under Alternative F; and 24.8 miles under Alternative E (Table 3-107). Of these miles, 2.6 miles of road to be decommissioned is currently open to motorized use with 1.5 miles of open road within RCAs.

Alternative E would decommission the greatest number of miles because roads that would be otherwise converted to motorized trail in the other alternatives would be decommissioned in Alternative E, which has no motorized trail proposal.

Table 3-107. Miles of National Forest System road decommissioning for all action alternatives

Operational Maintenance Level	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
ML 1—Roads currently closed	0	20.2	20.2	20.2	22.2	21.0
ML 2—Roads currently open	0	2.6	2.6	2.6	2.6	2.6
Totals	0	22.8	22.8	22.8	24.8	23.6

Converting National Forest System Road to Trail

Converting NFS roads to trails is considered in all TAP assessments as an opportunity to use existing infrastructure to benefit other resources, primarily recreation. Purpose 3 cites the need to modify the transportation system to improve the quality and diversity of the recreational experience in the project area.

Miles of road converted to non-motorized trail would range from 5.1 miles under Alternatives B, C, and D to 8.0 miles under Alternatives E and F. Alternatives E and F would convert the greatest number of miles as an indirect result of helicopter logging (as mentioned above).

Miles of road converted to motorized trail would range from 0.0 miles under Alternative E to 1.3 miles under Alternative F to 2.1 miles under Alternatives B, C, and D (Table 3-108). Alternative E would have no motorized trail and Alternative F would have a reduced trail loop length to address motorized noise concerns voiced by IDPR.

Table 3-108. Miles of National Forest System road converted to trail for all action alternatives

Trail Type	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Non-motorized trail	0	5.1	5.1	5.1	8.0	8.0
Motorized trail open to vehicles ≤50 inches in width	0	2.1	2.1	2.1	0.0	1.3
Totals		7.2	7.2	7.2	8.0	9.3

Cumulative Effects

The analysis area for cumulative effects to the transportation system is the 19,327-acre project area.

Alternative A

Past management actions have been considered in describing the existing condition and in disclosing direct and indirect effects. No present or foreseeable future activities would likely have any additional effect on the existing transportation system. As a result, no additional or cumulative effects would be indirectly or directly related to the planned management actions.

All Action Alternatives

Past management actions have been considered in describing the existing condition and in disclosing direct and indirect effects. No present or foreseeable future activities would have

any additional effect on the existing transportation system. As a result, no additional or cumulative effects would be indirectly or directly related to the planned management actions.

3.6.4 Unauthorized Roads

3.6.4.1 Affected Environment

Approximately 45 miles of unauthorized roads have been identified within the project area. An unknown number of unauthorized roads undoubtedly exist within the project area but remain unidentified.

3.6.4.2 Environmental Effects

Direct and Indirect Effects

Alternative A

Under this Alternative, the unauthorized roads would continue to exist on the landscape and the undesirable effects to water quality and other resources would not be mitigated. Unauthorized motorized use by the public would likely continue as the routes currently being used would not be blocked or obliterated.

All Action Alternatives

Approximately 45 miles unauthorized road with the project area have been identified through on-ground surveys conducted in 2006 and from aerial photography. Of these unauthorized routes, 6.5 miles are part of the non-motorized trail system associated with the IDPR Park N' Ski program; 7.5 miles are overgrown with brush and trees and are in a stable condition; 0.6 miles near the Whoop Um Up Equestrian Campground are used by the snowmobile groomer; 0.4 miles are coincident with temporary road (Temp26) and would be obliterated following use under all the action alternatives; and 16.9 miles will be evaluated in the future.

A total of 4.6 miles of unauthorized roads needed for Forest management activities would be added to the NFS road inventory (Table 3-109). Of these, 1.3 miles would be added to provide motorized road access to the IDPR yurts for facilities maintenance, 0.3 miles would provide access to an existing IDT disposal site, and 0.3 miles to provide access to an existing mining claim off NFS road 384. These added road segments would be closed yearlong to public motorized use. To facilitate the relocation of NFS road 393, 0.3 miles of unauthorized road would be added to the transportation system as ML 2 road, open yearlong to all motorized use (Table 3-109).

Three unauthorized roads identified in the Becker TAP as needed for this Project and/or future vegetation management projects would be added as ML 1 roads, closed yearlong to all motorized use. Together, these road segments would total 2.4 miles (Table 3-109).

Table 3-109. Unauthorized Roads (UA) added to the National Forest System (NFS)

UA Road Number	Length (miles)	Maintenance Level (ML)	Reason for Adding to Road System
X025M1	0.3	ML 2A	Provide authorized access to existing IDT disposal site
X025M2	0.1	ML 2A	Provide authorized access to Rocky Ridge Yurt
X362F2	0.1	ML 2A	Provide authorized access to Skyline Yurt
X362F3	0.1	ML 2A	Provide authorized access to Skyline Yurt
X384C	0.3	ML 2A	Provide authorized access to existing mining claim
X385	0.2	ML 2A	Provide authorized access to Banner Ridge Yurt
X385B6	0.1	ML 2A	Provide authorized access to Elkhorn Yurt
X393A4	0.2	ML 2A	Provide authorized access to Whispering Pines Yurt
X393A4-1	0.1	ML 2A	Provide authorized access to Whispering Pines Yurt
X393A5	0.3	ML 2A	Provide authorized access to Whispering Pines Yurt
X394B	0.1	ML 2A	Provide authorized access to Stargaze Yurt
X393B2	0.3	ML 2	Part of NFS road 393 relocation
X025Q1	0.6	ML 1	Haul route for this project
X393A1	1.5	ML 1	Haul route for this project
X394A1	0.3	ML 1	Needed for future forest management
Total	4.6		

Road decommissioning of unnecessary unauthorized roads would occur to reduce negative environmental effects on water, soil, fish, and wildlife. Road decommissioning would include culvert removal and stream channel rehab, roadbed outsloping or partial recontouring, seed and mulch application to the disturbed areas, and full recontouring of the entrance to prevent future motorized use.

Decommissioning of 16 unauthorized road segments (totaling 8.1 miles) would occur under all action alternatives to prevent unauthorized motorized use and reduce negative environmental effects on water, soil, fish, and wildlife (Table 3-110). These routes were identified because of their proximity to streams and current unauthorized motorized use. Road decommissioning would include removing culverts and rehabilitating stream channels, outsloping or partial recontouring of the roadbed, applying grass seed mix and straw mulch to the roadbed and disturbed areas, and fully recontouring access points to prevent future motorized use.

This treatment would be implemented in all action alternatives and addresses Purpose 2, which states the need to decommission authorized roads and unauthorized routes within the project area to reduce sediment to streams, improve wildlife habitat, and decrease noxious weed spread, thereby improving watershed, aquatic, and terrestrial resource conditions.

Of the 8.1 miles of unauthorized routes proposed for decommissioning, 3.5 miles or 47%, lie within RCAs.

Table 3-110. Decommissioning of Unauthorized Roads for all action alternatives

Unauthorized Road Number	Length (miles)	General Location
X025N5	0.3	Off National Forest System road 025O1, near Edna Creek
X025P4	0.3	Off north side of State Highway 21, near Beaver Creek Summit
X025P5	0.4	Off north side of State Highway 21, near Beaver Creek Summit
X025P6	0.1	Off north side of State Highway 21, near Beaver Creek Summit
X351C1	0.6	Off National Forest System road 351, north of Edna Creek
X351C2	0.4	Off X351C1, north of Edna Creek
X362-1	0.3	Off XX362, near Little Beaver Creek
X362B	0.8	Off National Forest System road 362, near Little Beaver Creek
X362D1A	1.5	Off east side of State Highway 21, connects to 362D1
X362F	0.4	Off National Forest System road 362F
X362-M	0.4	Off X362-1, near Little Beaver Creek
X393-11	0.3	Off National Forest System road 393, near top of China Fork watershed
X393A3	0.4	Off National Forest System road 393, connects to Road 025P
X393B	0.9	Off National Forest System road 393B, near 393B1
X392C1	0.5	Off National Forest System road 394, near Beaver Creek Summit
XX362	0.5	Off National Forest System road 362, near Little Beaver Creek
Total	8.1	

Cumulative Effects

Alternative A

Past management actions have been considered in describing the existing condition and in disclosing direct and indirect effects. No present or foreseeable future activities would have any additional effect on unauthorized roads. As a result, no additional or cumulative effects on motorized trails would be indirectly or directly related to the planned management actions.

All Action Alternatives

Past management actions have been considered in describing the existing condition and in disclosing direct and indirect effects. No present or foreseeable future activities would have any additional effect on unauthorized roads. As a result, no additional or cumulative effects on motorized trails would be indirectly or directly related to the planned management actions.

3.6.5 Temporary Road Construction

3.6.5.1 Affected Environment

No temporary roads currently exist within the Project area as t no active forest product removal activities are occurring within the project area.

3.6.5.2 Environmental Effects

Direct and Indirect Effects

Constructing temporary roads for the removal of forest products from the project area would be accomplished under a timber sale contract. The roads would be constructed to the minimum standard necessary to permit the safe passage of loaded log trucks and associated equipment. Several of the proposed routes are located on unauthorized roads where an existing road template occurs. These temporary roads would need less work than the newly constructed segments to prepare them for use.

Following usage, the roads would be obliterated by recontouring them back to the original ground line, applying grass seed mix and straw mulch, and covering with logging slash to prevent further motorized use. Temporary roads that are coincident with non-motorized trail locations would be reduced to a 24-inch wide trail tread, and then be re-vegetated using grass seed mix and straw mulch.

All temporary roads would be closed to public motorized use during project implementation.

See the maps in Appendix C of the Transportation Specialist Report for a spatial display of action alternatives, which are summarized below.

Alternative A

This alternative does not propose construction of any temporary roads. Therefore, no direct or indirect effects would occur as a result of implementing Alternative A.

All Action Alternatives

Temporary roads would be constructed under all action alternatives to facilitate the removal of forest products. without adding road mileage to the transportation system and the associated long-term maintenance costs and resource effects. These roads would be constructed to the minimum standard required to accommodate hauling and the associated harvesting equipment. Following use, they would be returned to a natural state or a single track non-motorized trail where their location is coincident with the IDPR Park N' Ski trail system.

All action alternatives would convert some unneeded NFS road mileage to non-motorized and/or motorized trail. If not converted to trail, these unneeded roads would be decommissioned and no longer part of the NFS road system.

Purpose 4 cites the need to provide wood products from vegetation restoration activities to local and regional economies. All action alternatives would provide wood products and have some temporary road construction.

Alternative E proposes the least amount of temporary road construction (1.5 miles) as a result of the most acres of helicopter logging (Table 3-111). Alternative D proposes the most miles of temporary road construction (6.5 miles) as a result of harvesting the most acres and using solely ground-based logging systems (Table 3-111). Alternative F proposes constructing 4.3 miles of temporary road and Alternatives B and C propose constructing 5.8 miles (Table 3-111).

Temporary roads are necessary to provide access to achieve restoration objectives and would be returned to a natural state or to a non-motorized trail setting to mitigate long-term environmental effects.

Table 3-111. Miles of temporary road construction by action alternative

Temporary Road Description	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
New construction	3.2	3.2	3.2	0.9	3.0
On existing roadbed	1.4	1.4	1.8	0.5	1.2
On existing roadbed coincident with trail segment	1.2	1.2	1.5	0.1	0.1
Total	5.8	5.8	6.5	1.5	4.3

Cumulative Effects

Alternative A

Past management actions have been considered in describing the existing condition and in disclosing direct and indirect effects. No present or foreseeable future activities would have any additional effect on the existing transportation system. As a result, no additional or cumulative effects to temporary roads would be indirectly or directly related to the planned management actions.

All Action Alternatives

Past management actions have been considered in describing the existing condition and in disclosing direct and indirect effects. No present or foreseeable future activities would have any additional effect on the existing transportation system. As a result, no additional or cumulative effects to temporary roads would be indirectly or directly related to the planned management actions.

3.6.6 Trails Co-located on Closed National Forest System Roads

3.6.6.1 Affected Environment

No authorized or designated trails are currently co-located on closed National Forest System roads.

3.6.6.2 Environmental Effects

Direct and Indirect Effects

NFS roads that are closed to public motorized use by highway legal vehicles provide an opportunity to authorize trails for non-motorized use and to designate trails for motorized use by non-legal highway vehicles. Non-motorized uses include hiking, horseback riding, and mountain biking in the summer months, and skiing and snowshoeing during the winter months. Motorized uses by non-highway legal vehicles include motorcycles, ATVs, and UTVs. This opportunity to enhance the trail system would improve the quality and diversity of the recreational experience.

Roads that are managed as ML 1 are closed to all motorized use unless they are assigned a special designation that permits use by non-highway legal vehicles. ML 2 Administrative Use Only roads are closed to all public motorized use, unless they are assigned a special designation that permits use by non-highway legal vehicles. These roads would be available for highway legal vehicle use for Forest management activities and for IDPR personnel to perform maintenance on the yurts.

Alternative A

This alternative does not propose the authorization or designation of trails on closed NFS roads. Therefore, no direct or indirect effects would occur as a result of implementing Alternative A.

All Action Alternatives

Both non-motorized and motorized trail segments would be co-located on portions of NFS roads that are closed to other motorized use. The roads would still be part of the NFS road system and could be re-opened in the future if needed for Forest management activities.

Removing forest products originating from within the project area would follow economically efficient routes. The primary routes for transporting forest products under all action alternatives would be NFS roads 393 and 394 on the west side of State Highway 21, and NFS roads 362 and 384 on the east side of State Highway 21. Forest products could then be transported to facilities in Idaho or Oregon via State Highways and/or Interstate Highways. See Appendix A of the transportation technical report for a listing of planned haul routes on NFS roads. Hauling would be restricted on weekends, holidays, and on opening day of general deer and elk hunting seasons.

The number of miles of non-motorized trail to be co-located on closed NFS roads would range from 13.0 miles under Alternatives C, D, and F to 16.4 miles under Alternative B to 18.3 miles under Alternative E (Table 3-112).

Miles of motorized trails co-located on closed NFS roads would vary by alternative: 0.0 miles under Alternative E; 15.9 miles under Alternative F; 18.0 miles under Alternatives C and D; and 19.1 miles under Alternative B. Alternative E proposes no motorized trails and Alternative F proposes 3 fewer miles because of the reduced trail loop size included under this alternative. These segments would appear on the MVUM as trails, along with the special motorized designation and permitted season of use.

Since recreation is an important aspect of the multi-use concept for the management of National Forests, the co-location of trails along closed NFS roads would accommodate the need for a quality recreational experience and the need to keep a transportation system on the ground that facilitates future restoration projects.

Table 3-112. Miles of non-motorized trail co-located on closed National Forest System roads

Road Maintenance Level	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
ML 1 Road	8.7	9.0	9.0	9.0	9.0
ML 2 Admin	7.7	4.0	4.0	9.3	4.0
Totals	16.4	13.0	13.0	18.3	13.0

Table 3-113. Miles of motorized trail co-located on closed National Forest System roads

Road Maintenance Level	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
ML 1 Road	12.8	11.7	11.7	0.0	10.3
ML 2 Admin	6.3	6.3	6.3	0.0	5.6
Totals	19.1	18.0	18.0	0.0	15.9

Cumulative Effects

Alternative A

Past management actions have been considered in describing the existing condition and in disclosing direct and indirect effects. No present or foreseeable future activities would have any additional effect on the existing transportation system. As a result, no additional or cumulative effects on motorized trails would be indirectly or directly related to the planned management actions.

All Action Alternatives

Past management actions have been considered in describing the existing condition and in disclosing direct and indirect effects. No present or foreseeable future activities would have any additional effect on the existing transportation system. As a result, no additional or cumulative effects on motorized trails would be indirectly or directly related to the planned management actions.

3.7 RECREATION

3.7.1 Analysis Scale, Data Sources, and Methodology

This section incorporates the recreation technical report (available in the project record), which contains the detailed data, methodologies, conclusions, maps, references, and technical documentation.

3.7.1.1 Analysis Scale

The analysis area for direct, indirect, and cumulative effects to recreation resources is the 19,327-acre project area because this is the maximum extent to which impacts from proposed activities to recreation resources could be measured.

3.7.1.2 Data Sources

The data used to complete the recreation analysis includes Forest and project-level GIS data, National Visitor Use Monitoring (NVUM), the Idaho City Ranger District Motor Vehicle Use Map (MVUM), the Boise National Forest Winter Travel Map, transportation and visual technical reports, and field observations.

3.7.1.3 Analysis Methodology

The methodology used to complete the analysis included evaluating the project GIS data, including dispersed recreations campsites, Recreation Opportunity Spectrum (ROS), roads, and trails; the MVUM; the transportation and visuals technical reports; and field observations to determine the impacts to the recreation indicators by proposed activities.

3.7.2 Analysis Indicators

The following indicators were used to evaluate the measure of change between the alternatives for recreational resources in the analysis.

3.7.2.1 Indicator: Recreation Experience

This indicator was used to capture the qualitative changes in a recreational user's experience in the project area. The following measures were used for this indicator:

- Recreation opportunities: This measure was used to evaluate changes in dispersed and developed opportunities in the project area as a result of proposed activities.
- Disturbance and Displacement of Recreation Users: This measure was used to qualitatively evaluate disruption and/or displacement of recreation users in the project area as a result of the proposed activities.
- Scenery: This measure was used to evaluate the change in the scenery, as viewed by recreationists, in the project area along trails, roads, and developed recreation sites as a result of proposed activities.

3.7.2.2 Indicator: Recreation Access

This indicator is used to evaluate the effects of the alternatives on visitor access due to changes in road designation, restrictions, or closures, depending on seasonal use (summer or winter). The following measures were used for this indicator:

- Miles of road shown on the MVUM for summer use: This measure was used to determine the difference in road open for public motorized use between the alternatives.
- Miles of motorized trails on the MVUM by vehicle class: This measure was used to determine the miles of trails designated as motorized trails open to public use by alternative.
- Non-motorized trail miles on the NFS trail system: This measure was used to determine the change in miles of authorized NFS non-motorized trails in the project area by alternative.
- Miles of over snow non-motorized trails: This measure was used to compare the miles of authorized over snow non-motorized trails between the No Action and action alternatives.

- Miles of over snow motorized trails: This measure was used to compare the miles of authorized over snow motorized trails between the No Action and action alternatives.
- Acres of winter motorized restrictions: This measure was used to compare acres of winter motorized restriction area by alternative.
- Type of access to Idaho Department of Parks and Recreation yurts: This measure was used to describe the type of access proposed by each alternative.

3.7.2.3 Indicator: Public Safety

This indicator shows the effect of the proposed alternatives on relevant aspects of public safety within the project area. The following measures were used for this indicator:

- Miles of summer mixed-use: This measure was used to evaluate the miles of routes with mixed use during the summer season. Mixed use routes included routes designated for different types of motorized vehicles access.
- Miles of summer shared-use: This measure was used to evaluate the miles of routes with shared use during the summer season. Shared use routes include routes that authorized both motorized and non-motorized uses.
- Miles of winter shared-use: This measure was used to evaluate the miles of routes with shared use during the winter season. Shared use routes include routes that authorized both motorized and non-motorized uses.

3.7.2.4 Indicator: Recreation Opportunity Spectrum (ROS) Classification

This indicator was used to evaluate the consistency of activities proposed under each alternative to the current ROS classifications defined in the Forest Plan for Management Area 7 (MA 7), North Fork of the Boise River (USDA Forest Service 2010a).

3.7.3 Recreation Experience Indicator

3.7.3.1 Affected Environment

The project area is a popular year-round recreation destination for Boise County residents. Additionally, this area is a popular week-end destination for Treasure Valley residents.

Past projects in the project area were considered in the developing the existing conditions for the recreation experience indicator. Specific projects considered for this analysis are identified in Table 1 in Appendix B. Past construction of developed recreation facilities, such as campgrounds, trailheads, and yurts, have formed the types of recreational experiences and opportunities currently available in the project area. Additionally, past and ongoing special use permits and cost-share agreements in the project area have affected the variety of recreational opportunities and experiences. Road and landing construction associated with past vegetation management activities has impacted the amount of motorized access and opportunities for dispersed campsites. Past trail construction in the project area has also contributed to both motorized and non-motorized opportunities. Past activities have altered recreational opportunities and experiences in the project area.

NFS recreation sites in the project area include a rental cabin, two campgrounds, and a trailhead (Table 3-114). In addition, four Park ‘N Ski trailheads and six yurts are present that are managed by IDPR under agreement with the Forest Service (Table 3-114).

Beaver Creek Cabin is a furnished historic Forest Service guard station that sleeps up to six people. Public access in the summer is by NFS road 362A; winter access is weather dependent since the Beaver Creek road is not plowed. Public access in the winter may be by car when the road is snow free or non-motorized over snow methods, such as cross country ski or snowshoe. Recreation infrastructure at this site includes an historic cabin, a picnic table, a fire pit, and designated parking. The site also has a well, well house, multiple water spigots, a small campground with picnic tables and fire rings, a septic system, bear proof trash cans, and a vault toilet.

Edna Creek Campground is located just off of Highway 21. This fee campground contains nine campsites which accommodate up to six people each. The campground is open May through September, annually. Recreation infrastructure includes nine campsites with a picnic table, lantern hook, and fire pit. The site also has a well and hand pump, a kiosk, designated parking, bear proof trash cans, and two vault toilets.

Whoop Um Up Campground is located just off of Highway 21. This fee campground contains six campsites, which accommodate up to six people each. The campground is open May through September, annually. Recreation infrastructure includes six campsites with a picnic table, lantern hook, and fire pit. The site also has a well and hand pump, a kiosk, designated parking, bear proof trash cans, and a vault toilet.

Crooked River Trailhead is located on NFS road 384 and primarily serves as a trailhead for NFS trail 158. Crooked River is one of the most popular trailheads on the Idaho City Ranger District. Spring, summer and fall are the most popular seasons of use. In the winter, the site is used by hikers if snow-free. Recreation infrastructure at this site includes designated parking and a kiosk.

Beaver Creek Summit Park and Ski Trailhead is located off of Highway 21 and provides access to the Nordic ski and snowshoe trails that access the Stargazer Yurt managed by IDPR. This existing trailhead is not currently an authorized NFS trailhead but is being managed under agreement with IDPR in the winter. Summer use of the site is limited since no summer trails connect the trailhead to the non-motorized trail system and NFS road 393B to the Stargazer Yurt is open to motorized use in the summer. An Idaho Park N' Ski Permit is required between November 15 and April 30. Recreation infrastructure at this site includes a kiosk.

Banner Ridge Park and Ski Trailhead is located on Highway 21 and accesses the winter and summer non-motorized trail system. The trails are maintained by IDPR by agreement with the Forest Service. In the winter, this trailhead is used to access the Nordic trail system. Summer use of the site is low but mountain bike use is increasing. An Idaho Park N' Ski Permit is required between November 15 and April 30. Recreation infrastructure at the site includes a kiosk and vault toilet.

Gold Fork Park and Ski Trailhead is located on Highway 21 and accesses the winter and summer non-motorized trail system. In the winter, this trailhead is used to access the Nordic trail system. Summer use of the site is low but mountain bike use is increasing. An Idaho Park N' Ski Permit is required between November 15 and April 30. Recreation infrastructure at the site includes a kiosk and vault toilet.

Whoop Um Up Park and Ski Trailhead is located on Highway 21 and accesses the winter and summer non-motorized trail system. The trails are maintained by IDPR by agreement with the Forest Service. In the winter, this trailhead is used to access the Nordic trail system. This trailhead can be used by snowmobilers to access the 8A snowmobile area. The snowmobile trails are maintained by Boise County Snowmobile Grooming Program under a partnership agreement. Summer use of the site is low but use by recreationists is increasing. An Idaho Park N' Ski Permit is required between November 15 and April 30. Recreation infrastructure at the site includes a kiosk and vault toilet.

Six Idaho Department of Parks and Recreation Yurts are located in the project area. Each of the six yurts sleeps six people in a well-furnished atmosphere with access to a wide variety of recreational opportunities, such as hiking, mountain biking, horseback riding, Nordic and telemark skiing, and snowshoeing. The yurt system is managed by IDPR under a Forest Service Cost Share Agreements (13-CS-11040203-03 and 13-CS-11040203-07). Recreation infrastructure at the yurts typically includes a yurt with a deck and pit toilet.

Table 3-114. Summary of developed recreation facilities in the Becker project area

Recreation Site	Managed By	Primary Season of use
Beaver Creek Cabin	Forest Service	Year round
Edna Creek Campground	Forest Service	Summer
Whoop Um Up Campground	Forest Service	Summer
Crooked River Trailhead	Forest Service	Summer
Beaver Creek Summit Park and Ski Trailhead*	Forest Service (Summer)/ Idaho Department of Parks and Recreation (Winter)	Year round
Banner Ridge Summit Park and Ski Trailhead	Forest Service (Summer)/ Idaho Department of Parks and Recreation (Winter)	Year round
Gold Fork Park and Ski Trailhead	Forest Service (Summer)/ Idaho Department of Parks and Recreation (Winter)	Year round
Whoop Um Up Park N' Ski and 8A Snowmobile Trailhead	Forest Service (Summer)/ Idaho Department of Parks and Recreation (Winter)	Year round
Elk Horn Yurt	Idaho Department of Parks and Recreation	Year round
Stargazer Yurt	Idaho Department of Parks and Recreation	Year round
Banner Ridge Yurt	Idaho Department of Parks and Recreation	Year round
Rocky Ridge Yurt	Idaho Department of Parks and Recreation	Year round
Skyline Yurt	Idaho Department of Parks and Recreation	Year round
Whispering Pines Yurt	Idaho Department of Parks and Recreation	Year round

Dispersed recreation, such as hunting, fishing, hiking, sight-seeing, snowmobiling, cross-country skiing, trail riding, firewood gathering, and camping, occurs throughout the project area. These activities have increased overtime due to available motorized access into the area and the proximity to local communities. Dispersed recreation uses generally occur along road/trail corridors but may occur anywhere within the project area. Currently, about 60.1 miles of roads are open year-round for full-sized vehicle motorized use and 26.9 miles are open seasonally (June 16–September 14) for motorized use on the 2015 Idaho City Ranger District MVUM (USDA Forest Service 2015i). All of these roads allow motorized travel to access dispersed recreation sites within 300 feet from the centerline of open NFS roads when it is safe to do so and when it does not cause damage to NFS resources

Dispersed campsites are any campsites located outside of a developed campground/campsite. In general, dispersed campsites are primitive in nature and are developed by recreation users. These sites do not have facilities such as garbage cans, toilets, and/ or fire rings. Dispersed campsites in this area require the user to be self-sufficient. These dispersed sites are typically used during hunting season and on weekends during the summer. Currently, 16 helicopter landings (1–2 acres in size) and 113 tractor landings (0.5–1 acre in size) are located in the project area. Commonly, the tractor landings are associated with the road system and located on turnouts or wide portions of road prism. Historically, landings have been used by recreationists for dispersed camping activities. Existing landings available for motorized access are assumed to be used as dispersed camp sites.

The Forest's Special Use Program authorizes uses on NFS land that provide a benefit to the general public and protect public and natural resources values. Currently, there are 8 special use authorizations within the project area (Table 3-115).

Table 3-115. Summary of special use permittees in the project area

Name	Type of Special Use Permit
Allreds Adventures LLC	Outfitter Guide
Camp Ed Da How	Organization Camp
Escape Adventures	Outfitter Guide
ITD Waste Sites (NFS Rd 025M and Lamar Creek)	Waste Site
Korell Outfitter and Guide	Outfitter Guide
Mountain Outfitters	Outfitter Guide
Pilot Peak Communication Site (ID Power SUP)	Communications Site
Youren Outfitter and Guide	Outfitter Guide

Occasional minor disruptions and/or displacement of recreation users by other uses, such as road/trail maintenance activities and livestock grazing, occur in the project area. Minor recreation use and/or access disruption may occur during scheduled maintenance of roads and trails. Recreational users may encounter livestock during their visit to the project area depending on the time of year and the grazing rotation and routing patterns.

In general, the scenery as viewed by recreation users in the analysis is characterized as moderate-to-high relief mountains covered with coniferous forests intermixed with aspen and brush/grass hillslopes. The river and streams are generally described by clear, fast moving, high gradient water features. Recreation users on roads and trails generally have confined forest views with limited breaks in vegetation (section 2.4.2 and Figure 3-94; scenery technical report [project record]).

Scenery from the developed recreation facilities in the project area depends on the type of site. The Forest Service developed campgrounds in the project area can be characterized as small, rustic campgrounds surrounded by a mixed-species conifer forest (Figure 3-95). Beaver Creek Cabin is an historic Forest Service cabin built in the 1930s by the Civilian Conservation Corps surrounded by a mixed species forest with several streams nearby (Figure 3-96). The IDPR yurts are typically located on ridgelines that provide panoramic views of the surrounding mountains and conifer forests (Figure 3-97 and Figure 3-98). The Park N' Ski trailheads are located just off of Highway 21 and are generally surrounded by mixed species conifer or ponderosa pine forests on at least one side (Figure 3 7).

Figure 3-93. Typical National Forest System road in the Becker project area

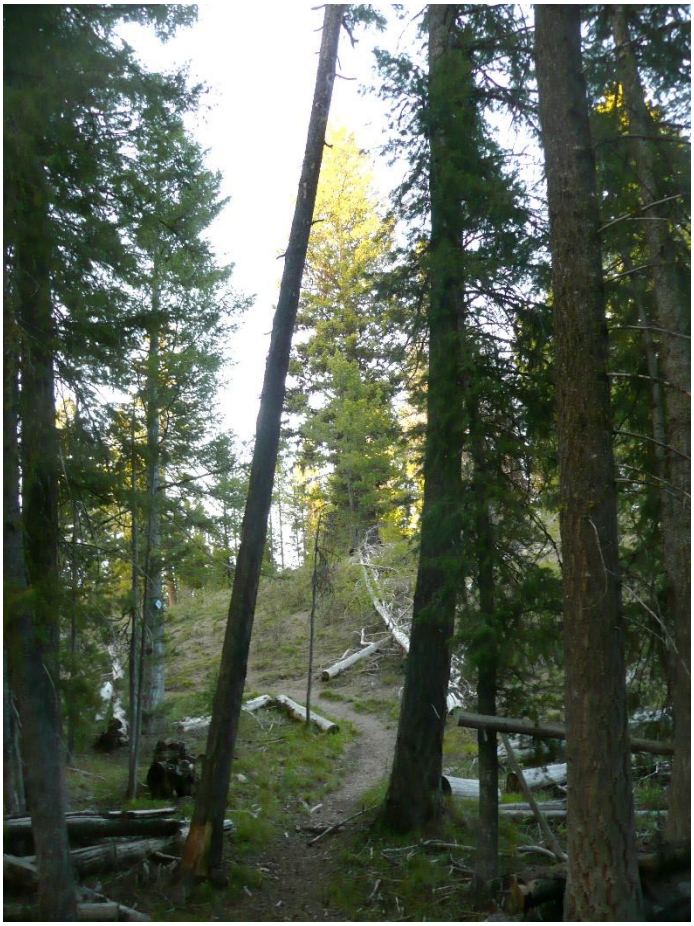


Figure 3-94. Typical non-motorized trail in the Becker project area

Figure 3-95. Edna Creek Campground

Figure 3-96. Beaver Creek Cabin

Figure 3-97. Stargazer Yurt

Figure 3-98. View from the deck of Stargazer Yurt

Figure 3-99. Gold Fork Park N' Ski trailhead

3.7.3.2 Environmental Effects

Direct and Indirect Effects

Alternative A (No Action)

Implementing Alternative A (No Action) would have no direct or indirect effects on the current recreational experience in the project area given that this alternative would maintain the existing recreational opportunities and scenery as viewed from travel ways and recreational facilities. Present and ongoing activities, such as road and trail maintenance, livestock grazing, and fire suppression (Appendix B) would be expected to continue in the project area. No new activities would be implemented under this alternative. Use of NFS and IDPR-managed developed recreational facilities in the analysis would be expected to continue at or near current levels. Beaver Creek Summit Park N' Ski trailhead would continue be managed by IDPR under agreement in the winter but would not be authorized as a Forest Service facility. Existing dispersed recreation activities would be expected to continue in the project area. No change would be expected in the amount, duration, or frequency of minor disruptions of recreational activities by other uses in the project area under this alternative.

Scenery as viewed by recreation users would be expected to remain very similar to existing conditions with implementation of this alternative. However, under the No Action Alternative there is the potential for loss of vegetation due to insect and disease and/or wildfire which could change the recreation scenery in the project area.

Alternative B (Proposed Action)

Alternative B would increase the number of developed recreational facilities by adding a developed trailhead for the motorized trail system at the junction of NFS roads 312 and 385, as well as improve and authorize one developed recreational facility in the project area by relocating the Beaver Creek Summit Park N' Ski Trailhead to a better location. The conceptual designs of the trailheads are available in Appendix G. The motorized trailhead would provide parking for full-sized vehicles and off highway vehicle (OHV) trailers, an information kiosk, and a vault toilet. In addition, development of this trailhead would close user-developed OHV trails and complete vegetation rehabilitation between the parking area and stream channel. The relocated Beaver Creek Summit Trailhead would provide a safer trailhead as users would be able to access the trail to the Stargazer Yurt without walking along the edge of Highway 21 directly adjacent to traffic. As part of the relocation, the existing information kiosk would be moved to the new trailhead location and approximately 200 feet of new trail for winter and summer use would be constructed to connect the trailhead to NFS road 394, which provides access to Stargazer Yurt. The Beaver Creek Park N' Ski Trailhead would be authorized as a Forest Service facility under this alternative. All of the other developed recreational facilities in the project areas would be maintained under this alternative.

Alternative B would reduce the dispersed recreation opportunities in the project area. Dispersed recreation activities, including hunting, camping, and fuelwood gathering, currently occurring in the project area would be expected to continue. Dispersed recreation uses generally occur along road/trail corridors but may occur anywhere within the project

area. Under this alternative, there would be a reduction in the miles of road open to the public year-round and seasonally by 28.7 miles. This reduction would also reduce the miles of MVUM routes that allow motorized travel within 300 feet from the centerline of open roads to access dispersed recreation sites as long as it is safe to do so and when it is not causing damage to NFS resources. This alternative would increase the miles of trail designated for motorized vehicles less than 50 inches in the project area by 23.3 miles (Table 3-118). However, the motorized trails in the project area would not allow motorized travel within 100 feet of the trail to access dispersed recreation sites. As a result, implementing this alternative would reduce the area that could be accessed by motorized vehicles for the purpose of dispersed camping. In addition, Alternative B would construct 4 helicopter landings (1–2 acres in size) and 20 tractor landings (0.5–1 acre in size) to facilitate tractor logging operations. In general, the tractor/light cable landings are associated with the road system (e.g., turnouts or wide portions of road prism), but under this alternative, four of the tractor landings are located off of the road prism. Implementing this alternative would reduce the number of landings available for dispersed camping activities since landings not located on the NFS road system would be decommissioned following completion of project activities as required by Design Feature FH-6. Dispersed recreation users in the project area may increase overtime based population growth of the local communities.

Alternative B would disrupt and displace recreational visitors in the project area during the snow-free season due to active timber harvest, prescribed fire, and road/trail activities. It is assumed that this project would be implemented in stages over the next 5 to 10 years; 4 timber sales, followed by non-commercial thinning and activity fuel treatments, and then prescribed fire activities (maps describing the timing of activities are available in the recreation technical report [project record]. Design Feature RE-2 requires that area closures be issued when logging operations are occurring for public safety; recreational uses would be restricted in the closure area. Project activities would also be expected to generate noise, dust, and/or smoke which, may displace recreational users. However, recreational users would likely shift their use to nearby areas within the project area that are open and away from project implementation to maintain their recreational experience. Timber sale contract provision C5.31# and the timber sale road maintenance plan would require dust abatement on all haul routes, which would reduce the impact to recreational visitors. In the project area, recreational visitors may be disrupted or displaced by log haul activities on NFS roads. However, Design Feature TH-3 prohibits log hauling from 6:00 pm Friday through midnight Sunday, on all major holidays, and the opening day of general deer and elk seasons, which would mitigate potential conflicts between log haul and recreationists during times when recreation use in the area is expected to be highest. Design Feature RE-3 would require the timber sale administrator to coordinate the timber sale purchaser/contractor campsites with Forest Service Recreation staff to avoid or minimize impacts to recreation users in the project area. Design Features FF-2 and RE-10 were applied to this alternative to provide a mechanism for informing the public of project activities and closures that may impact the availability of recreation opportunities in the project area. The design features have been applied to this alternative to minimize disruption and/or displacement of recreational users in the project area.

Winter recreational users may be disrupted during project implementation in the project area before December 15 and after April 15, if snow conditions allow for use during these times. Design Feature RE-5 would prohibit snow plowing on established groomed ski and snow

machine trails within the project area and all haul routes from December 15 to April 15 during project implementation. Design Feature RE-6 indicates that all logging operations would cease by December 15 in areas with winter recreation facilities and trails to allow for winter trail use by skiers and snowmobilers. Design Feature RE-7 would close non-motorized and motorized over snow trails until December 15 for log haul during project implementation. These design features would reduce potential conflict between timber sale activities and winter recreation users and minimize impacts to winter recreational uses between December 15 and April 15 from project activities.

Special use permit holders in the project area may also experience disruption and displacement of their activities during project implementation. Design Feature SU-1 requires that the Special Use Permit Administrator be notified of project activities and timing of implementation, so the permittee can be informed of scheduled activities and allow for a short-term modification of special use activities, where necessary. This design feature would minimize the impact of project implementation on the special use permittees in the project area.

Scenery as viewed by recreation users would be modified by implementing vegetation management, road/trail, and prescribed fire activities. These activities would modify the vegetation density and species composition, reduce fuels, and modify road/trail system through timber harvest activities, temporary road location, road relocation, and stream crossing installation/replacement along travel routes and adjacent to developed recreational sites. The scenery associated with non-motorized trails co-located on NFS roads that would be used for timber sale activities, such as skid trails and/or haul routes, would be affected by the reopening of the roads. These routes would be widened back to road width and vegetation would be cleared to facilitate use as roads and/or skid trails, which would change the scenery as viewed by recreational users on these routes. Implementing Design Features RE-4, RE-8, RE-9, SE-1, SE-2, SE-3, SE-4 SE-5, SE-6, SE-7, SE-8, SE-9, SE-10, and SE-11 (section 2.4.7) would minimize impacts of the activities to recreation scenery by reducing the visibility of the treatments to recreationists. The scenery changes would be expected to be more noticeable to recreation users in the area immediately (i.e., temporary timeframe [0–3 years]) following implementation and would be expected to become less noticeable over the short term (3–15 years). Visual quality objections (VQOs) are expected to be maintained with implementation of this alternative (see section 3.16, “Scenic Environment”).

Alternative C

The effects of Alternative C would be the same as those described for Alternative B above except for the changes to disperse recreation opportunities in the project area. Alternative C would reduce in the miles of road open to the public year-round and seasonally by 24.2 miles, which would also reduce the miles of MVUM routes that allow motorized travel within 300 feet from the centerline of open roads to access dispersed recreation sites as long as it is safe to do so and when it is not causing damage to NFS resources (USDA Forest Service 2015i). This alternative would increase the miles of trail designated for motorized vehicles <50 inches wide in the project area by 22.0 miles (Table 3-118). However, the motorized trails in the project area would not allow motorized travel within 100 feet of the trail to access dispersed recreation sites. As a result, implementing this alternative would reduce the area that could be accessed by motorized vehicles for dispersed camping.

Alternative D

The effects of Alternative D would be the same as those described for Alternative B above, except for the changes to disperse recreation opportunities in the project area. Alternative D would reduce the miles of road open to the public year-round and seasonally by 24.2 miles, which would also reduce the miles of MVUM routes that allow motorized travel within 300 feet from the centerline of open roads to access dispersed recreation sites as long as it is safe to do so and when it is not causing damage to NFS resources (USDA Forest Service 2015i). This alternative would increase the miles of trail designated for motorized vehicles <60 inches wide in the project area by 22.0 miles (Table 3-118). However, motorized trails in the project area would not allow motorized travel within 100 feet of the trail to access dispersed recreation sites. As a result, implementing this alternative would reduce the area that could can be accessed by motorized vehicles for dispersed camping.

Alternative E

The effects of Alternative E would be the same as those described for Alternative B above, except for the following changes to developed and dispersed recreation opportunities and scenery in the project area. Alternative E does not propose constructing the trailhead at the junction of NFS roads 385 and 312 nor designating the associated motorized trail system.

Under Alternative E, there would be a reduction in the miles of road open to the public year-round and seasonally by 28.7 miles, which would also reduce the miles of MVUM routes that allow motorized travel within 300 feet from the centerline of open roads to access dispersed recreation sites as long as it is safe to do so and when it is not causing damage to NFS resources (USDA Forest Service 2015i) (Table 3-118). As a result, implementing this alternative would reduce the area that can be accessed by motorized vehicles for dispersed camping. Additionally, Alternative E would implement tractor, light cable, and helicopter logging. This alternative would construct 4 new helicopter landings and 5 new tractor landings. In general, the tractor/light cable landings would be associated with the road system (e.g., turnouts or wide portions of road prism) but under this alternative, two of the tractor landings would be located off of the road prism. Implementing this alternative would reduce the number of landings available for dispersed camping activities since landings not located on the NFS road system would be decommissioned following completion of project activities as required by Design Feature FH-6.

Alternative E would be expected to have less impact to scenery as viewed by recreation users in the project area when compared to Alternatives B, C, and D since this alternative would implement helicopter logging, which is expected to reduce the number of NFS roads used to facilitate timber harvest activities. This would reduce the number of NFS roads with co-located non-motorized trails that would be widened and the amount of vegetation cleared to facilitate road use associated with timber harvest activities, thereby maintaining the non-motorized trails in a condition closer to existing conditions. The non-motorized trail experience following project implementation in areas with helicopter logging would likely be maintained closer to existing conditions since less trail damage would occur during timber harvest activities.

Alternative F

The effects of Alternative F would be the same as those described for Alternative B above, except for the changes to disperse recreation opportunities in the project area. Alternative F would reduce the miles of road open to the public year-round and seasonally by 24.2 miles, which would also reduce the miles of MVUM routes that allow motorized travel within 300 feet from the centerline of open roads to access dispersed recreation sites as long as it is safe to do so and when it is not causing damage to NFS resources (USDA Forest Service 2015i). This alternative would increase the miles of trail designated for motorized vehicles <60 inches wide by 18.8 miles (Table 3-118). However, the motorized trails in the project area would not allow motorized travel within 100 feet of the trail to access dispersed recreation sites. As a result, implementing this alternative would reduce the area that could be accessed by motorized vehicles for dispersed camping. Additionally, Alternative F would implement tractor, light cable, and helicopter logging. This alternative would construct 2 new helicopter landings and 13 new tractor landings. In general, the tractor/light cable landings are associated with the road system, i.e. turnouts or wide portions of road prism, but under this alternative four of the tractor landings are located off of the road prism. Implementation of this alternative would reduce the number of landings available for dispersed camping activities since landings not located on the NFS road system would be decommissioned following completion of project activities as required by Design Feature FH-6.

Alternative F would be expected to have less impact to scenery as viewed by recreation users in the project area when compared to Alternatives B, C, and D since this alternative would implement helicopter logging which is expected to reduce the number of NFS roads used to facilitate timber harvest activities. This would reduce the number of NFS roads with co-located non-motorized trails that would be widened and the amount of vegetation cleared to facilitate road use associated with timber harvest activities thereby maintaining the non-motorized trails in a condition closer to existing conditions. The non-motorized trail experience following project implementation in areas with helicopter logging would likely be maintained closer to existing conditions since there would be less trail damage during timber harvest activities.

Cumulative Effects

Alternative A

Alternative A would not have cumulative effects for the recreation experience indicator since there are no direct or indirect effects under this alternative.

Action Alternatives

Table 1 in Appendix B of the document identifies which past activities were considered for this cumulative effects analysis. The impacts of past activities have contributed to the existing conditions for the recreation experience indicator in the project area and, therefore, are included in the affected environment discussed in section 3.7.3.1.

Table 1 in Appendix B identifies which present/ongoing activities were considered for this cumulative effects analysis. Ongoing activities, such as road use and maintenance, trail use and maintenance, livestock grazing, IDPR cost-share agreement activities, snow grooming, noxious weed treatment, minerals activities, and fire suppression, would likely continue.

Recreational users may encounter livestock during their visit to the project area depending on time of year and the grazing rotation and routing pattern. In addition, areas could be temporarily closed to visitors during fire suppression activities to mitigate public health and safety hazards. Although proposed alternatives would incrementally add to the effects of present and ongoing activities, implementing the design features discussed above should prevent the proposed and present activities from substantially altering recreational experiences for visitors, particularly during the high-use periods.

Table 1 in Appendix B identifies which reasonably foreseeable activities were considered for this cumulative effects analysis. No cumulative effects activities would incrementally add to the effects of this indicator; therefore, no cumulative effects would be expected with implementation of these alternatives.

3.7.4 Recreation Access Indicator

3.7.4.1 Affected Environment

Recreational access in the project area is available by motorized and non-motorized means. An extensive NFS transportation system is located within the project area with Highway 21 providing primary access (Appendix J, Map 1). The existing motorized transportation system in the project area can be attributed to past vegetation and motorized route designation activities (Appendix B). Road construction associated with past vegetation management activities has impacted the transportation system in the project area. Additionally, travel management decisions on the Idaho City Ranger District have affected motorized access in the project area by designating the roads that are open to motorized use, as well as the types of authorized vehicles. Past trail construction activities in the project area have contributed to the non-motorized access. Agreements with the State of Idaho, Boise County, and 8A Snowmobile Club have provided winter access in the project area via groomed snowmobile trails and non-motorized groomed and ungroomed trails. Past activities have altered the miles of roads/trails that provide motorized access for recreation users as well as the non-motorized trail access in the project area. Additionally, minor disruption of recreational access in the project area by other uses, such as timber harvest, road/trail activities, and livestock grazing, have occurred in the project area. Minor recreation access disruption may occur during scheduled maintenance of roads and trails and livestock rotation through the project area.

The Idaho City RD MVUM identifies the motorized access and types of vehicles authorized, with the exception of over snow use, on NFS roads and trails in the project area. Currently, no NFS trails are designated for motorized use in the project area. About 87[40] miles of NFS roads have been designated as open to full-sized vehicles with about 26.9 miles closed seasonally (September 15 to June 15) to motorized use. No designated motorized NFS trails are available for summer use in the project area. (Appendix J, Map 2)

The project area features about 18.2 miles of NFS roads that are groomed and maintained as snowmobile routes during the winter (Table 3-3). Groomed snowmobile routes in the project area consist of NFS roads 312, 384, and 351 (Appendix J, Map 4). These snowmobile routes are used extensively during the snow season and are groomed through an agreement between

[40] The 87 miles of NFS roads designated for motorized use in the project area include 72.5 miles of Maintenance Level (ML) 2 Roads, 6.1 miles of ML 3 roads, and 8.4 miles of ML 5 roads. The ML 5 roads in the analysis area are State Highway 21 which is under jurisdiction of Idaho Transportation Department.

IDPR, the Forest Service, Boise County, and the Boise County 8A Snowmobile Club (Agreement #11-CD-017). Snowmobilers park at Whoop Um Up Park N' Ski Trailhead to access these trails. These routes are part of a larger system of groomed snowmobile trails in Boise and Elmore counties. In the project area, a 7491-acre winter motorized travel restriction area exists that prohibits motorized over snow use to routes displayed on the Boise National Forest Winter Travel Map only (USDA Forest Service 2014f). Cross-country over snow motorized use is currently allowed on about 11,836 acre in the project area.

About 2.9 miles of existing authorized NFS non-motorized trails exist in the project area (Table 3-116). In addition, 32.4 miles of existing summer non-motorized trails are located on NFS roads that are closed to all motorized use (ML 1) (Table 3-116 and Appendix J, Map 3). These trails are not authorized on the NFS trail system but are management by IDPR under agreement in conjunction with the yurt rental system. Under agreement, IDPR also manages 60.2 miles of winter non-motorized trails, of which 29.2 miles are groomed and 31 miles are ungroomed (Table 3-116). The trail system supports the IDPR yurt rental program and allows for year-round non-motorized use opportunities, including hiking, mountain biking, horseback riding, Nordic and telemark skiing, and snowshoeing.

The means by which each yurt is accessed depends on the transportation and trail system and the season. In winter, backcountry yurts are accessed by a 2- to 3-mile ski or snowshoe trek on either groomed or ungroomed non-motorized trails; in the summer, the yurts can be accessed by car and/or hiking, depending on the yurt (Table 3-117).

Table 3-116. Summary of existing trails in the Becker project area, including National Forest System (NFS) trails and those managed by the Idaho Department of Parks and Recreation (IDPR)

Trail Description	Miles
NFS Designated Motorized Trails (Summer)	0.0
NFS Non-motorized Trails: NFS Trail 267 (0.9 miles), NFS Trail 158 (0.5 miles), and NFS Trail 275 (1.4 miles)	2.9
Summer Non-motorized Trail under agreement with IDPR	32.4
Winter Groomed Non-motorized Trail under agreement with IDPR	29.2
Winter Ungroomed Non-motorized Trail under agreement with IDPR	31.0
Groomed snowmobile routes	18.2
Total Miles of Trail	**113.7**

Table 3-117. Summary of summer and winter access to the Idaho Department of Parks and Recreation yurts

Yurt	Summer Access	Winter Access
Elk Horn	Non-motorized Trail	Non-motorized groomed trail (ski/snowshoe)
Stargazer	Motorized—NFS road 394B	Non-motorized ungroomed trail (ski/snowshoe)
Banner Ridge	Motorized—NFS road 385	Non-motorized groomed trail (ski/snowshoe)
Rocky Ridge	Motorized—NFS road 025M	Non-motorized ungroomed trail (ski/snowshoe)
Skyline	Motorized—NFS road 362F, seasonally open June 16–September 14	Non-motorized groomed trail (ski/snowshoe)
Whispering Pines	Motorized—NFS road 393	Non-motorized groomed trail (ski/snowshoe)

3.7.4.2 Environmental Effects

Direct and Indirect Effects

Alternative A

Implementing Alternative A (No Action) would have no direct or indirect effects on recreation access in the project area given that all recreation access indicator measures would be maintained at current levels (Table 3-118, Table 3-119, Table 3-120, Table 3-121). Present and ongoing activities would be expected to continue in the analysis are but none of the proposed activities under the action alternatives would be implemented under Alternative A. Alternative A would not add the summer and winter trails currently under agreement with IDPR to the authorized NFS trail system and, therefore, the Forest Service could not expend funds on these trails and the trail system would continue to be maintained by IDPR.

Alternative B (Proposed Action)

Alternative B (Proposed Action) would decrease motorized recreation access and increase non-motorized access in the project area. Proposed transportation management activities, such as road decommissioning, road closures, road relocation, conversion of road to trail, new trail construction, and designation of motorized trail, would change the miles of routes available for public motorized use. Alternative B would reduce the miles of NFS road open to full size vehicle use by about 28.7 miles and increase the miles of motorized trail designated for vehicles 50 inches or less by about 23.3 miles. The Idaho City MVUM map (Appendix J, Map 8) would have approximately 5.4 miles less available for public motorized use under this alternative (Table 3-118). Design Feature TS-3 would require installing closure devices or other access modifications on ML 1 NFS roads. In addition, closure devices, such as gates, would be installed on all NFS roads and trails with seasonal closures. These design features would discourage unauthorized use of closed routes during closure periods.

Recreational access in the project area would be impacted during implementation of project activities, including timber harvest, prescribed fire, road maintenance, road relocation, and culvert replacements. This project was assumed to be divided into 4 timber sales so the entire project area would not be impacted by timber harvest disruptions simultaneously. Non-commercial thinning activities would be expected to occur following timber harvest activities. Activities fuels treatments were assumed to occur 1–3 years following the timber sale, and 5 prescribed fire treatments were assume to occur following activity fuels treatments. Closure orders would be issued for public safety during logging and prescribed fire operations for public safety as required by Design Feature RE-2. Design Features FF-2 and RE-10 were applied to this alternative to provide a mechanism for informing the public of project activities and closures which may impact the availability of recreational opportunities in the project area.

A potential exists for the non-motorized trails in the project area to be damaged by timber harvest activities. Design Feature RE-1 outlines the timber sale contract provisions to be included to maintain access or use and address public safety to protect and/or minimize impacts to trail surfaces, trail heads, and recreational opportunities. Design Feature RE-1 states that the timber sale administrator shall designate all skid trails that cross authorized

trails and shall consult with Forest Service Recreation staff to determine the appropriate repair or reconstruction needs in order to return the trail to a condition similar to prior to project implementation. This design feature would minimize negative impacts to the non-motorized NFS trail and meet Forest Plan Guideline REGU22.

Table 3-118. Summary of Motor Vehicle Use Map (MVUM) routes in the project area by alternative

MVUM Route Description	Alt. A (No Action)	Alt. B (Proposed Action)	Alt. C	Alt. D	Alt. E	Alt. F
Miles of National Forest System (NFS) roads open to full sized vehicles year round[a]	60.1	48.4	48.4	52.9	48.4	48.4
Miles of NFS roads open to full sized vehicles seasonally (June 16–September 14)	26.9	9.9	14.4	9.9	9.9	14.4
Miles of motorized trail designated for vehicles ≤50 inches wide	0	23.3	22.0	0	0	0
Miles of motorized trail designated for vehicles ≤60 inches or less	0	0	0	22	0	18.8
Total Miles	**87**	**81.6**	**84.8**	**84.8**	**58.3**	**81.6**

[a]These MVUM roads allow motorized travel for the purposes of dispersed camping for up to 300 feet of the centerline of the road when it is safe to do so and when this use does not cause damage to National Forest System (NFS) resources (USDA Forest Service 2015i).

Alternative B (Proposed Action) would add about 41.3 miles of summer non-motorized trails to the authorized NFS trail system (Table 3-119). Currently, about 2.9 miles of NFS non-motorized trail and 32.4 miles of trail under agreement with IDPR exist but are not on the authorized NFS trail system. This alternative would increase the miles of non-motorized trails available for summer recreational use by approximately 8.9 miles to 44.2 miles (Table 3-119). Approximately19.8 miles of unauthorized routes and 5.1 miles of NFS road would be converted to trail (Table 3-119) to meet standard trail construction/maintenance specifications and signage requirements and provide drainage as required by Design Features RE-11, RE-12, and RE-13. NFS roads converted to trail would serve as ungroomed winter non-motorized trails and mountain bike trails. This trail would have a minimum width of 24 inches and meet the requirements described in Design Feature RE-14. NFS roads converted to trails would serving as winter non-motorized groomed trails would be maintained at 14–16 feet wide to allow for double track snow grooming and meet the requirements described in Design Feature RE-15. IDPR would continue to manage the summer non-motorized trail system under a cost-share agreement.

Table 3-119. Summary of summer non-motorized trails in the project area by alternative

Non-Motorized Trail Actions	Alt. A (No Action)	Alt. B (Proposed Action)	Alt. C	Alt. D[41]	Alt. E	Alt. F
Existing National Forest System (NFS) non-motorized trail	2.9	2.9	2.9	2.9	2.9	2.9
Non-motorized trail under agreement with Idaho Department of Parks and Recreation and not on NFS trail system	32.4	0	0	0	0	0
Authorize trail currently on unauthorized routes	0	19.8	19.8	19.8	19.8	19.8
Authorize trail on existing NFS road, Maintenance Level (ML) 1	0	8.7	9.0	9.0	9.0	9.0
Authorize trail on existing NFS road, ML 2—Administrative Use Only	0	7.7	4.0	4.0	9.3	4.0
Convert NFS roads (ML 1) to non-motorized Trail	0	3.9	3.9	3.9	6.5	6.5
Convert NFS roads (ML 2) to non-motorized trail	0	1.2	1.2	1.2	1.5	1.5
Total Miles (all trails/routes)	**35.3**	**44.2**	**40.8**	**40.8**	**49**	**43.7**

Alternative B would add about 60.2 miles of winter non-motorized trail to the NFS trail system (Table 3-120). These trails are under agreement with IDPR but not on the authorized NFS trail system. Approximately 29.2 miles of this trail system is groomed by IDPR and 31.0 miles is ungroomed in the winter (Table 3-120). IDPR would continue to manage this winter non-motorized trail system under a cost-share agreement. Alternative B does not propose any changes to the groomed snowmobile routes in the project area. The existing 18.2 miles of groomed snowmobile routes on NFS roads 312, 351, and 384 would be maintained under this alternative. The existing winter motorized restriction area of 7,491 acres in the project area would be maintained under this alternative (Table 3-120). Thinning treatments along Nordic trails would be designed to provide shade for snow retention as required by Design Feature RE-4, in order to minimize the impact of these activities to the winter non-motorized trails. Winter trail access would be reduced in years with snow conditions that allow use prior to December 15 and after April 15 since logging operations may still occur until December 15 as defined by Design Feature RE-6. Design Feature RE-7 would close ski and snowmobile routes used for log haul until December 15 during project implementation. However, Design Feature RE-5 would prohibit snow plowing on established groomed ski and snow machine trails in the project area between December 15 and April 15, allowing winter recreation access on these routes.

Alternative B would maintain existing access to the Elk Horn, Banner Ridge, Rocky Ridge, and Whispering Pine in both the summer and winter (Table 3-121). This alternative would maintain the existing winter season access to the Stargazer and Skyline Yurts but change the

[41] Alternative D and F would designate motorized trail for motorized vehicles 60” or less.

summer season access to the yurts to non-motorized trails (Table 3-121 and Appendix J, Map 10).

Table 3-120. Winter motorized restriction areas by alternative

Winter Motorized Restriction	Alt. A (No Action)	Alt. B (Proposed Action)	Alt. C	Alt. D	Alt. E	Alt. F
Existing winter motorized restriction area (acres)	7,491	7,491	7,491	7,491	7,491	7,491
Proposed winter restriction area (acres)	0	0	3,309	0	3,309	3,309
Total Acres	**7,491**	**7,491**	**10,800**	**7,491**	**10,800**	**10,800**

Table 3-121. Summer access to Idaho Department of Parks and Recreation yurts by alternative

Yurt	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C	Alternative D	Alternative E	Alternative F
Elk Horn	Non-motorized trail	Non-motorized Trail	Non-motorized Trail	Non-motorized Trail	Non-motorized mechanized equipment closure May 1–June 15	Non-motorized trail
Stargazer	Motorized - NFS Rd 394B	Non-motorized Trail	Motorized—NFS road 394B, seasonally open June 16–September 14	Motorized—NFS road 394B	Non-motorized trail	Motorized—NFS road 394B seasonally open June 16–September 14
Banner Ridge	Motorized—NFS road 385	Motorized—NFS road 385	Motorized—NFS road 385	Motorized—NFS road 385	Motorized—NFS road 385	Motorized—NFS road 385
Rocky Ridge	Motorized—NFS road 025M	Motorized—NFS road 025M	Motorized—NFS road 025M	Motorized—NFS road 025M	Motorized—NFS road 025M	Motorized—NFS road 025M
Skyline	Motorized—NFS road 362F, seasonally open June 16–September 14	Non-motorized trail	Motorized—NFS road 362F, seasonally open June 16–September 14	Motorized	Non-motorized. mechanized equipment closure May 1–June 15	Motorized—NFS road 362F, seasonally open June 16–September 14
Whispering Pines	Motorized—NFS road 393	Motorized—NFS road 393	Motorized—NFS road 393	Motorized—NFS road 393	Motorized—NFS road 393	Motorized—NFS road 393

Alternative C

Alternative C would reduce the motorized recreation access in the project area and increase non-motorized access in the project area. The effects of Alternative C would be the same as those described for Alternative B, except for the measures described below.

Alternative C would reduce the miles of NFS road open to full size vehicle use by about 24.2 miles and increase the miles of motorized trail designated for vehicles ≤50 inches by about 22 miles. The Idaho City MVUM map would have approximately 2.2 miles less available for public motorized use under this alternative (Table 3-118 and Appendix J, Map 13).

Alternative C would increase the miles of non-motorized trail in the project area by about 5.5 miles. Alternative C would add about 37.9 miles of summer non-motorized trails to the existing 2.9 miles on the authorized NFS trail system (Table 3-119). Approximately19.8 miles of unauthorized routes and 4.1 miles of NFS road would be converted to trail to meet standard trail construction/maintenance specifications and signage requirements and provide drainage as required by Design Features RE-11, RE-12, and RE-13.

Under Alternative C, approximately 3,309 acres of winter motorized restriction area would be added to the existing 7,491-acre winter motorized restriction area in the project area (Table 3-120 and Map 15 in Appendix J). This addition would increase the area that restricts motorized over snow use to routes displayed on the Boise National Forest Winter Travel Map (USDA Forest Service 2014f) to 10,800 acres, thus reducing the area where motorized over snow use may occur in the area. The addition would decrease the potential for damage from snowmobile use on the non-motorized winter trail system in the project area and meet MA 7 Objective 0773 as described in the Forest Plan errata in Appendix I of this document.

Alternative C would maintain existing access to the Elk Horn, Banner Ridge, Rocky Ridge, Skyline and Whispering Pine Yurts in both the summer and winter. This alternative would maintain the existing winter season access to the Stargazer but only allow motorized summer season access to this yurt from June 16 to September 14 (Table 3-121 and Appendix J, Map 14). NFS road 394B would be seasonally closed from September 15 to June 15 annually; therefore, access to the Stargazer Yurt would be non-motorized during this time period (Table 3-121).

Alternative D

Overall, Alternative D would reduce motorized recreational access and increase non-motorized access in the project area. However, Alternative D would increase motorized access to the IDPR yurts by removing a seasonal closure on the road that accesses the Skyline Yurt (Table 3-121). The effects of Alternative D would be the same as those described for Alternative B (section **Error! Reference source not found.**), except for the easures described below.

Alternative D would reduce the miles of NFS road open to full size vehicle use by about 24.2 miles and increase the miles of motorized trail designated for vehicles ≤60 inches by about 22 miles. The Idaho City MVUM map would have approximately 2.2 miles less

available for public motorized use under this alternative (Table 3-118 and Appendix J, Map 19).

Alternative D would increase the miles of non-motorized trail in the project area by about 5.5 miles and add about 37.9 miles of summer non-motorized trails to the existing 2.9 miles on the authorized NFS trail system (Table 3-119).

Alternative D would maintain the existing access to the Elk Horn, Stargazer, Banner Ridge, Rocky Ridge, and Whispering Pine Yurts in both the summer and winter. This alternative would maintain the existing winter season access to the Skyline Yurt and remove the seasonal closure on NFS road 362F to allow motorized access to this yurt between June 16 and September 14 (Table 3-121).

Alternative E

Alternative E would reduce motorized recreation access and increase non-motorized access in the project area. The effects of Alternative E would be the same as those described for Alternative B in section **Error! Reference source not found.**, except for the measures escribed below.

Alternative E would reduce the miles of NFS road open to full size vehicle use by about 28.7 miles and would not add motorized trails. The Idaho City MVUM map would have approximately 28.7 miles less available for public motorized use under this alternative (Table 3-118 and Appendix J, Map 25).

Alternative E would increase the miles of non-motorized trail in the project area by about 13.7 miles. Alternative E would add about 46.1 miles of summer non-motorized trails to the existing 2.9 miles on the authorized NFS trail system (Table 3-119). Approximately19.8 miles of unauthorized routes and 8.0 miles of NFS road would be converted to trail to meet standard trail construction/maintenance specifications and signage requirements and provide drainage as required by Design Features RE-11, RE-12, and RE-13. Alternative E adds a mechanized equipment (e.g., wagons, carts, bicycles) closure north of Beaver Creek Cabin and east of Highway 21 from May 1 to June 15, annually. This closure would eliminate mountain bike trail users from this area during the closure period.

Alternative E proposes 1,166 acres of helicopter logging, which may reduce the potential for existing non-motorized trails co-located on NFS roads to be re-opened as roads to facilitate harvest activities. Alternative E would likely have less damage and require fewer repairs to trails in areas with helicopter logging, and trail access may be restored more quickly than Alternatives B, C, and D.

Under Alternative E, approximately 3,309 acres of winter motorized restriction area would be added to the existing 7,491-acre winter motorized restriction area in the project area (Table 3-120 and Map 27 in Appendix J). This addition would increase the area that restricts motorized over snow use to routes displayed on the Boise National Forest Winter Travel Map (USDA Forest Service 2014f) to 10,800 acres, thus reducing the area where motorized over snow use may occur. The addition would decrease the potential for damage from snowmobile use on the non-motorized winter trail system and meet MA 7 Objective 0773 as described in the Forest Plan errata in Appendix I of this document.

Alternative E would have the greatest change in access to the IDPR yurts over the existing condition. Alternative E would maintain existing access to the Banner Ridge, Rocky Ridge, and Whispering Pine Yurts in both the summer and winter. This alternative would maintain existing winter season access to the Stargazer Yurt but would only allow non-motorized access during the summer. This alternative would maintain winter access to the Elk Horn and Skyline Yurts but modify summer access. Alternative C adds a mechanized equipment (e.g., wagons, carts, bicycles) closure north of Beaver Creek Cabin and east of Highway 21 from May 1 to June 15, annually (Table 3-121 and Appendix J, Map 26). Alternative C would maintain existing winter access to the Skyline Yurt and change summer access to non-motorized equipment with the mechanized equipment closure. The existing winter access would be maintained for the Elkhorn Yurt and non-motorized summer access would be maintained with the mechanized equipment closure. The mechanized equipment closure would eliminate the ability for recreation users to use carts, bicycles, etc. to transport supplies from the trailhead to the yurt during the closure period.

Alternative F

Alternative F would reduce motorized recreation access and increase non-motorized access in the project area. The effects of Alternative F would be the same as those described for Alternative B (section **Error! Reference source not found.**) except for the measures escribed below.

Alternative F would reduce the miles of NFS road open to full size vehicle use by about 24.2 miles and increase the miles of motorized trail designated for vehicles ≤60 inches by about 18.8 miles. The Idaho City MVUM map would have approximately 5.4 miles less available for public motorized use under this alternative (Table 3-118 and Appendix J, Map 31).

Alternative F would increase the miles of non-motorized trail in the project area by about 8 miles and add about 40.8 miles of summer non-motorized trails to the existing 2.9 miles on the authorized NFS trail system (Table 3-119). Approximately19.8 miles of unauthorized routes and 8 miles of NFS road would be converted to trail to meet standard trail construction/maintenance specifications and signage requirements and provide drainage as required by Design Features RE-11, RE-12, and RE-13.

Alternative F proposes 377 acres of helicopter logging, which may reduce the potential for existing non-motorized trails co-located on NFS roads to be reopened as roads to facilitate harvest activities. Alternative E would likely cause less damage and require fewer repairs to trails in areas with helicopter logging, and trail access may be restored more quickly than under Alternatives B, C and D.

Under Alternative F, approximately 3,309 acres of winter motorized restriction area would be added to the existing 7,491-acre winter motorized restriction area in the project area (Table 3-120 and Map 33 in Appendix J). This addition would increase the area that restricts motorized over snow use to routes displayed on the Boise National Forest Winter Travel Map (USDA Forest Service 2014f) to 10,800 acres, thus reducing the area where motorized over snow use may occur in the area. The addition would decrease the potential for damage from snowmobile use on the non-motorized winter trail system in the project area and meet MA 7 Objective 0773 as described in the Forest Plan errata in Appendix I of this document.

Alternative F would maintain existing access to the Elk Horn, Banner Ridge, Rocky Ridge, Skyline, and Whispering Pine Yurts in both the summer and winter (Table 3-121). This alternative would maintain the existing winter season access to the Stargazer Yurt but only allow motorized summer access to this yurt from June 16 to September 14. NFS road 394B would be seasonally closed from September 15 to June 15, annually; therefore, access to Stargazer Yurt would be non-motorized during that time period (Table 3-121 and Appendix J, Map 32)).

Cumulative Effects

Alternative A

Alternative A would not have cumulative effects for the recreation access indicator since there are no direct or indirect effects under this alternative.

Action Alternatives

Table 1 in Appendix B identifies which past activities were considered for this cumulative effects analysis. The impacts of past activities have contributed to the existing conditions for recreational access and opportunities in the project area and, therefore, are included in the affected environment discussed in section 3.7.4.1.

Table 1 in Appendix B identifies which present/ongoing activities were considered for this cumulative effects analysis. Ongoing activities such as road use and maintenance, trail use and maintenance, livestock grazing, IDPR cost-share agreement activities, snow grooming, noxious weed treatment, minerals activities, and fire suppression would be expected to continue within the project area. Minor recreational access disruptions have occurred and may continue to occur during scheduled maintenance of NFS roads and trails in the project area. Recreational users may encounter livestock during their visit to the project area, depending on time of year and the grazing rotation and routing pattern. In addition, areas could be temporarily closed to visitors during fire suppression activities to mitigate public health and safety hazards. Although proposed alternatives could incrementally add to the effects of present and ongoing activities, implementing the design features discussed above should prevent the proposed and present activities from substantially altering recreational access for visitors, particularly during the high-use periods.

Table 1 in Appendix B identifies which reasonably foreseeable activities were considered for this cumulative effects analysis. There were no cumulative effects activities that would incrementally add to the effects of these alternatives; therefore, no cumulative effects to this indicator would be expected with implementation of the action alternatives.

3.7.5 Public Safety Indicator

3.7.5.1 Noxious Weed Treatment

Herbicide use to treat noxious weeds in the project area does occur as part of the Boise National Forest Noxious Weed Treatment program. Appendix E of this document describes the biological controls, mechanical treatments, and herbicide use that may have been used in the project area.

Use of pesticides, including herbicides, on NFS lands are based on effectiveness of the pesticide but also the understanding of the risks associated with their use. For the pesticides commonly used by the Forest Service in its management activities, Human Health and Ecological Risk Assessments (HERAs) have been prepared. In these documents, the process of risk assessment is used to quantitatively evaluate the probability (i.e., risk) that a pesticide use might pose harm to humans or other species in the environment. It is the same assessment process used for regulation of allowable residues of pesticides in food, as well as safety evaluations of medicines, cosmetics, and other chemicals. The Forest Service Forest Health website[42] for Pesticide-Use Risk Assessments states that existing HERAs for pesticide treatments completed by the Forest Service maybe used in lieu of project-specific risk assessments (USDA Forest Service 2015d). All herbicides currently used on the Boise National Forest and in the project area (Appendix E) have had a risk assessment completed (available in the project record). Risk of noxious weed treatment to the human environment as part of this project will not be discussed further.

3.7.5.2 Affected Environment

Motorized mixed use is the use of a road by both highway legal and non-highway legal vehicles. In 2009, Idaho Senate Bill 1098 modified the Idaho Code with respect to off-highway vehicle (OHV) licensing requirements. While responsible OHV recreation is welcome on NFS roads, this new law changed OHV operator licensing requirements by allowing any person under the age of 16 to operate an OHV on all federal lands open to such use. Motorized use designations on National Forests in Idaho were formed by the previous Idaho law that prohibited OHV use by unlicensed drivers on roads open to passenger vehicles. Trails designated for OHV use were unaffected by Senate Bill 1098.The National Travel Management Rule (36 CFR 212) requires that mixed use safety be considered in designating roads/trails for motorized use. In late 2010, Idaho Forests initiated motorized mixed use safety reviews of the primary transportation system, with unlicensed OHV operators in mind, and identified roads that might require additional safety measures in order to allow continued OHV and passenger vehicle mixed use. In 2011, the Idaho legislature passed Senate Bill 1001 which requires underage operators on NFS roads to complete an OHV safety course. This legislation is an important factor in completing the final risk analysis and will be one component of the Forest Service's plan to mitigate mixed use risk while allowing continued OHV recreation on the vast majority of NFS roads.

The existing motorized transportation and trail systems in the project area can be attributed to past vegetation; motorized route designation; and IDPR, Boise County, and 8A Snowmobile club cost-share agreement activities (Table 1 in Appendix B). Road construction associated with past vegetation management activities have contributed to the transportation system in the project area. Additionally, travel management decisions on the Idaho City RD have affected motorized access in the project area by designating the roads open to motorized use, as well as the types of authorized vehicles. Past trail construction activities have contributed to the non-motorized trail system. IDPR developed a non-motorized trail system in conjunction with their yurt rental system. Agreements with the State of Idaho, Boise County, and 8A Snowmobile Club have historically provided winter access in the analysis via

[42] http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

groomed snowmobile trails and non-motorized groomed and ungroomed trails. Past activities have altered the miles of roads/trails that provide motorized access for recreation users as well as the non-motorized trail access in the project area.

Currently, mixed use between full-sized vehicles and OHVs in the summer season may occur on 78.6 miles of NFS ML 2 and ML 3 roads in the project area (Table 3-122). Summer season shared use routes in the project area are routes that are authorized for non-motorized and motorized uses. While non-motorized recreation users may use open NFS roads in the project area, no routes are specifically authorize for shared use.

Winter season shared use may occur where non-motorized over-snow trails interact with groomed snowmobile trails in the vicinity of the Whoop-Um-Up Trailhead and Edna Creek Campground. Currently, 11,836 acres of the project area are open for motorized cross country over snow travel from November 1 to May 15, as snow conditions allow (USDA Forest Service 2014f). This area overlaps with portions of the existing non-motorized winter trail system, which increases the potential for non-motorized and motorized winter recreation user conflicts in this area. (Appendix J, Map 4)

3.7.5.3 Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A would have no direct or indirect effects on mixed use or shared use in the project area since no modifications to the transportation and/or trail system would be implemented. Alternative A would not change the miles or mixed use or shared use in the project area from existing conditions (Table 3-122 and Table 3-123).

Table 3-122. Summary of summer season mixed use by alternative

Summer Mixed Use	Alt. A (No Action)	Alt. B (Proposed Action)	Alt. C	Alt. D	Alt. E	Alt. F
Miles of National Forest System (NFS) Maintenance Level (ML) 2 and ML3 roads with full-sized vehicles and OHV mixed use	78.6	49.9	54.4	54.4	49.9	54.4
Miles of mixed use on designated NFS motorized trail co-located on NFS ML 2 roads (admin use only)	0	6.3	6.3	6.3	0	5.6
Total Miles	**78.6**	**56.2**	**60.7**	**60.7**	**49.9**	**60.0**

Alternative B (Proposed Action)

Alternative B would decrease mixed use in the project area through transportation system actions such as road decommissioning, road closures, conversion to trail, and motorized trail designation. This alternative would reduce routes with mixed use by about 22.4 miles, thus reducing the potential for conflict between highway legal and non-highway legal vehicles in the project area. Approximately 49.9 miles of NFS ML 2 and ML 3 roads have the potential for mixed use with implementation of this alternative (Table 3-122). Under Alternative B, a potential exists for mixed use on NFS ML 2 roads that are closed to the public but open for

administrative use only and co-located with 6.3 miles of designated motorized trails (Table 3-122). Mixed use on these roads would only occur when the road is being used by full-sized vehicles for administrative purposes, such as IDPR access to yurts for cleaning and/or maintenance.

The miles of routes with shared use between motorized and non-motorized uses would increase by about 9.6 miles under this alternative (Table 3-123). Alternative B would have 7.7 miles of NFS ML2 roads that are closed to the public but open for administrative use only and co-located non-motorized trail. Shared use on these roads would only occur in the event that the road is being used by motorized vehicles for administrative purposes. Alternative B would also have about 1.9 miles of non-motorized trails co-located with designated motorized trail, increasing the potential for non-motorized and motorized conflict on those trail segments (Table 3-123). Alternative B would continue to have the potential for winter non-motorized and motorized recreation user conflicts in the 11,836-acre portion of the project area that allows for motorized over-snow use and overlaps the winter non-motorized trail system (Appendix J, Map 11).

Table 3-123. Summary of summer season shared use by alternative

Summer Shared Use	Alt. A (No Action)	Alt. B (Proposed Action)	Alt. C	Alt. D	Alt. E	Alt. F
Miles of designated motorized trail co-located with non-motorized trail	0	1.9	1.6	1.6	0	1.6
Miles of National Forest System Maintenance Level ML 2 (admin use only) roads co-located with non-motorized trail	0	7.7	4.0	4.0	9.3	4.0
Total Miles	**0**	**9.6**	**5.6**	**5.6**	**9.3**	**5.6**

Alternatives C and D

Alternatives C and D would reduce the miles of routes with the potential for mixed use and increase the miles with the potential for shared use in the project area. The effects of Alternatives C and D would be the same as those described for Alternative B in section 3.1.4.3.2, except as described below.

Alternatives C and D would reduce the miles with the potential for mixed use between highway legal and non-highway legal vehicles by 17.9 miles. The miles of NFS ML 2 and ML 3 roads with the potential for mixed use would decrease from 78.6 miles to 54.4 miles under Alternatives C and D (Table 3-122).

Shared use in the project area would increase over existing conditions by about 5.6 miles under this alternative (Table 3-123). Alternatives C and D would have about 4.0 miles of NFS ML 2 roads that are closed to the public but open for administrative use only and co-located with non-motorized trail. Shared use on these roads would only occur in the event that the road is being used by motorized vehicles for administrative purposes. Alternatives C and D would also have about 1.6 miles of non-motorized trails co-located with designated motorized trail, increasing the potential for non-motorized and motorized conflict on those trail segments.

Alternative C would reduce miles of routes with the potential for winter shared use between motorized and non-motorized users by approximately 12 miles. Alternative C would reduce the potential for conflicts in the winter by adding a 3,309-acre winter motorized restriction area that restricts motorized over snow use to groomed routes only around the winter non-motorized trails that were not previously in a winter motorized restriction area (Appendix J, Map 15). This addition would decrease the potential for damage from snowmobile use on the non-motorized winter trail system in the project area and meet MA 7 Objective 0773 as described in the Forest Plan errata in Appendix I of this document.

Alternative D would have the same effects as Alternative B for winter shared-use miles.

Alternative E

Alternative E would reduce miles of routes with the potential for mixed use and increase miles with the potential for shared use in the project area. The effects of Alternative C would be the same as those described for Alternative B in section 3.1.4.3.2, except as described below.

Alternative E would reduce miles with the potential for mixed use between highway legal and non-highway legal vehicles by 28.7 miles. The miles of NFS ML 2 and 3 roads with the potential for mixed use would decrease from 78.6 miles to 49.9 miles under Alternative E (Table 3-122). Alternative E would not have the potential for mixed use on the designated motorized trail co-located on NFS ML 2 and ML 3 roads designated for administrative use only given that Alternative E would not designated a motorized trail system.

Shared use in the project area would increase over existing conditions by about 9.3 miles under this alternative (Table 3-123). Alternative E would have about 9.3 miles of NFS ML 2 roads that are closed to the public but open for administrative use only and co-located with non-motorized trail. Shared use on these roads would only occur in the event that the road is being used by motorized vehicles for administrative purposes. Alternative E would not have non-motorized trails co-located with designated motorized trail which would increase the potential for shared use between non-motorized and motorized conflict on those trail segments.

Alternative E would reduce miles of routes with the potential for winter shared use between motorized and non-motorized users by approximately 12 miles. Alternative E would reduce the potential for recreation user conflicts in the winter season by adding a 3,309-acre winter motorized restriction area that restricts motorized over snow use to groomed routes only around the winter non-motorized trails that were not previously in a winter motorized restriction area (Appendix J, Map 27). This addition would decrease the potential for damage from snowmobile use on the non-motorized winter trail system in the project area and meet MA 7 Objective 0773 as described in the Forest Plan errata in Appendix I of this document.

Alternative F

Alternative F would reduce miles of routes with the potential for mixed use and increase miles with the potential for shared use in the project area. The effects of Alternative F would be the same as those described for Alternative B in section **Error! Reference source not ound.**, except as described below.

Alternative F would reduce miles with the potential for mixed use between highway legal and non-highway legal vehicles by 18.6 miles. The miles of NFS ML 2 and ML 3 roads with the potential for mixed use would decrease from 78.6 miles to 54.4 miles under Alternative F (Table 3-122). Under Alternative F, the potential of mixed use would exist on NFS ML 2 roads that are closed to the public but open for administrative use only and co-located with 5.6 miles of designated motorized trail. Mixed use on these roads would only occur when the road is being used by full-sized vehicles for administrative purposes, such as IDPR access to yurts for cleaning and/or maintenance.

Shared use in the project area would increase over existing conditions by about 5.6 miles under this alternative (Table 3-123). Alternative F would have about 4.0 miles of NFS M 2 roads that are closed to the public but open for administrative use only and co-located with non-motorized trail. Shared use on these roads would only occur in the event that the road is being used by motorized vehicles for administrative purposes. Alternative F would also have about 1.6 miles of non-motorized trails co-located with designated motorized trail, which would increase the potential for non-motorized and motorized conflict on those trail segments.

Alternative F would reduce miles of routes with the potential for winter shared use between motorized and non-motorized users by approximately 12 miles. Alternative F would reduce the potential for recreation user conflicts in the winter season by adding a 3,309-acre winter motorized restriction area that restricts motorized over snow use to groomed routes only around the winter non-motorized trails that were not previously in a winter motorized restriction area (Appendix J, Map 33). This addition would decrease the potential for damage from snowmobile use on the non-motorized winter trail system in the project area and meet MA 7, Objective 0773 as described in the Forest Plan errata in Appendix I of this document.

Cumulative Effects

Alternative A

Alternative A would not have cumulative effects for the public safety indicator since no direct or indirect effects occur under this alternative.

Action Alternatives

Table 1 in Appendix B identifies which past activities were considered for this cumulative effects analysis. The impacts of past activities have contributed to the existing conditions for public safety in the project area and, therefore, are included in the affected environment discussed in section 3.7.5.2.

Table 1 in Appendix B identifies which present/ongoing activities were considered for this cumulative effects analysis. Ongoing activities, such as road use, trail use, IDPR cost-share agreement activities, livestock grazing, fire suppression (as needed), and snow grooming, would likely continue within the project area. Minor recreational access disruptions have occurred and may continue to do so during scheduled maintenance of NFS roads and trails in the project area. Recreational users may encounter livestock during their visit to the project area, depending on time of year, and the grazing rotation and routing pattern. In addition, areas could be temporarily closed to visitors during fire suppression activities, if needed, to mitigate public health and safety hazards. None of the present/ongoing activities would be

expected to incrementally add to the effects of these alternatives; therefore, no cumulative effects would be expected.

Table 1 in Appendix B identifies which reasonably foreseeable activities were considered for this cumulative effects analysis. No cumulative effects activities would incrementally add to the effects of these alternatives; therefore, no cumulative effects to this indicator would be expected with implementation.

3.7.6 Recreation Opportunity Spectrum Indicator

3.7.6.1 Affected Environment

The Recreation Opportunity Spectrum (ROS) (USDA Forest Service 1986) is a classification system in which components of recreation settings and facilities, such as access, developed sites/facilities, activities, and experiences, are organized and arranged along a continuum or spectrum. The continuum ranges from very primitive settings and experiences to highly concentrated, urbanized ones. Each class is defined in terms of its specific combination of activities, setting, facilities, and experience opportunities.

The ROS provides a framework for defining the types of outdoor recreation settings, opportunities, and experiences that exist or could be provided in a given area. It also provides a context and tool for estimating and describing recreation resources as well as effects to those resources from alternative management strategies and actions.

Two summer ROS classifications occur in the project area: Roaded Modified (13,263 acres) and Roaded Natural (5,923 acres) (Figure 3-100; Boise National Forest, Summer ROS GIS Data). Winter ROS for the project area occurs in three ROS classifications: Roaded Natural (4,443 Acres), Semi-Primitive Motorized (8,280 acres), and Semi-Primitive Non-motorized (6,463 acres) (Figure 3-101; Boise National Forest, Winter ROS GIS Data).

Roaded Natural areas are characterized by a predominantly natural or natural-appearing environment with moderate evidence of the sights and sounds of people. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities. Summer activities may include viewing scenery, using motorized vehicles, bicycling, hiking, horseback riding, camping, and hunting. Winter activities may include ice and snowcraft, sledding, downhill skiing, snowshoeing, cross country skiing, and snowplay (USDA Forest Service 1986, p. II-31 to II-33).

Roaded Modified areas provide for a range of recreational experiences that are consistent with substantially modified, motorized settings in which the sights and sounds of humans are readily evident and the interaction between users can be from low to high. Camping experiences are relatively primitive, with few onsite facilities provided. The area is very accessible using the numerous roads. Ample evidence of human activity includes roads, extensively logged timber stands, skid trails, and log landings. Visitors have a low probability of experiencing solitude and risk, but a moderate chance of enjoying a sense of closeness to nature, depending on the timing of their visit. Opportunities for challenge and risk are minimal. Summer activities may include viewing scenery, using motorized vehicles,

bicycling, hiking, horseback riding, camping, and hunting. Winter activities may include ice and snowcraft, sledding, downhill skiing, snowshoeing, cross country skiing, and snowplay (USDA Forest Service 1986, p. II-31 to II-33).

Semi-Primitive Motorized areas are characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but evidence of other users is often present. The area is managed in such a way that minimum onsite controls and restrictions may be present but would be subtle. Motorized use is permitted. Summer activities may include viewing scenery, using motorized vehicle, bicycling, hiking, horseback riding, camping, and hunting. Winter activities may include ice and snowcraft, sledding, downhill skiing, snowshoeing, cross country skiing, and snowplay (USDA Forest Service 1986, p. II-31 to II-33).

Semi-Primitive Nonmotorized areas are characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but evidence of other users is often present. The area is managed in such a way that minimum onsite controls and restrictions may be present but would be subtle. Motorized recreation use is not permitted, but primitive roads used for other resource management activities may be present on a limited basis. Use of such roads may be restricted to minimize impacts on recreational experience opportunities or other resources. Summer activities may include viewing scenery, using motorized vehicles, bicycling, hiking, horseback riding, camping, and hunting. Winter activities may include downhill skiing, snowshoeing, cross country skiing, and snowplay (USDA Forest Service 1986, p. II-31 to II-33).

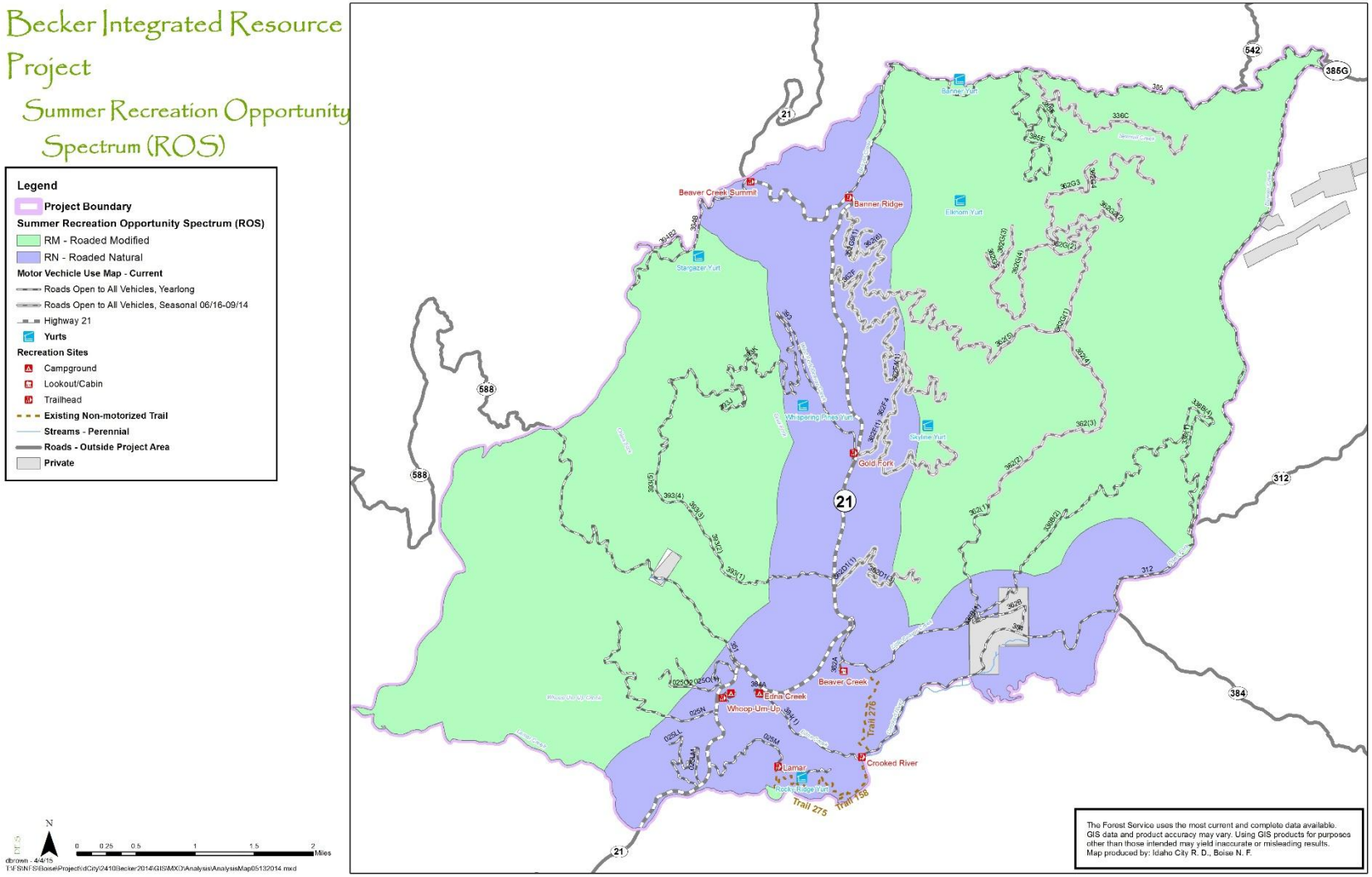


Figure 3-100. Becker project area summer Recreation Opportunity Spectrum (ROS) map

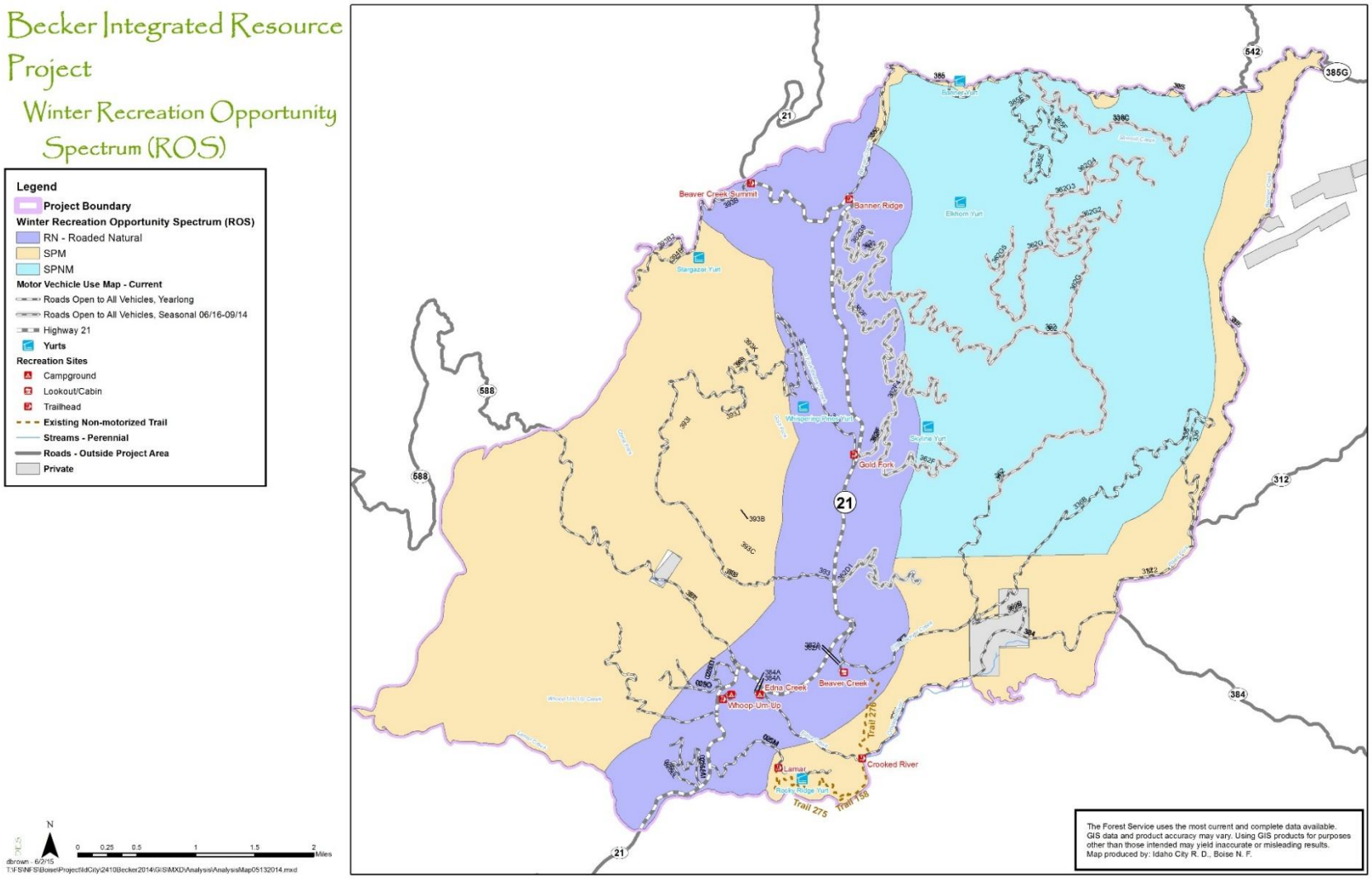


Figure 3-101. Becker project area winter Recreation Opportunity Spectrum (ROS) map

3.7.6.2 Environmental Effects

Direct and Indirect Effects

Alternative A (No Action)

Under Alternative A, no changes are proposed to the current NFS transportation system, NFS non-motorized trail system, or winter recreation opportunities in the project area; therefore, no change to the current ROS classifications would be expected. Alternative A would be consistent with the ROS classification in the project area.

Alternative B (Proposed Action) and Alternative D

Neither Alternative B nor Alternative D would have direct or indirect effects to summer or winter ROS classifications because the activities proposed in the project area are consistent with current ROS classifications. Implementing either alternative would, however, modify the long-term NFS transportation system in the project area by designating motorized trails, relocating NFS roads, closing NFS roads to public motorized access, and decommissioning roads (Table 3-116). These changes to the transportation system would be consistent with the activities, setting, facilities, and experience opportunities of the current summer ROS classifications of Roaded Natural and Roaded Modified. Both Alternatives B and D would authorize about 60.2 miles of existing winter (over snow) non-motorized trails in areas classified in the Roaded Natural, Semi-primitive Non-motorized, and Semi-primitive Motorized ROS categories for the winter months. Approximately 29.2 miles of winter non-motorized trails would continue to be groomed by IDPR. These alternatives would maintain the existing 7,491-acre winter motorized restriction area in the project area that is currently classified as Semi-primitive Non-motorized ROS. Implementing either of these alternatives would be consistent with activities, setting, facilities, and experience opportunities of the current winter ROS classifications in the project area.

Alternative C, E, and F

Alternatives C, E, or F would not be expected to have direct or indirect effects to summer or winter ROS classifications within the project area. Implementing any of these action alternatives would, however, modify the long-term NFS transportation system in the project area by designating motorized trails, relocating NFS roads, closing NFS roads to public motorized access, and decommissioning roads (Table 3-116). These changes to the transportation system would be consistent with activities, setting, facilities, and experience opportunities of the current summer ROS classifications of Roaded Natural and Roaded Modified. Each of these alternatives would authorize about 60.2 miles of existing winter (over snow) non-motorized trails in areas classified in the Roaded Natural, Semi-primitive Non-motorized, and Semi-primitive Motorized ROS categories for the winter (Table 3-122). Approximately 29.2 miles of the winter non-motorized trails would continue to be groomed by IDPR. Approximately 3,309 acres of a new winter motorized restriction area located in areas classified as Roaded Natural and Semi-primitive Motorized ROS in the winter would be added under each of these alternatives. This addition would not impact the Forest Plan ROS classifications of these areas because activities can be more restrictive than the assigned ROS classifications to allow for site-specific management (USDA Forest Service 1986).

Addition of the new winter motorized restriction areas would allow the Forest to manage the winter non-motorized trail system while still providing for winter motorized use in other areas in the project area. Implementing any of these alternatives would be consistent with activities, setting, facilities, and experience opportunities of the current winter ROS classifications in the project area.

Cumulative Effects

Alternative A

Alternative A would not have cumulative effects for the ROS indicator since no direct or indirect effects occur under this alternative.

Action Alternatives

Given that there would be no direct or indirect effects to the existing ROS classifications within the project area, no cumulative effects to ROS would be expected with the implementation of any of the action alternatives.

3.8 FISHERIES RESOURCES

This section incorporates by reference the fisheries specialist report (see project record), which contains the detailed data, methodologies, analyses, conclusions, maps, references, and technical documentation. This section summarizes the effects of the alternatives to fisheries and addresses the issue that proposed management activities may affect individuals, populations, or habitats of fish species in the Project area.

3.8.1 Analysis Scale, Data Sources, and Methodology

3.8.1.1 Analysis Scale

Direct, indirect, and cumulative effects were tracked at the subwatershed scale (6th field Hydrologic Unit Code—National Hydrography Dataset). For the Becker Integrated Project this includes two subwatersheds: Middle Crooked River Subwatershed and the Pikes Fork Subwatershed. This scale was chosen because the spatial scale of proposed management activities (approximately 19,000 acres) is consistent with typical subwatershed scales (10,000–40,000 acres). Additionally, broader national and forest specific watershed goals, such as those described in the *Watershed Condition Framework* and *Boise National Forest Aquatic Conservation Strategy*, use subwatershed scales for depicting resource conditions and functionality.

Analysis timeframes were chosen to be consistent with Forest Plan Standards SWTS01 and SWTS04, and consist of temporary (0–3 years), short-term (3–15 years), and long-term (15+ years) timeframes.

Effects to bull trout and their habitat were analyzed at the stream reach at the Forest "suitable, potentially occupied habitat", at the Forest "suitable but unoccupied" bull trout patches, and when occurring within USFWS designated critical habitat.

3.8.1.2 Data Sources

Data used include corporate GIS layers, the Forest Aquatic database, baseline descriptions and data for the affected subwatersheds, and project-specific surveys and observations. The

environmental baseline was completed at the subwatershed scale. Stream surveys have been conducted on various river and streams throughout the project area for decades and stream data for this analysis comes from information stored in the Forest Fisheries Database. Fish surveys have been concentrated on those streams believed to be capable of supporting populations of fish.

3.8.1.3 Methodology

Methodology for the fisheries analysis consisted of delineating RCAs, determining the relevant and affected WCIs, and projecting effects to fish species and habitat based on a combination of literature reviews, modeling, and professional judgment.

Riparian Conservation Area Delineations

RCAs incorporate riparian areas along streams, as well as wetlands and floodplains associated with stream systems and ponds, lakes, and reservoirs. Aquatic and riparian systems may be affected by adjacent land management activities. RCAs provide both a linkage and transitional habitat between hillslopes and upland terrestrial habitats and the aquatic habitats within the stream channels. The Forest Plan outlines criteria to aid interdisciplinary teams (IDT) in delineating RCAs for perennial and intermittent streams, ponds, lakes, reservoirs, and wetlands (USDA Forest Service 2010a, Appendix B, p. B 32-41). The objective of RCA delineation is to provide boundaries around streams for which management activities must consider and maintain riparian processes and functions that are important to overall stream and aquatic habitat functionality. Individual management activities may affect riparian process and functions in different ways and magnitudes, depending on the type of activity and its proximity to the stream channel, as well as the characteristics of the stream channel at that location. The following riparian functions and processes identified in the Forest Plan are important to properly functioning riparian areas:

- Stream shading
- Large woody debris recruitment
- Fine organic litter
- Bank stabilization
- Sediment control
- Nutrients and other dissolved materials
- Riparian microclimate and productivity
- Wildlife habitat
- Windthrow
- Importance of small streams
- Importance of hillslope steepness

For the Project, RCAs have been identified by the IDT using Option 2 as described in the Forest Plan (USDA Forest Service, Appendix B, p. B-32 through B-41), which uses site potential tree heights (SPTHs) based on the dominant Potential Vegetation Group (PVG) in the stand (Table 3-124). Option 2 indicates that one SPTH is the RCA buffer distance for intermittent stream channels (as well as ponds, lakes, reservoirs, and wetlands) and two SPTH is the RCA buffer distance for perennial stream channels. Because the project area

contains a wide array of PVGs, the dominant PVG based on the most recent vegetation data was used to delineate RCAs. Table 3-125 displays the delineated RCAs for the project area and overall acreage associated with RCAs within the project area, and Figure 3-102 displays the RCAs within each subwatershed.

Table 3-124. Site Potential Tree Height distances by Potential Vegetation Group from the Boise National Forest Land and Resource Management Plan (USDA Forest Service 2010a)

Potential Vegetation Group	Age	One Site Tree Height (feet)	Two Site Tree Heights (feet)
1—Dry Ponderosa Pine/Xeric Douglas-fir	200	110	220
2—Warm Dry Douglas-fir/Moist Ponderosa Pine	200	120	240
3—Cool Moist Douglas-fir	200	120	240
4—Cool Dry Douglas-fir	200	100	200
5—Dry Grand Fir	200	110	220
6—Cool Moist Grand Fir	200	130	260
7—Cool Dry Subalpine Fir	200	100	200
8—Cool Moist Subalpine Fir	200	100	200
9—Hydric Subalpine Fir	200	100	200
10—Persistent Lodgepole Pine	[a]	80	160
11—High Elevation Subalpine Fir	200	70	140

[a]In PVG 10, individual trees and stands normally do not achieve an average of 200 years. However, mature lodgepole pine site trees can achieve an average height of approximately 80 feet.

Table 3-125. Acres of riparian conservation areas (RCAs) by subwatershed

Subwatershed	Acres of RCA
Middle Crooked	4,518
Pikes Fork	1,046
Total	**5,564**

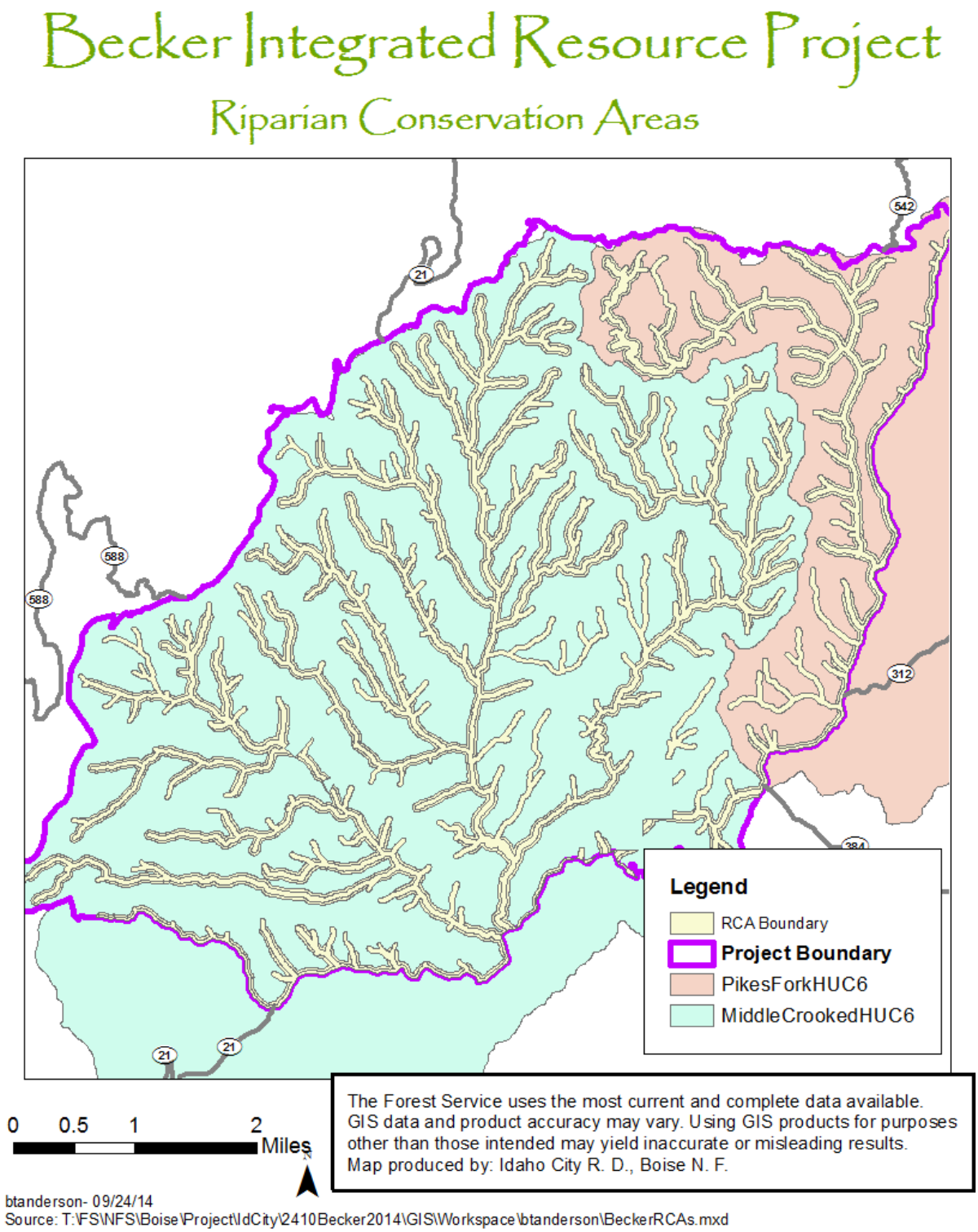


Figure 3-102. Becker Integrated Project Riparian Conservation Areas and Subwatersheds

Proposed management actions associated with the Project have been evaluated with consideration of riparian functions and processes. Distances from streams at which activities

would be permitted have been delineated for each proposed activity within RCAs based on anticipated effects related to site conditions, surveys, modeling results, existing research, and professional judgment. Within RCA buffers at various distances from the stream channel, vegetation management activities associated with *Purpose and Need 1* (thinning, thinning with product removal and burning), transportation management activities associated with *Purpose and Need 2* (road realignment and road decommissioning [both authorized and unauthorized]), and recreation management activities associated with *Purpose and Need 3* (motorized and nonmotorized trail designation, and trailhead construction) are proposed. See **Error! Reference source not found.** 2.4.2 for a complete list of activities and distances at hich they may occur, and refer to **Error! Reference source not found.** for a graphical illustration of these criteria.

Analysis of effects to RCA functions and processes from implementing the proposed actions with the distances assigned in **Error! Reference source not found.** 2.4.2 and **Error! ference source not found.** are discussed in the *Affected Environment and Environmental Effects* section using the analysis indicators identified in *Analysis Process/Pathways and Indicators*. The stream temperature, sediment/turbidity (bull trout and other fishes) and substrate embeddedness, change in peak/base flows, change in drainage network/road density and location, and disturbance history/disturbance regime WCIs related to RCA functions and processes are analyzed in the hydrology section.

Watershed Condition Indicators

Appendix B of the Forest Plan (USDA Forest Service 2010a), also referred to as the "Matrix," comprises a decision support tool developed to assist land managers in describing the existing conditions and assessing how well management actions affect watershed and fisheries resources' goals and objectives. There are four components/tables in the Matrix with each table divided into eight overall pathways (major rows). Each of these rows represents a significant pathway by which actions can have potential effects on native and desired non-native fish species, their habitats, and associated water quality beneficial uses. Pathways are further broken down into 24 WCIs.

The pathways and WCIs are an integrated suite of aquatic (including biophysical components), riparian (including riparian associated vegetation species), and hydrologic (including uplands) condition measures that are intended to be used at a variety of scales. WCIs assist in determining the current condition of a subwatershed and should be used to help design appropriate management actions, or to alter or mitigate proposed and/or ongoing actions to shift subwatersheds toward desired conditions. WCIs represent a diagnostic means to determine factors of current condition and assist in determining future conditions caused by the direct, indirect, and cumulative effects associated with the implementation of management actions or natural restoration over time.

Determining which WCIs are present, relevant, and influenced included evaluating the 24 WCIs outlined in the Forest Plan to characterize current watershed, riparian, and aquatic conditions and the potential effects of proposed management activities on bull trout local populations, water quality, habitat access, habitat elements, channel conditions and dynamics, flow/hydrology, watershed conditions, and the integration of species and habitat conditions (USDA Forest Service 2010a, Appendix B, pp. B-12 to B-21). A full discussion of this process is located in the fisheries technical report (see project record). The fisheries

analysis also relied on information found in the hydrology technical report (see project record), particularly modeling for sediment changes.

Fisheries Resource

Fish Species Analyzed

Bull Trout and Bull Trout Critical Habitat

On June 10, 1998, the US Fish and Wildlife Service produced a final rule listing the Columbia River Basin distinct population segment (DPS) of bull trout (*Salvelinus confluentus*) as threatened under the Endangered Species Act (ESA) (USDI FWS 1998).

The biology, ecology, population status, and habitat conditions of bull trout are described in:

- *Draft Bull Trout Recovery Plan* (USDI FWS 2002a);
- *Ongoing Bull Trout Biological Assessment* (Burton and Erickson 1999); and
- *Designation of Critical Habitat for the Klamath River and Columbia River Distinct Population Segments of Bull Trout* (USDI FWS 2010b).

The USFWS released a draft *Bull Trout Recovery Plan* in compliance with Section 7 of the ESA. Each state within the historic range of bull trout has recovery units, designated core areas, critical habitat units, and management directives (USDI FWS 2002b). The Southwest Idaho Recovery Unit includes the Boise River, Payette River, and Weiser River basins.

The *Bull Trout Recovery Plan* uses criteria such as habitat quality, historic documentation of presence, recent documentation of presence, land use, and presence of potentially competitive species. The recovery unit team identified priority streams to focus the implementation of recovery activities to areas having the greatest potential for supporting bull trout. The priority streams include known bull trout spawning streams; streams with evidence of bull trout recruitment and early life stage rearing; and streams with habitat conditions having elements necessary for bull trout occupancy.

The goal and objectives of the *Bull Trout Recovery Plan* is to ensure the long-term persistence of self-sustaining, complex, interacting groups of bull trout distributed throughout the species' native range, so the species can be delisted. To achieve this goal, the following objectives have been identified for bull trout in the Southwestern Idaho Recovery Unit: (1) maintain current distribution of bull trout and restore distribution in previously occupied areas; (2) maintain stable or increasing trends in abundance of bull trout; (3) restore and maintain suitable habitat conditions for all bull trout life history stages and strategies; and (4) conserve genetic diversity and provide opportunity for genetic exchange.

Fish Species Not Analyzed

Westslope Cutthroat Trout

Westslope cutthroat trout (*O. clarki lewisi*) are listed as a sensitive species by the Regional Forester (USDA Forest Service 2013). No cutthroat trout are known to be native to major Snake River tributaries below Shoshone Falls, such as the Wood, Weiser, Boise, Payette, Owyhee, and Malheur rivers (Behnke 1992). Any cutthroat trout within the Boise River drainage is likely from historic fish stocking practices. As a result, Westslope cutthroat trout

and their habitat within their historical range would not be impacted, and consequently were not considered further in this effects analysis.

Management Indicator Species

Bull trout are the only fish management indicator species in the Forest Plan (USDA Forest Service 2010a, Appendix E, p. E3).

Other Species

Rainbow/redband trout (*O. mykiss*) have been found throughout the Boise River drainage. Redband trout are the native subspecies of rainbow trout. However, other subspecies of rainbow trout have been stocked in the Boise River drainage over the years, and the various subspecies cannot be distinguished without genetic analysis. In addition, interbreeding between redband and non-native subspecies complicates the population's genetics.

Various data from the Forest Aquatic Survey database and local district data has shown populations of whitefish (*Prosopium sp.*), cutthroat trout (*Oncorhynchus clarki*), Brook Trout (*Salvelinus fontinalis*), dace (*Rhinichthys* sp.), and sculpin (*Cottus* sp.) in the Boise River drainage and various tributaries (USDA Forest Service 2014a). However, effects to these species and their habitat were not analyzed.

3.8.2 Analysis Process/Pathways and Indicators

Analysis indicators represent metrics used to describe the cause and effect relationships between components of the proposed action and desired conditions for attributes of stream health important for maintaining healthy fish populations, quality aquatic habitat, and water quality beneficial uses. Analysis indicators have been taken, where appropriate, from the list of WCIs in the Forest Plan (USDA Forest Service 2010a, Appendix B).

The pathways and WCIs are an integrated suite of aquatic (including biophysical components), riparian (including riparian associated vegetation species), and hydrologic (including uplands) condition measures that are intended to be used at a variety of scales. The baseline matrix (Appendix R and S in the fisheries technical report [project record]) was updated to reflect the current conditions. A summary of the current functional ratings and effects of the alternative for each WCI in the Middle Crooked River and Pikes Fork 6th HUCs follows.

The following assumptions exist for this analysis:

- Assumptions associated with the characterization of existing (baseline) conditions for analysis indicators described the "Affected Environment" sections below
- The assumption that all project design features identified in Chapter 2 would be implemented, timely and effectively

3.8.2.1 WCI Pathway Indicators

The following WCI Pathway indicators were used in this analysis.

Indicator: Bull Trout Population Characteristics (includes Local Population Size, Growth and Survival, Life History Diversity and Isolation, Persistence and Genetic Integrity WCIs)

- Concern: Vegetation management (commercial harvest and precommercial thinning) in the RCA could result in falling trees within streams or rivers which may kill or harass bull trout.
    - Methods: Methods include qualitative assessment of bull trout populations using available data included in section 3.8.4.2. Analysis includes the number of acres in USFWS designated bull trout critical habitat and Boise National Forest bull trout "habitat" patch model.
- Concern: Prescribed burning in the RCA could result in direct/indirect effects to this WCI based on exposed soils (Sediment WCI), large woody debris recruitment (LWD WCI) and chemicals near tributaries (Chemical Contamination WCI).
    - Methods: Methods include qualitative assessment included in the appropriate WCI.
- Concern: Transportation management (including temporary road construction, decommissioning/closure road activities, road reconstruction, converting unauthorized roads to NFS roads) could result in direct/indirect effects to this WCI based on exposed soils (Sediment WCI), large woody debris recruitment (LWD WCI), streambank condition (Streambank WCI), and chemicals near tributaries (Chemical Contamination WCI).
    - Methods: Methods include qualitative assessment included in the appropriate WCI.
- Concern: Culvert replacements may temporarily block fish passage within tributaries. There could be temporary adverse effects to individual fish including incidental handling injury and mortality when performing fish removal prior to culvert construction activities.
    - Methods: Methods include qualitative assessment of bull trout populations using available data included in section 3.8.4.2. Analysis includes number of acres in USFWS designated bull trout critical habitat and Boise National Forest bull trout "habitat" patch model.
- Concern: Recreation management (including construction of motorized trail, designation of non-motorized trail, and new trailhead construction) could affect bull trout habitat.
    - Methods: Methods include qualitative assessment of bull trout populations using available data included in section 3.8.4.2. Analysis includes number of acres in USFWS designated bull trout critical habitat and Boise National Forest bull trout "habitat" patch model.

Indicator: Chemical Contaminants/Excess Nutrients

Concern: Accidental spill of petroleum-based products could occur inside the RCA.

Concern: Magnesium chloride application on NFS road 384 could affect the RCA.

Concern: Noxious weed treatments could affect the RCA.

Concern: Snowmobile groomer operations could affect the RCA.

Methods: Methods include qualitative assessment of bull trout populations using available data included in section 3.8.4.2. Analysis includes number of acres in USFWS designated bull trout critical habitat and Boise National Forest bull trout "habitat" patch model.

Indicator: Physical Barrier

Concern: During culvert replacements, bull trout passage may be temporarily obstructed upstream or downstream.

Methods: Methods include qualitative assessment of timing of activity.

Indicator: Large Woody Debris (LWD)

Concern: Future LWD recruitment could be affected by vegetation management, prescribed burning, culvert replacement activities, transportation management, and recreation activities.

Methods: Methods include qualitative assessment of quantity of trees removed. Analysis includes number of acres of vegetation management, prescribed burning, culvert replacement activities, transportation management, and recreation activities in USFWS designated bull trout critical habitat and Forest bull trout "habitat" patch model.

Indicator: Pool Frequency/Quality and Large Pools and Width/Depth Maximum Ratio

Concern: Increases in sediment from various project activities described in the hydrology technical report (project record) could fill or alter these WCIs.

Methods: Methods include qualitative assessment of location of activities and effects to bull trout habitat. Analysis includes number of acres of project activities in USFWS designated bull trout critical habitat and Forest bull trout "habitat" patch model.

Indicator: Refugia

Concern: Various project implementations within the RCA as part of vegetation management, prescribed burning, culvert replacement activities, transportation management, and recreation activities could alter bull trout habitat requirements.

Methods: Methods include qualitative assessment of bull trout populations and habitat using available data included in section 3.8.4.2. Analysis includes number of acres of vegetation management, prescribed burning, culvert replacement activities, transportation management, and recreation activities in USFWS designated bull trout critical habitat and Forest bull trout "habitat" patch model.

Indicator: Streambank Condition

Concern: Various project implementations near the streambank as part of vegetation management, prescribed burning, culvert replacement activities, transportation management, and recreation activities could damage this WCI.

Methods: Methods include quantitative assessment of the distance from the activities to the stream.

Indicator: Change in Peak/Base Flows, Change in Drainage Network/Road Density and Location, Disturbance History/Disturbance Regime

The hydrology section contains a full analysis of these WCIs.

Indicator: Riparian Conservation Areas

Concern: Riparian functions and ecological processes may be negatively affected as a result of vegetation management, prescribed burning, culvert replacement activities, transportation management, and recreation activities.

Methods: Methods include qualitative assessment of various project activities within the RCA.

Indicator: Integration of Species and Habitat Conditions

Concern: Various project implementations within the RCA as part of vegetation management, prescribed burning, culvert replacement activities, transportation management, and recreation activities could affect integration of the biophysical and aquatic habitat conditions.

Methods: Methods include qualitative assessment of bull trout population WCIs, bull trout habitat requirements, and previous WCI analysis. Analysis includes number of acres of activities in USFWS designated bull trout critical habitat and Forest bull trout “habitat” patch model.

3.8.2.2 Fisheries Resource Indicators

Indicator: Effects to Bull Trout Population Characteristics and Critical Habitat

Concern: Project activities may affect bull trout recovery by affecting individual bull trout or designated critical habitat within the project area.

Methods: Methods include qualitative assessment of bull trout population characteristics – (includes local population size, growth and survival, life history diversity and isolation, and persistence and genetic integrity WCIs) and bull trout habitat requirements (temperature, sediment/turbidity, physical barriers, large woody debris, pool frequency and quality, large pools/pool quality, refugia, width/depth maximum ratio, streambank condition, riparian conservation areas, and integration of species and habitat conditions WCIs.

3.8.3 WCI Pathway Indicators—Affected Environment and Environmental Effects

3.8.3.1 Indicator: Bull Trout Population Characteristics (includes Local Population Size, Growth and Survival, Life History Diversity and Isolation, Persistence and Genetic Integrity WCIs)

Affected Environment

Desired Condition—Mean total local population size or local habitat capacity is more than several thousand individuals. All life stages are represented within the local population. The local population has the resilience to recover from temporary or short-term disturbances or local population declines within 1 or 2 generations. The migratory form is present and the local populations are in close proximity to each other. Migratory corridors and rearing habitat are in good to excellent condition. Connectivity is high among multiple local populations. Each of the relevant local populations has a low risk of extinction. The probability of hybridization or displacement by competitive species is low to nonexistent.

Current Condition—Middle Crooked River 6th HUC is functioning at unacceptable risk in all bull trout WCIs because no local population of bull trout have been documented within this HUC (Table 3-126). Telemetry studies have documented migratory adults passing through this subwatershed. The upper North Fork Boise River local population is considered strong within the core area. Other neighboring local populations with the core area are not considered strong. Connectivity among these local populations is constrained by barriers.

Edna Creek had seven fish presence/absence surveys in 1993, 1995, and 2006. No bull trout have been detected and brook trout are present throughout the Middle Crook River subwatershed. Environmental DNA (eDNA) is a new surveillance tool used to monitor for the genetic presence of an aquatic species. This is done by collecting a water sample and testing the water for DNA. One sample was collected September 2014 in Edna Creek and was sent to Rocky Mountain Research Station, Missoula Montana for processing. Bull trout DNA was detected in Edna Creek (Carim et. al. 2015) within the project area.

Pikes Fork 6th HUC is functioning at unacceptable risk in all bull trout WCIs because only a few bull trout have been detected within Banner Creek for this 6th HUC (Table 3-126). No bull trout have been documented in Pikes Fork within the project area, but bull trout have been located upstream outside the project area. The USFWS Bull Trout Recovery Plan (2002a) identified Pikes Fork as potential spawning and rearing habitat. In addition, the Boise National Forest bull trout patch model classified this creek as "suitable but unoccupied" habitat. There are many barriers (culverts) and non-native species (brook trout) within this 6th HUC.

Environmental Effects

Direct and Indirect Effects

Alternative A

This alternative does not propose any new management activities. However, current conditions in these subwatersheds suggest bull trout and their habitat is at risk. Under this

alternative, no migration barriers would be replaced with appropriate AOP structures. Barriers limit the diversity and abundance of accessible habitat and change community composition by limiting recolonization opportunities following events such as drought and floods. Fish habitat would continue to be fragmented at the current level, decreasing gene flow and potential usable habitat.

RCA road densities would remain high and have a negative effect to this WCI, as well as pool quality/large pools, width depth max pool ratios, and refugia WCIs. Furthermore, instream fine sediment levels would continue to be elevated due to roads. Dispersed recreation sites along with various recreation activities (OHV, motor bike use, etc.) are having immeasurable negative effects to critical bull trout habitat. This is visible along FS 384 and 312 Roads paralleling Crooked River and Pikes Fork of Crooked River (Pikes Fork), respectively. Although fish survey data shows no bull trout have been found in this river within the project area, it is USFWS designated critical habitat and researchers classified Crooked River as foraging, migration, and overwintering (FMO) habitat. Pikes Fork has a high potential for establishment of a local population of bull trout and is mentioned in the Draft USFWS Bull Trout Recovery Plan as potential spawning and rearing habitat. Improving the long-term core habitat values would increase the chance bull trout migrate into this tributary and use the potential spawning and rearing habitat. The no action alternative would have immeasurable negative effects on both subwatersheds in the temporary, short- and long-term timeframes.

Alternative B

The effects to bull trout and their habitat associated with the proposed actions are not expected to change the functional ratings of any of population characteristics WCIs (see discussions of affected WCIs below) and effects to bull trout or their habitat are expected to be localized and negligible for all proposed activities except culvert replacements. Potential adverse effects to individual fish include incidental handing injury and survival during fish removal before culvert replacement construction. Further, turbidity as a result of culvert replacements could displace bull trout residing downstream. Finally, the importance of direct and indirect effects to bull trout and their habitat in from the proposed NFS 312/385 Trailhead near critical bull trout habitat in the long-term timeframe (>30 years) is unclear because the level of use into the future is unknown. The analysis for this WCI focused on proposed actions within the RCA and more importantly within bull trout designated critical habitat or Boise National Forest (Forest) “suitable but unoccupied habitat” bull trout patch model. Furthermore, actions occurring near Edna Creek in the Middle Crooked River subwatershed were analyzed because of the new eDNA data suggesting bull trout may be occupying that tributary.

Indirect effects are not expected to be measurable in the temporary, short- or long-term timeframes associated with any of the proposed activities except sediment input (described in the Sediment WCI section of the hydrology section). Mechanisms for indirect effects to bull trout would include effects to their prey base (terrestrial insects or macroinvertebrates) and to supporting habitat. Effects to the prey base are highly unlikely since there is no insecticide treatments associated with the project, and the majority of insects that are consumed by fish are associated with broad leaf riparian vegetation that is overhanging the streams, not coniferous species. Wipfli (1997) found that young growth broad-leaf riparian species provided fish with more terrestrial prey than old-growth conifer riparian areas. Cadwallader

et al. (1980) demonstrated that overhanging vegetation was more important for terrestrial invertebrate inputs in some Victorian, Australia streams and terrestrial prey were more common in diets of fish from sites with overhanging vegetation. Overhanging vegetation and broad-leaf riparian species are not expected to be impacted by project activities. Additional mechanisms of indirect effects, such as increased fine sediment delivery, reduction in pool quality, magnesium chloride ($MgCl_2$) dust abatement application, or changes to water quality, are addressed below under the respective WCI.

The estimated temporary and future sediment delivery increases (detailed in the Sediment WCI section of the hydrology section) are not expected to change this WCIs functional rating or considerably affect bull trout; because, most of the described sediment increases are not located near USFWS critical habitat, Forest "suitable, potentially occupied habitat", or Forest "suitable but unoccupied" bull trout patches. Furthermore, Design Features FH-25, TS-4, and TS-6 and Forest Service National Best Management Practices (BMPs) should reduce the likelihood exposed soils reach streams. Potential effects from proposed activities on tributaries flowing into critical habitat is expected to be negligible because the stream network is expected to both transport and store the temporary sediment increase throughout the channel reach during an annual range of streamflow velocities (Wohl 2000), reducing the potential for site specific deposition in usable bull trout habitat. Over natural sediment that is delivered to tributaries is not expected to be in quantities which would have an adverse effect on downstream fish species or negatively change their habitat. Project implementation is planned over 15 years and this should result in small amounts of sediment deposited over time with measurable reductions in the long-term timeframe. Further, sediment inputs as a result of these proposed actions are not expected to hinder the biological integrity or productivity of the Crooked River.

Vegetation Management—The proposed action includes treatments within the RCAs of both commercial and non-commercial units. The objective of this treatment is to increase the spacing between trees which would improve tree vigor, increase growth, and encourage future development of large tree size class. Of the total RCA acres, approximately 15.6 acres of treatment adjacent to USFWS designated bull trout critical habitat and 0.05 acres of treatment within Forest "suitable but unoccupied habitat" bull trout patch would occur. This area equates to 0.11 river miles along Crooked River located outside of known spawning and rearing habitat and Forest "occupied" bull trout patches.

Noncommercial thinning would occur in the RCA but no closer than 50 feet from the stream outside of plantations and one site potential tree height (approximately 35 feet) within plantations. This 50 foot buffer would protect bull trout residing in Crooked River during implementation because fallers would directionally fall trees parallel or away from streams (Design Feature FH-30). As a result, no direct or indirect effect to bull trout or their critical habitat would occur from this action.

Though commercial treatments may occur between one and two site potential tree heights within the RCA, no logging equipment would be allowed off existing routes. There is 1.38 acres inside the RCA adjacent to USFWS designated bull trout critical habitat and no acres adjacent to Forest "suitable but unoccupied" bull trout patch proposed for treatment. This area equates to 0.09 river miles along Crooked River located outside of spawning and rearing habitat and Forest "occupied" bull trout patches. No expected effects to this WCI would occur because, one site potential tree height should be ample enough to buffer bull trout and

their habitat from effects associated with commercial treatments. Within Edna Creek, 434 acres of commercial treatment would occur within the second site potential tree height and trees would be felled parallel or away from Edna Creek. Therefore, effects to bull trout should also be negligible.

Prescribed Burning—The proposed action includes prescribed burning and pile burning within the RCA to treat the vegetation in a manner that would prevent fuel loads and ladder fuels from increasing, therefore reducing the likelihood of a lethal fire occurring in the future. Reducing the potential for a future large fire would also reduce the potential for direct and indirect effects to bull trout populations. Prescribed fire would be managed at low-to-moderate burn intensity. Hand piles within RCAs would be limited to 6 feet in diameter and would be distributed across the burn unit.

The prescribed burning would occur on 15.6 acres within USFWS designated bull trout critical habitat along 0.11 river miles of Crook River. This area located outside of known spawning and rearing habitat. Given the low fire intensities, limited extent, and relatively wet nature of streamside RCAs; little if any, tree mortality or substantial consumption of down and dead material would be expected. In the event of a rainstorm in the weeks after ignition, considerable groundcover would be available to filter run-off following a prescribed burn. Most of the WCIs are unaffected by prescribed burning (see explanations below) and effects to sediment and temperature are expected to be negligible (see hydrology section). Design Feature FF-3 should protect bull trout and their habitat if undesirable fire behavior is evident. As a result, the prescribed burning component of this project would have negligible effects on bull trout and their habitat.

Transportation Management—Within the RCA, implementation of this project would decommission 13.8 miles and close 1.1 miles of road. Of those miles, 0.93 are within Forest "suitable but unoccupied" bull trout patch and none are within USFWS critical habitat.

A variety of mechanisms exist by which a road can reduce the suitability of a stream reach. Within the project area, roads along banks of streams can lead to increased water temperatures because more light reaches the stream. Poorly designed or maintained roads can lead to increased fine sediment loads, which reduces the quality of spawning and rearing habitat by filling in interstitial spaces and reducing food supplies for young fish (Furniss et al. 1991; Waters 1995). Roads also facilitate the introduction of pathogens and increased angling pressure, which may be negatively correlated to bull trout presence and abundance (Dunham and Rieman 1999). This reduction in roads and the location in "suitable but unoccupied" habitat patch would benefit bull trout habitat in the long-term timeframe. Design features (FH-8 and FH-10) would mitigate any temporary effect to bull trout during implementation.

A temporary 2% Over Natural (ON) increase in sediment delivery in the Pikes Fork 6th HUC is predicted from proposed road treatments. Additionally, two sections of unauthorized road decommissioning (X025N5 and X351C1) could affect bull trout residing in Edna Creek. These road segments are near perennial creeks which flow into Edna Creek. The analysis shows that Road Segment X025N5 is 77 feet and Road Segment X351C1 is 31 feet from perennial creeks. These actions contribute 0.05% of the overall total ON sediment input in the short-term timeframe. Vegetation between RCAs and streams are expected to retain sediment which would protect bull trout and their habitat. As a result, effects to bull trout and

their habitat are expected to be negligible. The resulting short- and long-term sediment reductions (1% ON) would be beneficial to all life stages of bull trout.

Temporary Road Construction/Road Reconstruction/Converting Unauthorized Roads to NFS Roads—No road activities are proposed within RCAs in USFWS designed critical habitat or Forest "suitable but unoccupied" bull trout patch. Four segments of temporary road sections are proposed in Alternatives B through F which could affect bull trout and their habitat near the Edna Creek drainage. These road segments range from 219 feet (Temporary Road Section 18) to 539 feet (Temporary Road Section 15) from Edna Creek. These actions contribute 1.25% of the overall total ON sediment input in the temporary timeframe. Vegetation between RCAs and streams are expected to retain sediment which would protect bull trout and their habitat. As a result, effects to bull trout and their habitat are expected to be negligible.

Culvert Replacement—The proposed action includes replacing 22 culverts with AOP structures and modifying the pool outlet of one culvert. These activities would reduce fish migration barriers and improve access to miles of quality fish habitat. However, temporary adverse effects to individual fish could occur including incidental handling injury and mortality. These effects are not expected to degrade overall subpopulation size, growth and survival, life history diversity, or genetic integrity of bull trout populations. Removing and replacing culverts would help increase the baseline population toward a restore rating in the long-term timeframe. The new AOP structures would reestablish passage for all life stages of bull trout resulting in increased resiliency of subpopulations by reconnecting fragmented habitats within and between watersheds, helping to restore various life history patterns and emphasizing genetic integrity.

Recreation Management—Recreation management activities that may affect this WCI include construction of a motorized trail, designation of non-motorized trails, and new trailhead construction within the RCA.

The proposed action includes 6.6 miles of motorized trail construction within the RCA. Of this mileage, 6.2 miles would occur on existing road prisms and 0.4 miles would be new construction. Approximately 0.38 miles of new construction and 0.61 miles existing road conversion (ML1) to a motorized trail located in Forest "suitable but unoccupied habitat" bull trout patch (Appendix M). No trail construction (either new or on existing road prisms) is located near USFWS bull trout designated critical habitat. As a result of very little trail construction occurring inside RCAs near bull trout habitat, effects are expected to be localized and negligible.

The designation of the non-motorized trail would occur on 15.19 miles within the RCA, of which none are located within USFWS critical habitat and 1.36 miles are located within Forest "suitable but unoccupied habitat" bull trout patch. The hydrology technical report stated field reviews of non-motorized trails not co-located on roads was made in May and June of 2014 and did not find accelerated sedimentation problems. Additionally, all stream crossings including bridges were in good condition. This trail is currently in place and any effect to bull trout or their habitat would be associated with input of sediment. Based on the field review and very little trail with the RCA which could affect ESA-listed fish, effects of this action should be negligible.

New trailhead construction is proposed at the junction of FS 385/312 Roads in the Pikes Fork subwatershed which is directly adjacent to Pikes Fork Creek. The new trailhead is located inside the RCA and near USFWS designated critical habitat. Fish survey data (n-14) have not found bull trout in Pikes Fork within the project area, but changing fish barriers should allow bull trout to re-populate this creek.

Sediment delivery from trailhead construction is not represented in sediment modeling results due to lack of a routine within the models to simulate this activity. However, sediment delivery from this action is expected to be negligible. Incorporation of Forest Service National BMPs and design feature (FH-14) during construction should reduce the likelihood of exposed soils reaching Pikes Fork. Furthermore, topography at the site is sloped away from the creek; and surfacing the parking area with aggregate should minimize surface erosion. The proposed site is next to a disturbed site. The Pikes Fork Trailhead Monitoring and Rehabilitation Plan requires stabilization of the streambank, vegetation planting in the disturbed area, and blocking access of the OHV creek crossing. Fencing would also be installed prior to construction of the new trailhead to reduce future expansion of this site. Long-term monitoring (>30 years) of the site should document whether effects to bull trout and their habitat are within the effects analysis disclosed in this document. The project design features should mitigate effects to bull trout and their habitat in the temporary and short-term timeframes. Also, vegetation between the trail and stream would retain sediment on the hillside and decrease the likelihood bull trout and experience negative effects from this action.

There is uncertainty regarding the long-term effects to bull trout or their critical habitat from building a trailhead facility near Pikes Fork. This would encourage a much larger human footprint (use of the restrooms, walking around the site, disperse camping nearby, etc.) which is adjacent to bull trout critical habitat. Increases in outdoor recreation have taken place at a rapid rate and FS 384 Road is a heavily traveled route. Barbaro et al. (1969) report a 7% increase per year over the last decade. More recently it has been estimated that mountain areas are host to 15-20% of the tourism industry (FAO 2005).

Regrowth of vegetation at this previously disturbed site could be difficult if users don’t stay outside of these recovery areas. Recreational use tends to lead to the loss of vegetative cover and soil organic horizons and contributes to the compaction of mineral soils. These impacts result in increased overland runoff, erosion, and deposition of sediments in waterways (Cole 1993). Plant deterioration occurs much more rapidly than recovery and trampling of plant species at recreation sites frequently has been reported as a serious threat to the natural attractiveness of developed recreation areas (Clawson 1959, Devoto 1953, James and Ripley 1963). Further, trampling problems usually result in vegetation loss, soil compaction, landscape degradation, and erosion (Li et al. 2005). Therefore, encouragement of public use at this new trailhead could hinder the restoration of this site. Past land management activities (road construction along Pikes Fork) has resulted in degraded aquatic and riparian habitats by altering stream flows and riparian vegetation which have negatively affected bull trout in several areas of the Boise River bull trout recovery unit (USDI FWS 2010). As a result, critical bull trout habitat components in Pikes Fork have previously been disturbed and building a trailhead near this creek would encourage public use which may not promote new vegetation growth. Therefore, the effects of this facility in the long-term timeframe are not

discountable and may grow outside of the proposed site, potentially having direct or indirect effects to bull trout or their habitat.

Temporal Effects of Alternative B

Temporary Effects—Culvert replacements and sediment increase (2% ON) would be the biggest factors affecting bull trout or their habitat. The negative effect associated with these actions should be localized and immeasurable. The Pikes Fork Trailhead Monitoring and Rehabilitation Plan would implement stabilization of the streambank, vegetation planting, fence installation, and OHV creek crossing blocking. These improvements would result in a localized positive effect. However, this positive effect is not expected to outweigh the negative effects associated with the culvert replacements.

Short-term Effects—Culvert replacements would likely continue in this timeframe and have a negative, localized effect on this WCI. The sediment reduction (1% ON) resulting from transportation management actions would be beneficial to bull trout and their habitat. Installation of the FS 385/312 Road trailhead along Pikes Fork may have a negative effect to bull trout habitat, but should be negligible because project design features and Forest Service National BMPs should mitigate direct effects to bull trout.

Long-term Effects—Thinning activities which would have occurred in the temporary timeframe should result in benefits (slight positive, immeasurable effect) to bull trout and multiple WCIs (LWD, pool frequency/quality, width/depth/max ratio, and streambank condition) during this timeframe. The sediment reduction (1% ON) resulting from transportation management actions would be beneficial to bull trout and their habitat and continue into this timeframe. Uncertainty regarding the effects to bull trout and their habitat from building the FS 385/312 Trailhead along Pikes Fork may have a localized and measurable negative effect. The culvert replacements would have the biggest and most noteworthy effect on this WCI. The replacements would re-establish passage for all life stages of bull trout into USFWS designated critical habitat. The resulting positive effect from culvert replacements, sediment reduction, and vegetation management activities should outweigh the localized negative effects of the trailhead use.

Alternatives C

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. The reduction of RCA miles as a result of this alternative would have a similar effect as described in the proposed action. However, the proposed trailhead is included with this alternative and effects would be the same as described above in the proposed action.

Temporary, Short-term, and Long-term Effects of Alternative C—Effects to this WCI are expected to be the same as Alternative B.

Alternative D

Vegetation Management—This alternative includes an additional 10 acres of thinning with no product removal, 9 acres of thinning with product removal, and 1 acre of mixed treatment with product removal. The treatments would not occur closer than 50 feet from streams. These treatments are occurring outside of USFWS bull trout critical habitat and Forest "suitable but unoccupied habitat" bull trout patch (Appendix P). The 50 foot buffer and

directional tree falling design feature should mitigate effects associated with the additional acres. Therefore, no additional effects are expected from this action, and any effect would be localized and immeasurable.

Recreation—The proposed trailhead is included with this alternative and effects would be the same as described above in the proposed action.

Temporary, Short-term, and Long-term Effects—Effects to this WCI are expected to be the same as Alternative B.

Alternative E

Transportation Management—This alternative includes an additional 0.7 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The temporary/short-term negative effects (potential sediment input), and the long-term benefits of these activities are not occurring near USFWS critical habitat or Forest "suitable but unoccupied habitat" bull trout patch. Therefore, road activities associated with this alternative are not expected to affect this WCI.

Recreation—This alternative does not include the motorized trail and trailhead. In the Pikes Fork 6th HUC, the elimination of these recreation activities would result in a reduction of sediment (2% decrease ON) compared to Alternative B (2% increase ON) in the temporary timeframe. This alternative would result in a 2% ON reduction in sediment, which is the same as Alternative B in the short- and long-term timeframes.

The proposed trailhead site is in a previously disturbed area that may be inputting fine sediment in Pikes Fork presently. This alternative would reduce indirect and direct effects (new construction activities) in the RCA by not including the new trailhead. On the other hand, this alternative would not implement the Pikes Fork Trailhead Monitoring and Rehabilitation Plan which would reduce present effects to this creek.

Temporary, Short-term, and Long-term Effects—Effects to this WCI are expected to be the same as Alternative B.

Alternative F

Transportation Management—This alternative includes an additional 0.1 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The temporary/short-term negative effects, and the long-term benefits of these activities are not occurring near USFWS bull trout critical habitat or Forest "suitable but unoccupied habitat" bull trout patch. Therefore, road activities associated with this alternative are not expected to affect this WCI.

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. Additionally, there is a reduction of RCA trails from the Alternative B from 6.6 miles to 5.6 miles. In the Middle Crooked River 6th HUC, the elimination of these recreation activities would result in a small reduction of sediment (22% ON) compared to Alternative B (25% ON). However, it is doubtful the benefits of this alterative would translate to this WCI or bull trout habitat. These actions are occurring near Forest "unsuitable, likely unoccupied habitat" bull trout patch and not near USFWS bull trout critical habitat.

The proposed trailhead is included with this alternative and effects would be the same as described above in the proposed action.

Temporary, Short-term, and Long-term Effects—Effects to this WCI are expected to be the same as Alternative B.

3.8.3.2 Indicator: Chemical Contaminants/Nutrients

Affected Environment

Desired Condition—Ideal conditions show low levels of chemical contamination from agricultural, industrial, and other sources. Also, ideal conditions show no excess nutrients and no 303(d) water quality limited water bodies.

Current Condition—This indicator is functioning appropriately for the Middle Crooked River subwatershed and functioning at risk for the Pikes Fork subwatershed (Table 3-126). There are no 303(d) listed streams or TMDLs within either subwatershed. Sources of chemical contamination are limited in both subwatersheds with a couple exceptions. The area is an active sheep grazing allotment; however, areas of over use or water quality contamination by sheep have not been encountered during field visits within the analysis area. There are numerous mining claims throughout the analysis area but there are few large scale mines with the exception of the Banner Mine. Adit and spring discharge with elevated levels of arsenic/cadmium/chromium/lead/mercury/silver that exceed state groundwater and drinking water standards had been documented at the Banner Mine in the Pikes Fork subwatershed (IDEQ 2008). The Pikes Fork subwatershed is functioning at risk due to this adit discharge.

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A would continue the existing condition with regard to the Chemical Contaminants/Nutrients WCI which is functioning appropriately in the Middle Crooked River subwatershed and functioning at risk in the Pikes Fork subwatershed. There are no 303(d) listed streams, no sources of excessive nutrient loading, and no known sources of chemical contamination within the subwatersheds. The exception to this is the Banner Mine within the Pikes Fork subwatershed. Adit and spring discharge with elevated levels of arsenic/cadmium/chromium/lead/mercury/silver that exceed state groundwater and drinking water standards has been documented at the Banner Mine in the Pikes Fork subwatershed (IDEQ 2008).

All Action Alternatives

The proposed action would have the potential to deliver gas and oil to RCAs and streams during project activities in the temporary and short-term timeframe. The relevant mechanism of effect is accidental spill of petroleum-based products during road construction work inside the RCA or during construction of AOP stream crossings. However, Design Feature FH-1 limit the fuel storage within the RCA and Design Feature FH-3 require a spill containment kit onsite anytime equipment/machinery is operating within the RCA. These design features should minimize the likelihood of petroleum-based products reaching streams. Additionally, fuel managers implementing prescribed burning inside the RCA would use gas/oil mix to

perform direct ignition no closer than 75 feet from the stream to areas outside USFWS critical habitat and Forest "suitable, potentially occupied habitat", or Forest "suitable but unoccupied" bull trout patches. Also, these areas are located outside of known spawning and rearing habitat. From past experience performing these operations, the gas/oil mix is expected to burn entirely and leave no remnants. Design Feature FH-1 would require drip torch cans to be refilled outside the RCA, reducing the potential for accidental spill inside the RCA. There would be ignition of handpiles occurring within the RCA on 15.6 acres adjacent to USFWS designated bull trout critical habitat. The burning would occur along 0.11 river miles along Crook River. As a result, effects from this action are expected to be negligible and project design features should protect the RCA, bull trout, and their habitat for chemical contaminants.

Magnesium chloride ($MgCl_2$) could be applied to NFS road 384 in an effort to control dust during commercial logging operations. This compound is a simple salt that can be found in natural brine deposits within the earth and is applied to NFS roads for dust control and surface stabilization. These natural products likely biodegrade in the environment, so toxic effects are expected to be minimal (EPA 2002). Numerous studies have been documented about chloride ground-water pollution, mainly in the northeastern United States. Most studies found that concentrations vary from season to season and year to year. Some freshwater fish exhibit a great deal of tolerance to salts in general and chloride in particular. One study showed that pike, bass, and perch can tolerate chloride levels exceeding 4,000 parts per million (ppm). Trout, however, could only withstand chloride levels of 400 ppm. It is unlikely that creeks within the project area could have concentrations high enough to cause growth or survival problems for fish because design feature TS-5 prohibits application over live water road crossings. Goodrich (2009) found that although chloride and magnesium were both extremely high close to the roads, both were dramatically lower 3.0 meters away from the road, and $MgCl_2$ ions were detected in the soil matrix and vegetation up to 6.1 meters from the edge of the road. They speculated that the majority of ions remained in the road base with $MgCl_2$ treatments, and a large proportion of those that did move off treated roads were either taken up by plant roots or moved further down into the soil profile than our sampled depths (>61.0 centimeters). Therefore, the location of application and associated bull trout habitat along with the design feature would protect ESA-listed fish species and their habitat from negative effects associated with the application of $MgCl_2$ within the project area.

The proposed action also includes noxious weed treatments. These treatments include chemical application of herbicides at certain stages of plant growth to kill targeted weed species. This would be accomplished through spot treating and consists of back pack sprayers. Herbicides are made up of various substances which make them effective and easier to apply. Using an integrated approach for these treatments, applicators would use methods consistent with the on-going forest-wide invasive plant species program. The chemicals or types of herbicides considered in the analysis include those used under the Forest-wide noxious weed program. Standard management practices would restrict application and type of chemicals around riparian buffer zones (100 feet) and during periods when environmental factors (wind, rain) may result in chemical misapplication. The effects to this WCI from these proposed activities are expected to be localized and negligible.

Recreation Management—Petroleum fuels associated with snowmobile groomer operations could be a concern if there is an accidental spill. Groomers are parked within storage facilities near the major grooming routes. All fuel and other chemicals are stored at the groomer storage facilities or outside the RCAs. Fuel spill containment equipment is kept at the storage facilities. To protect against fuel spills, project design features (FH-1 and FH-3) would mitigate any effects regarding refueling or accidental spills. The potential fuel spills or other chemicals from the groomer would reach open water is highly unlikely due to the operating plan and project features. Furthermore, the chance that this action would have any effect on bull trout is discountable since snowmobile grooming is occurring in only 0.78 miles of Forest "suitable but unoccupied" habitat.

Temporary, Short-term, and Long-term Effects—No effect to this WCI is anticipated during these timeframes.

Alternatives B, C, D, and F

Recreation Management—Proposed activities include new construction within the RCA (0.4 miles) of motorized trail and trailhead construction. Also, proposed activities include conversion of old road prism to motorized trail within the RCA (6.2 miles) as part of this trail system. These actions would require petroleum-fueled equipment inside the RCA. The possibility of petroleum-based products reaching streams is unlikely because of the design feature (FH-3). The proposed action would not use treated wood products to construct bridges over live water for the motorized trail. Bull trout should not be affected by this action because the location of these activities are not in "occupied" or "suitable but unoccupied" habitat bull trout patches. Furthermore, this action should not have an effect because the minimal duration of time needed to perform the work and the vegetation buffer between the proposed action and bull trout streams and habitat.

Cumulative Effects

All Alternatives

Past and ongoing management actions have been considered in describing the baseline existing condition for the Chemical Contaminants/Nutrients WCI. Idaho Power Cloud Seeding stations represent ongoing/foreseeable future activities that may affect the Chemical Contaminants/Nutrients WCI due to silver iodide use as a seeding agent. Based on existing literature, it is unlikely that silver iodide use for cloud seeding would result in detectable increases in silver iodide in water bodies (Cooper and Jolly 1970). As a result, no additional or cumulative effects, either indirectly or directly related to planned management actions, would occur.

3.8.3.3 Indicator: Physical Barrier

Affected Environment

Desired Condition—Any man-made barriers present in watershed allow upstream and downstream fish passage at all flows.

Current Condition—There are 7 fish passage barriers within the Becker Project boundary in the Pikes Fork 6th HUC; as well as 16 within the Middle Crooked River 6th HUC that do not pass all life stages at a range of flows. Additional culvert barriers may exist along Idaho State

jurisdiction occurring along Highway 21. As a result both subwatersheds are functioning at unacceptable risk (Table 3-126).

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A does not propose any new management activities; however, this WCI is functioning at unacceptable risk for both 6th HUCs (Table 3-126). The functional rating is mainly because of the 23 barriers in the two subwatersheds that were classified as impassable during the 2003 and 2004 culvert inventory. Under Alternative A, this WCI would continue functioning at unacceptable risk.

All Action Alternatives

Vegetation Management/Prescribed Burning/Transportation Management/Temporary Road Construction/Converting Unauthorized Roads to NFS Roads/Road Reconstruction/Recreation Management—Activities associated with the proposed action would have no effect on this WCI.

Culvert Replacement—During project implementation, diversions may temporarily block upstream or downstream passage. All of the proposed culverts are existing barriers themselves, but this action could move the baseline condition towards a temporary degrade rating. After project completion, fish passage would be improved for all native fish and associated life stages. Therefore, in the short- and long-term timeframes, results of this action should move the baseline towards a restore rating.

Temporal Effects of All Action Alternatives

Temporary Effects—Some culvert replacements would occur in this timeframe; therefore, benefits (positive, measurable effect) from this action would be realized in this timeframe.

Short-term Effects—Some culvert replacements would occur in this timeframe; therefore, benefits (positive, measurable effect) from this action would be realized in this timeframe.

Long-term Effects—If funding becomes available, the Middle Crooked River subwatershed culverts could be replaced resulting in an improved functional rating.

3.8.3.4 Indicator: Large Woody Debris

Affected Environment

Desired Condition—Adequate sources of large woody debris for both long- and short-term recruitment exist in RCAs. Adequate sources are defined as >20 pieces per mile, >12 inches in diameter, and >35 feet in length.

Current Condition—The LWD WCI values are functioning appropriately for both 6th HUCs (Table 3-126). Pikes Fork subwatershed had a mean of 87 pieces/mile with a range from 0 to 240 pieces/mile, and the Middle Crooked River subwatershed had a mean of 177 pieces/mile with a range from 0 to 430 pieces/mile.

Environmental Effects

Direct and Indirect Effects

Alternative A

The current baseline data suggests there is adequate LWD within streams in both subwatersheds. There is no reason to suspect that this would not continue into the future. This alternative does not propose any new management activities and existing trees would continue to mature and provide future LWD recruitment into the long-term timeframe.

All Action Alternatives

Vegetation Management—Noncommercial thinning would occur in the RCA but no closer than 50 feet from the stream outside of plantations and one site potential tree height (approximately 35 feet) within plantations. The proposed action is not expected to have any measureable effects on the LWD WCI; because, the 8 inch diameter breast height (DBH) restriction within the first SPTH would reduce the potential for thinning recruitable LWD into the future. This WCI is expected to remain functioning appropriately over the temporary and short-term timeframes. In the long-term, as project objectives enhance the growth of retained trees and restore species towards historic conditions, slight positive improvements in this WCI are expected. Improvements are a result of larger (taller) trees being more likely to reach the stream channel when they fall.

Commercial treatments would include cutting large trees in the RCA between the second and first site potential tree heights (second potential tree height). This may have a slight unmeasurable negative effect in the temporary and short-term timeframe. The effect may be realized during the timeframe when remaining large trees in the second site potential tree height fall and future recruitment of smaller trees maturing to the diameter and length needed to be considered LWD. However, it is expected the remaining large trees within the first site potential tree height should still be available for recruitment and would maintain the WCI functionally rating. The proposed actions are not occurring adjacent to designated critical bull trout streams and are outside Forest “occupied” or “potentially suitable” bull trout habitat patches. As a result, the loss of potential LWD benefiting bull trout habitat is not expected to be substantial and any effects to the WCI are expected to be negligible.

Prescribed Burning—Prescribed fire would be used to reduce fuel loads from thinning activities (pile burning and lop/scatter) and to prevent species compositions, stand densities, fuel loads, and ladder fuels from moving away from historic conditions. The proposed action includes direct ignition within the RCA, but prohibits fire ignition within 75 feet of the stream. Prescribed fire activities would be implemented using an approximate 50 foot stripping design starting from the second potential tree height and working their way towards the stream ending at 75 feet from the stream. From there, fire would be allowed to back towards the stream. This design would allow fire personnel to adjust the stripping distance based on the activities fuels on location. In the past, fire has been allowed to back into the RCA resulting in a mosaic burn pattern. It is expected that this fire design would result in a similar pattern, but allow for more control of the fire. Project design features (FH-3) have been incorporated into the project to control fire intensity within streamside RCAs. Given the low fire intensities, limited extent, and the relatively wet nature of streamside RCAs, little, if

any, tree mortality or consumption of down and dead material would be expected. Therefore, negligible and immeasurable effects to this WCI are expected.

Transportation Management—The proposed action includes decommissioning 13.8 miles and closing (ML1) 1.1 miles NFS roads within RCAs. Road decommissioning and closure activities may include a variety of stabilization techniques; refer to design feature TS-6 for a detailed description of decommissioning treatments. As these decommissioned and closed road areas have time to naturally seed in, the benefits of this action should be realized in the long-term timeframe as these areas within the RCA have the potential to contribute LWD.

Road Reconstruction—This activity would occur on existing road templates but would require some shaping of the existing road bed and some realignment. This project activity would occur on 0.9 miles within the RCA. Since these roads were in use in the past, it is unlikely trees big enough to contribute LWD are within these areas. Therefore, the effect of the project activities on this WCI is expected to be negligible.

Temporary Road Construction—There are 0.6 miles of temporary road construction within the RCA; of this 0.58 miles would occur on existing road templates and 0.02 miles would be new road construction. This activity is not located near designated critical bull trout habitat and is outside of the Forest "unoccupied but suitable" habitat model. During construction of the temporary roads; it is possible that medium to smaller size trees may be cut, eliminating those trees for future LWD recruitment. This effect is expected to be localized and negligible.

Converting Unauthorized Roads to NFS Roads—These roads are currently in place and would not require new construction but may require some realignment (blading and installation of drainage features). The LWD WCI is not expected to be affected by this action because these roads are already in place.

Culvert Replacement—LWD may be temporarily moved within the project site to allow for construction machinery mobilization. However, in such cases, all LWD would be placed back or near to its original location once construction is completed (design feature FH-18). Because pieces of LWD per mile would not be changed, and potential LWD would not be removed, the effect of this action should have a negligible effect on this WCI.

Recreation Management—Minimal amounts of riparian vegetation are expected to be removed when installing trails. New trail construction would occur during building of the motorized trail, of which there is 0.4 miles within the RCA. Additionally, there is 6.2 miles of trail construction within the RCA that would occur on road prisms. The current designation of those roads is Maintenance Level 1 or Maintenance Level 2. Because these roads have been used in past periodically for administrative use, trees have not had the time required to mature and benefit this WCI. However, there are large trees just off the road prism and project design feature (FH-25) has been incorporated to ensure the proposed action would not reduce these trees from future LWD recruitment. As a result, this action is expected to have localized and immeasurable effects on the WCI.

Construction of the trailhead located in the RCA would result in removing less than five mature trees. Project design feature (FH-25) ensures that any trees felled would be left inside the RCA to serve as LWD. As a result, effects to this WCI are expected to be negligible because there are few trees that need to be felled during construction and they would remain within the RCA.

Temporal Effects of All Action Alternatives

Temporary and Short-term Effects—Negligible effect to this WCI is anticipated during these timeframes. The buffer described in the non-commercial and commercial vegetation management section and the design features protecting large trees during transportation and recreation management activities should protect this WCI.

Long-term Effects—Road decommissioning and closures, along with tree thinning in the RCA within should result in a positive, immeasurable long-term effect.

Alternatives C and D

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA compared to 0.4 miles in the proposed action. This action is expected to have negligible effects on this WCI because effects are localized and immeasurable.

Alternative D

Vegetation Management—This alternative includes an additional 10 acres of thinning with no product removal, 9 acres of thinning with product removal, and 1 acre of mixed treatment with product removal. The treatments would not occur closer than 50 feet from streams. This treatment is not occurring near designated critical bull trout habitat and is outside of the Forest "unoccupied but suitable" habitat patch. Therefore, the addition of these acres is expected to be negligible.

Alternative E

Transportation Management—This alternative includes an additional 0.7 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Recreation—This alternative does not include the motorized trail and trailhead. As a result, this alternative would reduce effects in the RCA and promote LWD recruitment in the long-term timeframe. The positive effect to this WCI is expected to be localized and immeasurable.

Alternative F

Transportation Management—This alternative includes an additional 0.1 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. Additionally, there is a reduction of motorized RCA trails from the Alternative B from 6.6 miles to 5.6 miles. This action is expected to have negligible and immeasurable effects on this WCI.

3.8.3.5 Indicator: Pool Frequency/Quality and Large Pools/Pool Quality and Width/Depth Maximum Ratio

Affected Environment

Desired Condition—Ideal conditions have good cover and cool water, and only minor reduction of pool volume by fine sediment. Large woody debris recruitment standards for desired conditions can be found in the Forest Plan (USDA Forest Service 2010a, Appendix B, p. B-17).

Average wetted width/maximum depth ratio in scour pools in a stream reach is ≤10.

Current Condition—Pool frequency in the subwatersheds is at desired conditions in respect to the different stream sizes. However, pool quality, measured by the abundance of pools greater than one meter in depth, is functioning at risk for both subwatershed (Table 3-126). Increased erosion and sediment delivery to stream channels from roads and post wildfire events have reduced pool depths in the subwatersheds.

Stream channel maximum width-to-depth ratios are functioning appropriately in both subwatersheds (Table 3-126).

Environmental Effects

Direct and Indirect Effects

Alternative A

Increased erosion and sediment delivery to stream channels from roads, human influence, and post-wildfire events have reduced pool depth and quality in both subwatersheds. As a result, these WCIs are functioning at unacceptable risk. Since Alternative A does not propose any new management activities to correct the reasons causing the risk, negligible negative effects to these WCIs could continue into the future.

All Action Alternatives

Within the Middle Crooked River 6th HUC, the hydrology technical report (project record) states proposed actions could increase sediment by 25% above background rates in the temporary timeframe. Additionally, there would be a short-term timeframe increase ON of sediment by 3% and proposed activities would have a long-term timeframe decrease ON of 7%. Within the Pikes Fork 6th HUC, proposed actions could increase sediment by 2% above background rates in temporary timeframe. There would be a short- and long-term timeframe decrease ON in sediment delivery by 1%.

Vegetation Management—One of the long-term objectives of the proposed RCA treatments is to promote mature tree growth which will provide future LWD recruitment. LWD within RCAs contributes to the formation of new pools. An increase in potential for LWD recruitment represents an improving trend in pool frequency, pool quality, and width/max depth ratios. The proposed commercial and non-commercial vegetation management activities would treat upland vegetation (conifer trees) both within and outside RCAs. Sediment delivery associated with vegetation management activities is not expected to occur due to the incorporation of distance restrictions for activities occurring within and outside RCAs (see hydrology technical report [project record]).

Prescribed Burning—The prescribed burn component of this project would reduce the risk of uncharacteristically large and high severity wildfire that has historically not been a component of these PVGs. Prescribed fire applications may increase sediment delivery amounts in the temporary and 2 years into the short-term timeframe by exposing bare soil. However, allowing fire to back into the RCA from 75 feet out would result in a mosaic burn pattern. Unburnt vegetation would help filter sediment in the event of a rainstorm immediately following this treatment. Implementation is staggered throughout the project area. Overall, sediment delivery amounts associated with fuels treatments are expected to be minor (see hydrology technical report [project record]). This is due to incorporation of burn prescriptions that would limit fire intensity and burn severity; as well as, the use of ignition patterns to control fire spread and limits on the size and density of handpiles (Design Features FF-3 and FF-5). Any effects from the proposed activity are expected to be localized, negligible, and immeasurable.

Transportation Management—All action alternatives include road treatments throughout the project area including temporary road construction, road realignment, road reconstruction (heavy and light), road closure, and road decommissioning. These changes in the transportation system represent the largest overall contributions and reductions in sediment delivery over the life of the project. Increases in sediment delivery in the temporary timeframe are attributed to temporary road construction, road reconstruction, and road realignment. Road related sediment delivery can fill pools and reduce the number and depth of pools in an area (Quigley and Arbelbide 1997). There is a 25% ON increase in the Middle Crooked River 6th HUC in sediment in the temporary timeframe and this increase may fill or degrade pools and pool quality and negatively affect stream width/max/depth ratios. This effect is expected to be temporary and associated with implementation. As a result of these proposed activities and results described in the see hydrology technical report (project record), these WCIs would experience an immeasurable negative effect in the temporary timeframe. Decreases in sediment delivery in the long-term timeframe are attributed to road decommissioning, road realignment, and road closure (conversion of ML 2 roads to ML 1 roads, or conversion of ML 2 roads to ML 2 admin only). Design Features FH-7, FH-25, TS-4, TS-6, and TS-7 would be implemented in association with these alternatives to assist in maintaining sediment control. The reduction of roads over the long-term timeframe is expected to have immeasurable positive effects to this WCI.

Within the Pikes Fork 6th HUC, there is a 2% ON increase of sediment in the temporary timeframe. The functionality rating of this WCI is expected to be maintained during all timeframes. There is a 1% reduction ON in sediment over the short- and long-term timeframes within this subwatershed. This small increase/reduction over all timeframes is not

expected to affect these WCIs. None of the actions are near designated critical bull trout streams and are outside Forest "occupied" or "potentially suitable" bull trout habitat.

Culvert Replacement—All action alternatives include 22 AOP culvert replacements and 1 culvert outlet modification. Activities would occur in previously disturbed sites, although projects may eliminate any scour pool created by undersized culverts. Given that the scour pools to be eliminated are artificial and limited in number, along with the fact that project-related sediment introduced into the stream channel would be minimized to preclude a noticeable reduction in pool quality and depth, removing or replacing culverts would result in a maintain rating. Limited increases in turbidity associated with crossing reconstruction are anticipated but are not expected to last more than the duration of the construction period (Yenko 2007). Furthermore, Design Features FH-15, FH-20, FH-21, FH-22, and FH-23 would be employed to minimize sediment delivery and turbidity during construction. Therefore, effects to this WCI are expected to be localized and negligible.

Recreation Management—All action alternatives include authorization of existing and proposed trail system for both motorized and non-motorized use, with the exception of Alternative E which does not include authorization of a new motorized trail loop system. Effects of trail management actions on sediment delivery are incorporated into estimates of sediment delivery related to roads displayed in the hydrology section. The contributing factor in trails' related effects to sediment are linked to the designation of a new motorized trail. The motorized trail includes segments in both the Middle Crooked River and Pikes Fork subwatersheds.

New trailhead construction is proposed at the junction of NFS roads 385/312 in the Pikes Fork subwatershed which is directly adjacent to Pikes Fork Creek. Sediment delivery from trailhead construction is not represented in sediment modeling results due to lack of a routine within the models to simulate this activity. However, topography designs show that the proposed trailhead is sloping in the opposite direction of Pikes Fork. The location of the trailhead is 68.5 feet over relatively flat ground to Pikes Fork. Sediment delivery from this action is expected to be negligible due to the incorporation of BMPs during construction and utilizing a trailhead design that would include surfacing of the parking area with aggregate to minimize surface erosion. Furthermore, the vegetative buffer should protect the creek, as well as block the OHV access across the creek. Lastly, implementing the Pikes Fork Trailhead Rehabilitation and Monitoring Plan would result in fencing, re-vegetation and stabilizing the streambank in the disturbed area. These mitigation measures are expected to keep the effects localized in the temporary and short-term timeframes.

Non-motorized trail authorizations for both winter and summer recreation are not expected to affect sediment delivery. In many cases, non-motorized trails are co-located on existing ML1 or ML2 roads, in these cases sediment delivery from the road is incorporated into overall sediment delivery estimates. Field reviews of non-motorized trails not co-located on roads were made in May and June of 2014 and did not find accelerated sedimentation problems. Additionally, all stream crossings including bridges were in good condition.

Alternatives C and D

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA compared to 0.4 miles in the proposed action. This action is expected to have localized and immeasurable effects on this WCI.

Alternative D

Vegetation Management—This alternative includes an additional 10 acres of thinning with no product removal, 9 acres of thinning with product removal, and 1 acre of mixed treatment with product removal. The treatments would not occur closer than 50 feet from streams. The 50 foot buffer would mitigate effects associated with the additional acres. Therefore, no additional increase in sediment is expected from this action.

Temporal Effects of Alternatives B, C, and D

Temporary Effects—Sediment associated with prescribed fire, transportation management, and culvert replacements are expected to have an immeasurable negative effect on these WCIs. There is a 25% ON increase in the Middle Crooked River 6th HUC in sediment in the temporary timeframe and this increase may fill or degrade pools and pool quality and negatively affect stream width/max/depth ratios. These WCIs would experience an immeasurable negative effect in the temporary timeframe within the Middle Crooked River subwatershed.

Within the Pikes Fork 6th HUC, proposed actions could increase sediment by 2% above background rates. There is very little vegetation and transportation management, or other activities which could result in sediment delivery to streams. Therefore, incremental, immeasurable, positive effects to these WCIs are expected during this timeframe.

Short-term Effects—The sediment increase (3% ON in Middle Crooked River subwatershed) in this timeframe is expected to result in negative effects to the sediment/turbidity WCI; however, it is doubtful this small increase would translate into negative effects to these WCIs because the increase may not reach streams and such a little sediment input should not fill or change pool frequency/quality or width/max depth ratio of pools. Therefore, negligible effects associated with these alternatives are expected.

Within the Pikes Fork 6th HUC, proposed actions could decrease sediment by 1% below background rates. Again it is doubtful this small decrease in ON sediment would translate into measurable effects to this WCI; therefore, negligible effects are expected.

Long-term Effects—The decrease (7% ON) in sediment delivery in the Middle Crooked River is attributed to road decommissioning, road realignment, and road closure. The buffer described in the non-commercial and commercial vegetation management section and the design features protecting large trees during transportation and recreation management activities would help form new pools into the future. Consequently, an immeasurable positive effect is expected during this timeframe.

Within the Pikes Fork 6th HUC, proposed actions could decrease in sediment by 1% below background rates. Again it is doubtful this small decrease in ON sediment would translate into measurable effects to this WCI; therefore, negligible effects are expected.

Alternative E

Transportation Management—This alternative includes an additional 0.7 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The temporary/short-term negative effects, as well as the long-term benefits of these activities are similar to the effects common to all action alternatives described above.

Recreation—This alternative does not include the motorized trail and trailhead. In the Middle Crooked River 6th HUC, the elimination of these recreation activities would result in a reduction of sediment (13% ON) compared to Alternative B (25% ON). Alternative E is expected to have immeasurable negative effects in the temporary timeframe. Unlike the proposed action (Alternative B), this alternative would result in a measurable positive (2% ON) decrease in sediment within the short-term timeframe. Additionally, this alternative would have a measurable positive (8% ON) decrease in sediment within the long-term timeframe (see sediment discussion in hydrology section).

In the Pikes Fork 6th HUC, the elimination of these recreation activities (motorized trail) would result in a reduction of sediment (2% ON) compared to Alternative B (2% ON increase) in the temporary timeframe. This alternative would result in a 2% ON reduction in sediment, which is the same as Alternative B in the short- and long-term timeframe (see sediment discussion in hydrology section).

The proposed trailhead site is in a previously disturbed site that could be inputting fine sediment in Pikes Fork presently. This alternative would reduce effects in the RCA. The positive effect to this WCI may be realized in a decreased trailhead footprint at the proposed trailhead site.

Temporal Effects of Alternative E

Temporary Effects—In the Middle Crook River subwatershed, sediment associated with prescribed fire, transportation management, and culvert replacements are expected to have an immeasurable negative effect on these WCIs. There is a 13% ON increase in the Middle Crooked River 6th HUC in sediment in the temporary timeframe and this increase may fill or degrade pools/pool quality and negatively affect stream width/max/depth ratios.

Within the Pikes Fork 6th HUC, proposed actions could decrease in sediment by 2% ON below background rates. There is very little vegetation and transportation management or other activities which could result in sediment delivery to streams. Again it is doubtful this small decrease in ON sediment would translate into measurable effects to this WCI; therefore, negligible effects are expected.

Short-term Effects—Unlike the proposed action (Alternative B), this alternative would result in a positive (2% ON) decrease in sediment within the Middle Crooked River subwatershed. Within the Pikes Fork 6th HUC, proposed actions could decrease in sediment by 2% ON below background rates. Again it is doubtful this small decrease in ON sediment would translate into measurable effects to this WCI; therefore, negligible effects are expected.

Long-term Effects—This alternative would result in a positive (8% ON) decrease in sediment in the Middle Crooked River subwatershed. Road decommissioning and closures along with tree thinning in the RCA within the temporary timeframe would start to show a positive, immeasurable effect during this timeframe. Non-commercial thinning should promote mature tree growth faster which would provide future LWD recruitment. This should encourage formation of new pools and improve existing pools during this timeframe. Consequently, a negligible positive effect is expected during this timeframe.

Within the Pikes Fork 6th HUC, proposed actions could decrease sediment by 2% ON below background rates. Again it is doubtful this small decrease in ON sediment would translate into measurable effects to this WCI; therefore, negligible effects are expected.

Alternative F

Transportation Management—This alternative includes an additional 0.1 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The temporary/short-term negative effects, as well as the long-term benefits of these activities are similar to the effects common to all action alternatives described above.

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. Additionally, there is a reduction of motorized RCA trails from the Alternative B from 6.6 miles to 5.6 miles. In the Middle Crooked River 6th HUC, the elimination of these recreation activities would result in a small reduction of sediment (22% ON above background) compared to Alternative B (25% ON above background). Alternative F is expected to have measureable negative effects in the temporary timeframe. This alternative would result in a measurable negative (2% ON) increase in the short-term timeframe and a measurable positive (7% ON) decrease in the long-term timeframe. In the Pikes Fork 6th HUC, this alternative has the same effect as the proposed action (Alternative B).

Temporal Effects of Alternative F

Temporary Effects—Sediment associated with prescribed fire, transportation management, and culvert replacements are expected to have an immeasurable negative effect on these WCIs. There is a 22% ON increase in the Middle Crooked River 6th HUC in sediment in the temporary timeframe and this increase may fill or degrade pools/pool quality and negatively affect stream width/max/depth ratios.

Within the Pikes Fork 6th HUC, proposed actions could increase sediment by 2% ON. There is very little vegetation or transportation management or other activities which could result in sediment delivery to streams. Again it is doubtful this small increase in ON sediment would translate into measurable effects to this WCI; therefore, negligible effects are expected.

Short-term Effects—The increase (2% ON) in the short-term timeframe is not expected to have an effect on these WCIs during this timeframe. Therefore, negligible effects are expected to this WCI during this timeframe.

Within the Pikes Fork 6th HUC, proposed actions could decrease in sediment by 1% ON. Again it is doubtful this small decrease in ON sediment would translate into measurable effects to this WCI; therefore, negligible effects are expected.

Long-term Effects—This alternative would result in a positive (7% ON) decrease in sediment in the Middle Crooked River subwatershed. Road decommissioning and closures along with tree thinning in the RCA within the temporary timeframe would start to show a positive, immeasurable effect during this timeframe. Non-commercial thinning should promote mature tree growth faster which would provide future LWD recruitment. This should encourage formation of new pools and improve existing pools during this timeframe. Consequently, a negligible positive effect is expected during this timeframe.

Within the Pikes Fork 6th HUC, proposed actions could decrease sediment by 2% ON. Again it is doubtful this small decrease in ON sediment would translate into measurable effects to this WCI; therefore, negligible effects are expected.

3.8.3.6 Indicator: Off-Channel Habitat

Affected Environment

Desired Condition—The watershed has many ponds, oxbows, backwaters, and other off-channel areas with cover.

Current Condition—The Pikes Fork 6th HUC streams are primarily Rosgen A and B type channels, so off-channel habitat is limited but functioning appropriately for the channel types (Table 3-126). The Middle Crooked River subwatershed has few oxbows and off channel areas. This is mainly due to roads paralleling the channel and an artifact of the channel types in the subwatershed; therefore, this WCI is functioning at risk (Table 3-126).

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A does not propose any new management activities and would therefore have no effect on this WCI. The Middle Crooked River subwatershed is functioning at risk, primarily because of high RCA road density. This trend is expected to continue into the future.

All Action Alternatives

Vegetation Management/Prescribed Burning—The majority of streams are confined Rosgen A or B channels, which have limited floodplains. Because of the limited RCA treatments, no change in peak/base flow is expected. Further, there are no in-channel or streamside activities with the potential to affect off-channel habitat. As a result, no effect to this WCI in any timeframe is anticipated.

Transportation Management—It is not anticipated that the reduction in RCA roads or other activities included in the proposed action would affect a change in how floodplains and/or wetlands are hydrologically linked to the main channel. Although road reduction is beneficial to other WCIs, it is not expected to have any effect to this WCI.

Temporary Road Construction—Temporary road construction is not expected to have any influence on how floodplains and/or wetlands are hydrologically linked to the main channel. These proposed actions are not expected to have any effect to this WCI in any timeframe.

Converting Unauthorized Roads to NFS Roads—Converting Unauthorized Road to NFS Road is not expected to have any influence on how floodplains and/or wetlands are hydrologically linked to the main channel

Culvert Replacement—The culvert replacements would design to accommodate 100-year flow events and therefore would maintain this indicator.

Recreation Management—Construction of the motorized trail, designating the non-motorized trail, or construction of trailhead would not be expected to change how floodplains

and/or wetlands are hydrologically linked to the main channel. The proposed action is not expected to have any effect to this WCI in any timeframes.

3.8.3.7 Indicator: Refugia

Affected Environment

Desired Condition—Habitats capable of supporting strong and significant local populations are protected and are well distributed and connected for all life stages.

Current Condition—The Middle Crooked River 6th HUC is functioning at unacceptable risk; while the Pikes Fork 6th HUC is functioning at risk (Table 3-126). Six bull trout patches are located within the Crooked River 5th HUC. However, roads within the RCA, poor water quality, high stream temperatures, and poor connectivity within the Middle Crooked River subwatershed result in very little fish refugia. Habitats capable of supporting significant local populations in the Pikes Fork 6th HUC are likely insufficient in size and number. No bull trout have been documented in the 6th HUC, but potential spawning and rearing habitat has been observed. Most of the neighboring local populations are small. Connectivity is limited by culvert barriers.

Environmental Effects

Direct and Indirect Effects

Alternative A

Refugia is a large-scale indicator based on the quality, uniqueness, and importance of habitat within the 6th HUC. Alternative A does not propose any new management activities. The Middle Crooked River 6th HUC is functioning at unacceptable risk, while the Pikes Fork 6th HUC is functioning at risk. The current functioning conditions are occurring for a variety of reasons. Since this indicator is functioning at risk or unacceptable risk and no future foreseeable activities would correct this trend, this WCI would stay the same or get worse under the no action alternative.

All Action Alternatives

Vegetation Management/Prescribed Burning/Transportation Management/Converting Unauthorized Roads to NFS Roads/Road Reconstruction—A weak local fish population appears to be related to roads within the RCAs, elevated instream fine sediment, high stream temperatures, and poor connectivity with functional refugia in core areas. The proposed action may have a temporary immeasurable negative effect on this WCI based on various project implementations during that timeframe. Promoting mature tree growth and future LWD recruitment in the watershed would increase shading (lowering stream temperatures), create more channel complexity/pool formation, and sediment storage capacity in the future, all of which are critical components of bull trout core habitat areas. Additionally, road closure and decommissioning and road/trail improvements within the RCA would reduce future sediment and improve this WCI. Culvert replacement activities would open up future bull trout spawning and rearing habitat and improve connectivity between core areas. As a result, the proposed action should have a negligible positive effect on this WCI in the short- and long-term timeframes.

Temporary Road Construction—The proposed action includes 5.8 miles of temporary road construction. Of the 5.8 miles, only 0.6 miles is located inside the RCA. Construction inside the RCA would consist of 0.58 miles occurring on existing road templates and 0.02 miles would be new road construction. Vegetation between the proposed activities and RCAs should decrease the likelihood that sediment from constructing temporary roads would reach streams. These activities are not occurring adjacent to designated critical bull trout streams and are outside Forest "occupied" or "potentially suitable" bull trout habitat. As a result, effects to this WCI from these activities are expected to localized and negligible.

Culvert Replacement—Connections between local bull trout populations within the core area are limited by culvert barriers. All of the alternatives would replace or modify seven culverts with AOP structures, improving access for bull trout to usable spawning and rearing habitat in the Pikes Fork 6th HUC area. In addition, sixteen other culverts are proposed to be replaced within the project area. Consequently, it is expected that these actions would improve bull trout connectivity.

Recreation Management—Trail construction is estimated to increase sediment. Although the proposed action could continue to produce sediment that may enter streams, it is expected to have a negligible effect on this WCI. The irrelevance of this impact was determined because the proposed action is mostly located outside the RCA and vegetation between the trail and streams would filter potential sediment. It is expected that this action would not result in substantial or significant amounts of sediment which could affect this WCI. The effects associated with this action are expected to be negligible, localized, and immeasurable.

Constructing the trailhead near Pikes Fork would expose soils inside the RCA. This is a disturbed site and Design Feature FH-25 would reduce sediment delivery to streams by implementing erosion control measures and re-vegetating disturbed areas. Topography designs show that the proposed trailhead is sloping in the opposite direction of Pikes Fork. The location of the trailhead is 68.5 feet over relatively flat ground to Pikes Fork. Sediment delivery from this action is expected to be negligible due to the incorporation of BMPs during construction and utilizing a trailhead design that would include surfacing of the parking area with aggregate to minimize surface erosion. Implementation of the Pikes Fork Trailhead Rehabilitation and Monitoring Plan would result in fencing, re-vegetation and stabilizing the streambank in the disturbed area. This proposed activity would encourage more forest visitors to use this site. As National Forests have seen with other developed sites, the human footprint would grow around the site over time. In the temporary and short-term timeframes, effects should be localized and immeasurable. The effects of this facility in the long-term timeframe are not discountable and may grow outside of the proposed site, having direct or indirect effects on this WCI.

Temporal Effects of All Alternatives

Temporary and Short-term Effects—The proposed action may have a temporary negligible negative effect based on various project implementations within the RCA.

Long-term Effects—The culvert replacements would have the biggest and most substantial effect on this WCI because the replacements would re-establish passage for all life stages of bull trout into designated critical habitat. The resulting positive effect from culvert replacements, sediment reduction, and vegetation management activities should outweigh the uncertain effects of the trailhead use.

Alternatives C and D

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. The reduction of RCA miles as a result of this alternative would not have a different effect as described in the proposed action because the activities are not occurring adjacent to designated critical bull trout streams and are outside Forest "occupied" or "potentially suitable" bull trout habitat. As a result, this action is expected to have a negligible effect on this WCI.

Alternative D

Vegetation Management—This alternative includes an additional 10 acres of thinning with no product removal, 9 acres of thinning with product removal, and 1 acre of mixed treatment with product removal. The treatments would not occur closer than 50 feet from streams. This treatment is not occurring near designated critical bull trout habitat and is outside of the Forest "unoccupied but suitable" habitat model. Therefore, the addition of these acres is not expected have any effect on this WCI.

Alternative E

Transportation Management—This alternative includes an additional 0.7 miles of road decommissioning and 0.7 miles of road closure (ML 1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Recreation—This alternative does not include the motorized trail and trailhead. As a result, this alternative would reduce effects in the RCA. The positive effect to this WCI may be realized in a decreased footprint at the trailhead proposed site. The resulting positive effect to this WCI is expected to be localized and immeasurable.

Alternative F

Transportation Management—This alternative includes an additional 0.1 miles of road decommissioning and 0.7 miles of road closure (ML 1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. Additionally, there is a reduction of RCA motorized trails from the Alternative B from 6.6 miles to 5.6 miles. This action is expected to have localized and immeasurable effects on this WCI.

3.8.3.8 Indicator: Streambank Condition

Affected Environment

Desired Condition—More than 90% of any stream reach has stable banks.

Current Condition—The Pikes Fork 6th HUC is functioning appropriately (Table 3-126); however, the condition of the proposed Pikes Fork trailhead site is having localized and measurable negative effects on this WCI based on field visits to this site. No foreseeable future project is planned to correct this disturbance adjacent to bull trout USFWS designated critical habitat. The Middle Crooked River 6th HUC is functioning at risk in the future. Land management activities in the past and resulting high road densities have contributed to this condition.

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A does not propose any new management activities. Therefore, existing conditions would stay the same. The Pike Fork 6th HUC is functioning appropriately and the Middle Crooked River 6th HUC is functioning at risk. There is a disturbed site next to the location of the new proposed trailhead site near Pikes Fork. Currently, the streambank is degraded by human foot traffic and an OHV ford crossing is eroding the streambank. Although the Pikes Fork 6th subwatershed is functioning appropriately, the condition of this site is having a localized and measurable negative effect on this WCI based on field visits to this site. There is no foreseeable project in the future to correct this disturbance adjacent to bull trout USFWS designated critical habitat.

All Action Alternatives

Vegetation Management—The proposed action includes noncommercial thinning within the RCAs. Given the no treatment buffers identified in the proposed action (0–50 feet for perennial streams, 0–15 feet for intermittent streams, and one site potential tree height in plantations), streambank condition is expected to be maintained in the temporary and short-term timeframes. There could be a slight positive effect from this action in the long-term timeframe. This improvement is attributed to an increase in LWD recruitment which could promote streambank stability by contributing high quality LWD. The majority of these treatments are occurring in the Middle Crooked River subwatershed, so that is where the positive effect may be realized.

Commercial treatments would include cutting large trees between one and two site potential tree heights which is not expected to have an effect on this WCI because of the distance to the stream. This component of the project requires trees to be winched outside the RCA and no ground based equipment (skidders, feller-bunchers, tractors) would be allowed to travel off existing routes. Furthermore, no skid trails would be constructed within RCA boundaries. The proposed action should not have any effect on this WCI in any timeframe.

Prescribed Burning—As a result of distances outlined in the project proposal, low fire intensities, the limited extent, and the relatively wet nature of streamside RCAs, little, if any, tree mortality or degraded stream banks would be expected. Therefore, no effect to this WCI should occur.

Transportation Management—The proposed action includes decommissioning 13.8 miles and closing 1.1 miles of NFS roads within RCAs. These activities would promote vegetative growth near the streambank and are expected to have a negligible positive effect on streambank stability in the long-term timeframe.

Road Reconstruction—This activity would occur on existing road templates but would require some shaping of the existing road bed and some realignment (blading and installation of drainage features). The project activity would occur on 0.9 miles within the RCA. This activity is occurring on average 12.25 feet from the streambank along a 160 foot section of an unnamed perennial tributary to North Fork China Creek. Design Feature FH-25 and BMPs

would mitigate any negative effects to this WCI. Consequently, these effects would be localized and immeasurable.

Temporary Road Construction—Temporary road construction is proposed to occur on 0.6 miles within the RCA. Of this, there is a 174 foot section of proposed temporary road on an existing road template that averages 19.14 feet from an unnamed perennial tributary of Beaver creek (Temporary Road Section 12). Design Features FH-25 and TS-4 would mitigate any potential effects construction may have on the streambank condition at this site. Also, vegetation between the proposed action and streams are expected to protect this WCI. These activities are not occurring adjacent to designated critical bull trout streams and are outside Forest "occupied" or "potentially suitable" bull trout habitat. As a result, effects to this WCI from these activities are expected to localized and negligible.

Converting Unauthorized Roads to NFS Roads—Road maintenance activities include reshaping road surfaces, installing additional relief culverts, adding or enhancing waterbars, and redirecting road surface runoff on 0.7 miles of existing roads within the RCA, not located within occupied bull trout habitat or USFWS designated critical bull trout habitat. Of the 0.7 miles, 0.3 miles would be converted to closed to all motorized use/state of storage and 0.4 miles would be converted to closed to public motorized use. The closest these activities occur to an unnamed perennial stream is 89 feet. Field data indicates that vegetation between the road and creeks would help minimize potential effects to the steambank WCI. Furthermore, Design Feature FH-25 would help mitigate potential effects associated with the proposed action. Consequently, there is no anticipated effect to this WCI.

Culvert Replacement—Replacing culverts would have a negative effect to this WCI in the temporary and short-term timeframes. The effects of this action would maintain the functionally rating and are expected to be localized. Design Features FH-18, FH- 19, FH-21, and FH-24 would ensure the streambank would be rehabilitated within the temporary or short-term timeframes. There would be no effect to this WCI in the long-term timeframe.

Recreation Management—The proposed action includes 0.4 miles of motorized trail construction inside the RCA. Minimal amounts of riparian vegetation are expected to be removed when installing trails. The closest this activity occurs to an unnamed perennial stream is 54 feet. Vegetation between the proposed action and streams are expected to protect this WCI from the effects. Design Feature FH-25 would be incorporated to ensure the proposed action would mitigate effects. Therefore, this proposed action is not expected to have an effect on this WCI.

The construction of the trailhead could have an effect on streambank condition. Site visits to this location in the past has shown the terrain is flat. Currently, the streambank is degraded by human foot traffic and there is an OHV ford crossing eroding the streambank. Design Feature FH-25 would help protect the streambank at this location from further erosion. Implementing the Pikes Fork Trailhead Rehabilitation and Monitoring Plan would result in fencing, revegetation and stabilizing the streambank in the disturbed area. These actions are expected to keep the effects localized in the temporary and short-term timeframes. There is uncertainty regarding the long-term effects to this WCI from usage of the trailhead facility so close to Pikes Fork. The monitoring plan would monitor effects of the trailhead to ensure these effects are consistent with what is described in this document.

Alternatives C and D

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. The reduction of RCA miles as a result of this alternative would not have a different effect as described in the proposed action because the activities are not occurring adjacent to designated critical bull trout streams and are outside Forest "occupied" or "potentially suitable" bull trout habitat. As a result, this action is expected to have a negligible effect on this WCI.

Alternative D

Vegetation Management—This alternative includes an additional 10 acres of thinning with no product removal, 9 acres of thinning with product removal, and 1 acre of mixed treatment with product removal. The treatments would not occur closer than 50 feet from streams. This buffer would be substantial enough to protect this WCI. Therefore, the addition of these acres is not expected have any effect on this WCI.

Alternative F

Transportation Management—This alternative includes an additional 0.1 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Temporary Road Construction—This alternative includes 0.2 miles inside the RCA and does not include temporary road section 12 as discussed in the proposed action above. Design Features FH-25 and TS-4 would mitigate any potential effects construction may have on the streambank condition. Therefore, effects to this WCI from these activities are expected to localized and negligible.

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. Additionally, there is a reduction of RCA trails from the Alternative B from 6.6 miles to 5.6 miles. This action is expected to have similar effects to those described in the proposed action.

Temporal Effects of Alternatives B, C, D, and F

Temporary Effects—The proposed action may have negligible negative effects based on culvert replacement construction activities.

Short-term Effects—The proposed action may have negligible negative effects based on culvert replacement construction activities.

Long-term Effects—The Middle Fork Crooked River subwatershed could experience a slight positive improvement because of the promotion of LWD recruitment and road decommission/closure activities. The Pikes Fork subwatershed could experience a localized negative effect associated with the usage of the new proposed trailhead.

Alternative E

Transportation Management—This alternative includes an additional 0.7 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Temporary Road Construction—This alternative does not include any RCA temporary road construction or temporary road section 12 as discussed in the proposed action above. Therefore, there would be no effect to this WCI.

Recreation—This alternative does not include the motorized trail and trailhead. As a result, this alternative would reduce effects in the RCA and improve the streambank condition in the long-term timeframe. The positive effect to this WCI may be realized in a reduced footprint at the proposed trailhead site. The resulting positive effect to this WCI is expected to be localized and immeasurable.

Temporal Effects of Alternative E

Temporary Effects—The proposed action may have negligible negative effects based on culvert replacement construction activities.

Short-term Effects—The proposed action may have negligible negative effects based on culvert replacement construction activities.

Long-term Effects—The Middle Fork Crooked River subwatershed could experience a slight positive improvement because of the promotion of LWD recruitment and road decommission/closure activities. The Pikes Fork subwatershed could experience a positive effect to this WCI because of a reduced footprint at the proposed trailhead site. The resulting positive effect to this WCI is expected to be localized and negligible.

3.8.3.9 Indicator: Floodplain Connectivity

Affected Environment

Desired Condition—Within RCAs, floodplains and wetlands are hydrologically linked to the main channel. Overbank flows occur and maintain wetland/floodplain functions.

Current Condition—The Pikes Fork 6th HUC is functioning at risk and the Middle Crooked River 6th HUC is functioning at unacceptable risk (Table 3-126). Extremely high RCA road densities have impacted floodplains and wetlands within both 6th HUCs.

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A does not propose any new management activities. Therefore, existing conditions would remain the same.

Action Alternatives

Vegetation Management/Prescribed Burning/Transportation Management/Road Reconstruction/Temporary Road Construction/Converting Unauthorized Roads to NFS Roads/Culvert Replacement/Recreation Management—The majority of the streams is confined Rosgen A or B channels, and by definition, has limited floodplains. Based on the limited RCA treatments and lack of in-channel or streamside activities with the potential to affect the hydrological linkage of floodplains to the main channel, there would be no temporary effects to this WCI. The proposed decommissioning or closing of existing roads

may enhance the hydrologic linkage of floodplains in the short- and long-term timeframes. However, most of these treatments are located outside of the RCA and uncertainty regarding the possibility of a positive change in any timeframe resulted in a no effect determination for this WCI.

3.8.3.10 Indicator: Change in Peak/Base Flows

Affected Environment

Desired Condition—Watershed hydrograph indicates peak flow, base flow, and flow timing characteristics comparable to an undisturbed watershed of a similar size, geomorphology and climatology.

Current Condition—This indicator is functioning at risk for both subwatersheds (Table 3-126). There are no active surface water diversions in either subwatershed. Past vegetation management and fires have resulted in 4% and 5% ECA for Middle Crooked and Pikes Fork subwatersheds, respectively, which is well below the amount required to detect changes in water yield. High numbers and lengths of roads within these areas may route water to the channel faster and increase peak flows from precipitation events. However, stream hydrographs are dominated by spring snowmelt and not precipitation event flows. So it is unlikely that the largest peak flows are significantly altered by an increased drainage network from roads.

Environmental Effects

See the hydrology report for a full analysis. The proposed action and all alternatives include activities which could affect this WCI, thereby affecting bull trout and their habitat. Under each of the action alternatives, an immeasurable long-term improvement in this indicator is expected in the Middle Crooked subwatershed due to vegetation management activities, prescribed fire, and road decommissioning. Vegetation thinning and prescribed fire would be expected to alter vegetation conditions toward desired conditions and reduce the risk of uncharacteristic wildfire as well as reduce effects of fire exclusion on overall water yield. This may have negligible positive effects to fishes residing in the Middle Crooked subwatershed and ESA-listed fishes residing in the Crooked River.

3.8.3.11 Indicator: Change in Drainage Network/Road Density and Location

Affected Environment

Desired Condition—Zero or minimum change in active channel length correlated with human caused disturbance. Ideal conditions consist of a total road density <0.7 miles per square mile of the subwatershed and no roads within the RCA.

Current Condition—This indicator is functioning at unacceptable risk in both subwatersheds (Table 3-126). Road density in both subwatersheds is very high, constituting a greater than moderate change in active channel length as roads act as a conduit to route water to stream channels. The road density for the Middle Crooked River 6th HUC is 5.7 mi/m^2; while the PikesFork 6th HUC is 6.48 mi/m^2.

Environmental Effects

See the hydrology section for the full analysis. The proposed action and all alternatives include activities which could affect this WCI, and thereby affect bull trout and their habitat. All action alternatives would maintain both the Changes in Drainage Network WCI and the Road Density and Location WCI in the long-term which is FUR in both subwatersheds. The FUR rating is because the reductions in road miles associated with the action alternatives do not meet the desired road density statistics that are specified in the Forest Plan Appendix B. However, each of the action alternatives would result in reductions in both overall subwatershed road density and RCA road density. The Middle Crooked subwatershed would receive the bulk of the benefit as the majority of the road decommissioning occurs within this subwatershed. Under Alternatives B, C, and D, Middle Crooked road density would be reduced by 0.69 mi/mi^2, and by 0.8 mi/mi^2 under Alternatives E and F. RCA road density in the Middle Crooked subwatershed would be reduced by 1.78 mi/mi^2 under Alternatives B and C, 1.7 mi/mi^2 under alternative D, and 1.89 mi/mi^2 under alternatives E and F. In the Pikes Fork subwatershed, road density would be reduced by 0.19 mi/mi^2 under Alternatives B and E, 0.08 mi/mi^2 under Alternative C, and 0.13 mi/mi^2 under Alternatives D and F. RCA road density within the Pikes Fork subwatershed would be reduced by 0.37 mi/mi^2 under Alternatives B, C, D, and F, and by 0.75 mi/mi^2 under Alternative E. Overall, Alternative E results in the greatest reduction in both road density and RCA road density of any of the action alternatives. Further, these alternatives would benefit bull trout and their habitat in the short- and long-term timeframes.

3.8.3.12 Indicator: Disturbance History/Disturbance Regime

Affected Environment

Desired Condition—Ideal conditions consists of < 15% ECA (entire watershed) with no concentration of disturbance in areas with landslide or landslide prone areas, and/or refugia, and/or RCAs.

Disturbance resulting from land management activities are negligible or temporary. Streamflow regimes are appropriate to the local geomorphology, potential vegetation and climatology resulting in appropriate high quality habitat and watershed complexity that provide refugia and rearing space for all life stages or multiple life-history forms. Ecological processes are within historical ranges. Resiliency of habitat to recover from land management disturbances is high.

Current Conditions—For disturbance history, this indicator is functioning at risk in both subwatersheds (Table 3-126). Past vegetation management and fires have resulted in 4% and 5% ECA for Middle Crooked and Pikes Fork subwatersheds respectively. Both subwatersheds have high concentrations of roads in RCAs.

For the disturbance regime WCI, the Pikes Fork and Middle Crooked River 6th HUCs are functioning at risk (Table 3-126). Vegetation is documented as being outside desired conditions due to alteration of the natural fire regime from fire suppression. This increases the risk of wildfire in the area which, if a fire were to occur, may result in negative effects to or loss of aquatic habitat.

Environmental Effects

See the hydrology section for the full analysis. The proposed action and all alternatives include activities which could affect this WCI and thereby affect bull trout and their habitat. All action alternatives include closure, realignment, and decommissioning of roads within RCAs which benefits overall RCA function in the short and long-term. All action alternatives are expected to maintain the existing functionality of the RCAs WCI in the long-term. An immeasurable degrade to this indicator is expected in the temporary timeframe with measurable improving trend to the WCI in the short and long-term. Replacements of existing undersized or otherwise impassable culverts with AOP type structures would increase available habitat and migration corridors for aquatic species as well as increase the capacity of the crossing to handle higher stream flows and debris during flood events. The temporary immeasurable negative and short- and long-term immeasurable positive effects to this WCI may benefit bull trout and their habitat.

3.8.3.13 Indicator: Riparian Conservation Areas

Affected Environment

Desired Condition—The riparian conservation areas within the subwatershed have historic and occupied refugia for listed, sensitive or native/desired nonnative fish species which are present and provide adequate shade, large woody debris recruitment, sediment buffering, connectivity, and habitat protection to minimize adverse effects from land management activities (>80% intact).

Current Condition—This indicator is functioning at risk in both subwatersheds (Table 3-126). Past land management activities including logging, roads, and mining have contributed to fragmented habitats and altered hydrologic, sediment, and temperature regimes. Some of these influences have recovered over time, however, roads and fish barriers at stream crossings continue to hinder attainment of desired conditions. Both subwatersheds have had very little fire in the past several decades and are at high risk of uncharacteristic wildfire due to fuels conditions and missed fire cycles.

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A would continue the existing condition with regard to the RCA WCI, which is functioning at risk. The functioning at risk status is primarily due to the high amounts of roads within RCAs, which increase sediment delivery and reduce potential shade along streams. Additional factors contributing to the current functionality are stream barriers and vegetation conditions outside of desired conditions. Under Alternative A, AOP would continue to be limited by 23 physical barriers in the form of unpassable road/stream crossings throughout the project area. Additionally, Alternative A would leave the project at high risk of wildfire and insect infestation due to higher stand densities and abundance of ladder fuels resulting from fire exclusion over the past century. If a large fire were to occur, negative effects to sediment and temperature (as well as other WCIs) would be expected as increased erosion and reductions in stream shade is likely to occur after a large scale fire.

All Action Alternatives

Vegetation Management—Riparian areas show disturbance from past and ongoing land management activities including road construction and developed/dispersed recreation. The proposed activities include RCA thinning treatments. Decreased tree density from thinning would allow growth rates to increase, providing potential LWD sooner than would have taken place under overstocked conditions. Promotion of mature tree growth and future LWD recruitment in the watershed would increase shading (lowering stream temperatures), channel complexity/pool formation, and sediment storage capacity; all of which are critical components of bull trout core habitat areas. Noncommercial thinning would occur in the RCA, but no closer than 50 feet from the stream outside of plantations and one site potential tree height (approximately 35 feet) within plantations. The vegetation management actions should have negligible effects on this WCI in the temporary timeframe. In the short- and long-term timeframes, as project objectives enhance the growth of retained trees and alter species towards historic conditions, negligible positive improvements to this WCI are expected. These improvements would result in more vigorous, larger trees in the RCA.

Commercial treatments would include cutting large trees between the second and first site potential tree heights. There would be soil disturbance within the second tree height of the RCA, but because these trees would be whole tree yarded minimal disturbance is expected. In addition, the *Hydrology Resource Technical Report* states that MK sediment delivery length estimates for yarding activities were less than RCA buffer distances (1 site potential tree height). Therefore, sediment associated with vegetation thinning yarding operations is not expected to be delivered to streams. It is expected the remaining large trees within the first site potential tree height should still be available for LWD recruitment and would maintain the WCI functionally rating. Consequently, the vegetation management disturbance to the RCA would result in immeasurable negative effects in the temporary and short-term timeframes and should result in long-term benefits.

Prescribed Burning—The proposed activity includes prescribed burning within the RCA. Design Feature FF-3 should mitigate effects associated with fire intensity and undesirable spread within the RCA. Given the low fire intensities, limited extent, and relatively wet nature of streamside RCAs, little, if any, tree mortality or consumption of down and dead material would be expected. These prescribed burns would occur in the spring or fall under specific weather conditions. As a result, the prescribed burn should result in a mosaic burn pattern on the ground and unburnt ground cover should be sufficient to filter run-off following a rain storm event. Effects associated with the prescribed burning component of this project are expected to be localized, negligible, and immeasurable.

Transportation Management—The proposed action would reduce road miles within the watershed and RCAs. Road decommissioning and closure activities would include installing drainage features, installing effective barriers to motorized vehicles, and seeding with grass and forbs. These decommissioned and closed roads within the RCA may temporarily have a negligible negative effect during project implementation. However, these improvements are expected to have a negligible positive effect to this WCI in the short- and long-term timeframes because there would be a reduction in sediment to streams, these areas would regrow vegetation and promote large tree growth, and there would be less overall disturbance near streams.

Road Reconstruction—This activity would occur on existing road templates but would require some shaping of the existing road bed and some realignment. Project activities would occur on 0.9 miles within the RCA. These roads are currently closed to all motorized use and in a state of storage. Therefore, disturbance to this WCI is likely to occur; however, based on the limited mileage and Design Features FH-25 and TS-4, effects should be negligible, localized, and immeasurable.

Temporary Road Construction—Most temporary road construction is located outside of RCAs with only a short amount (0.6 mile) within an RCA. Of the 0.6 miles, only 0.02 miles is new temporary road construction, the other 0.58 miles would occur on existing road templates. The vegetation buffer between temporary road construction and streams would decrease the likelihood that sediment or other effects from the construction of temporary roads would affect this WCI. Therefore, effects from this activity are expected to be localized, negligible, and immeasurable.

Converting Unauthorized Roads to NFS Roads—Road maintenance activities would reduce sediment entry into streams from existing roads through reshaping road surfaces, installing additional relief culverts, adding or enhancing waterbars, and redirecting road surface runoff. Approximately 0.7 miles are located inside the RCA. These roads are already in place and therefore most of the disturbance to this WCI has occurred. Design Features FH-25 and TS-4 would help minimize sediment delivery to streams. As a result, effects to this WCI are expected to be localized, negligible, and immeasurable.

Culvert Removal/Replacement—The proposed activities include replacing or modifying 23 culverts in the Middle Crooked River and Pikes Fork subwatersheds. These activities are expected to have an immeasurable and localized effect on riparian vegetation in the temporary and short-term timeframes. No effect is expected in the long-term timeframe.

Recreation Management—The proposed action includes 6.6 miles of motorized trail construction within the RCA. Of this mileage, only 0.4 miles would be new construction, the rest is located on existing road prisms. There is 0.38 miles of new construction and 0.61 miles converting an existing road (ML1) to motorized trail located in Forest "suitable but unoccupied habitat" bull trout patch. No trail construction (either new or on existing road prisms) is located near USFWS bull trout designated critical habitat. Minimal amounts of riparian vegetation are expected to be removed when installing these trails. Vegetation would be cleared around the trail to a height of 6 to 8 feet and a width of 3 to 4 feet. As a result of very little trail construction occurring inside RCAs, the effects of this action are expected to be localized and negligible.

The designation of the non-motorized trail proposed in this alternative would occur on 15.19 miles within the RCA. Of this mileage, none is proposed within USFWS critical habitat and 1.36 miles are within Forest "suitable but unoccupied habitat" bull trout patch. The hydrology resource technical report (project record) stated field reviews of non-motorized trails not co-located on roads was made in May and June of 2014 and did not find accelerated sedimentation problems. Additionally, all stream crossings including bridges were in good condition. This trail is currently in place and any continued effect to this WCI should be negligible.

New trailhead construction is proposed at the junction of NS Roads 385/312 in the Pikes Fork subwatershed which is directly adjacent to Pikes Fork Creek. The new trailhead is

located inside the RCA and near USFWS designated critical habitat. The site is located in a previously disturbed area. The location of the trailhead is 68.5 feet from Pikes Fork. The Pikes Fork Trailhead Rehabilitation and Monitoring Plan (Appendix B) requires stabilization of the streambank, vegetation planting in the disturbed area, and blocking access of the OHV creek crossing. Fencing would also be required to be installed prior to construction of the new trailhead to reduce future expansion of this site. The project design features and rehabilitation/monitoring plan should mitigate effects to bull trout and their habitat in the temporary and short-term timeframes. Also, vegetation between the trailhead and stream would decrease the likelihood this WCI, or bull trout or their habitat would experience substantial negative effects from this action.

There is uncertainty regarding the long-term effects to this WCI from building a trailhead facility within the RCA. This action would encourage a much larger human footprint (e.g., use of the restrooms, walking around the site, disperse camping nearby) at this site. The effects of this facility in the long-term timeframe are not discountable and may grow outside of the proposed site, having direct or indirect negative effects to this WCI.

Alternatives C and D

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. The reduction of RCA miles as a result of this alternative would not have a different effect as described in the proposed action because the activities are not occurring adjacent to designated critical bull trout streams and are outside Forest "occupied" or "potentially suitable" bull trout habitat. As a result, this action is not expected to have significant effects on this WCI.

Alternative D

Vegetation Management—This alternative includes an additional 10 acres of thinning with no product removal, 9 acres of thinning with product removal, and 1 acre of mixed treatment with product removal. The treatments would not occur closer than 50 feet from streams. This buffer would be substantial enough to protect this WCI. Therefore, the addition of these acres is not expected have any effect on this WCI.

Alternative F

Transportation Management—This alternative includes an additional 0.1 miles of road decommissioning and 0.7 miles of road closure (ML 1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Temporary Road Construction—This alternative includes 0.2 miles temporary road construction inside the RCA. Design Features FH-13 and TS-4 would mitigate any potential effects construction may have on this WCI. Therefore, effects from these activities are expected to localized and negligible.

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. Additionally, there is a reduction of RCA trails from Alternative B from 6.6 miles to 5.6 miles. This action is expected to have similar effects to those described in the proposed action.

Temporal Effects of Alternatives B, C, D, and F

Temporary Effects—The proposed action may have negligible negative effects based on multiple project implementations described above.

Short-term Effects—The proposed action may have negligible negative effects based on multiple project implementations described above.

Long-term Effects—The Middle Crooked River subwatershed could experience a slight positive improvement because of the promotion of LWD recruitment and road decommission/closure activities. In the Pikes Fork subwatershed, transportation management activities and reduction in sediment should result in an immeasurable positive effect. Uncertainty of effects associated with the usage of the new trailhead is not expected to outweigh the positive effects of management actions.

Alternative E

Transportation Management—This alternative includes an additional 0.7 miles of road decommissioning and 0.7 miles of road closure (ML 1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Temporary Road Construction—This alternative does not include any RCA temporary road construction. Therefore, effects to this WCI are expected to be negligible.

Recreation—This alternative does not include the motorized trail and trailhead. As a result, this alternative would reduce effects in the RCA. The positive effect to this WCI may be realized in a reduced footprint at the the proposed trailhead site. The resulting positive effect to this WCI is expected to be localized and immeasurable.

Temporal Effects of Alternative E

Temporary Effects—The proposed action may have negligible negative effects based on multiple project implementations described above.

Short-term Effects—The proposed action may have negligible negative effects based on multiple project implementations described above.

Long-term Effects—The Middle Crooked River subwatershed could experience a slight positive improvement because of the promotion of LWD recruitment and road decommission/closure activities. The Pikes Fork subwatershed could also experience a slight positive effect because of a reduced footprint at the proposed trailhead site. Additionally, road decommissioning activities and reduced sediment in the subwatershed should improve this WCI. The resulting positive effect to this WCI is expected to be negligible and immeasurable.

3.8.3.14 Indicator: Integration of Species and Habitat Conditions

Affected Environment

Desired Condition—Habitat quality and connectivity among local populations is high. The migratory form of bull trout is present. Disturbance has not altered channel equilibrium. Fine sediment and other habitat characteristics influencing survival and growth are consistent with

pristine habitat. The local population has the resilience to recover from short-term disturbance within one or two generation (5 to 10 years).

Current Condition—The Pikes Fork 6th HUC is functioning at risk; while the Middle Crooked River 6th HUC is functioning at unacceptable risk. Habitat quality is functioning appropriately for some habitat elements. However, temperature, surface fines, pool quality, large pools, substrate embeddedness, refugia, chemical contaminants and nutrients, road density and location, and disturbance history appear to be limiting factors in this watershed. There are many known barriers to fish passage, and brook trout are occupying habitat within these subwatersheds.

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A does not propose any new management activities. As explained above, some WCIs would continue a negative trend. These WCIs would have a direct influence over integration of species and habitat conditions WCI. As a result, this WCI would continue to experience immeasurable negative effects in both subwatersheds in all timeframes.

All Action Alternatives

Vegetation Management—The proposed action includes both commercial and non-commercial treatments within the RCAs. The objective of this treatment is to increase the spacing between trees which would improve tree vigor, increase growth, and encourage future development of large tree size class. This action is expected to maintain the LWD WCI in the temporary and short-term timeframes and improve the WCI in the long-term by providing better growing conditions for remaining trees. It is likely these activities would have the potential to immeasurably increase stream temperatures in the temporary and short-term timeframes (see the Temperature WCI discussion in the hydrology section). FEMAT (1993) found that a buffer of about one existing tree height is sufficient to maintain litter fall and root strength and retain most of the shading and LWD functions. Increasing LWD recruitment should contribute to new pool formations, which in turn, allows for increased sediment storage and improved width/max/depth ratio of streams. There are approximately 15.6 acres of vegetation treatment within USFWS designated bull trout critical habitat and 0.05 acres in Forest “suitable but unoccupied” bull trout patch. These actions are occurring outside known bull trout spawning and rearing habitat. Additionally, the 50 foot stream buffer and the directional felling away from creeks/rivers (Design Feature FH-30) should ensure no direct or indirect effect to the resource occur. Effects to this WCI, bull trout, or their habitat are expected to be negligible and immeasurable from vegetation management activities.

Prescribed Burning—The proposed action includes prescribed burning and pile burning within the RCA to prevent fuel loads and ladder fuels from increasing compared to historic conditions, and reducing the likelihood of a lethal fire occurring in the future. Reducing the potential for a future large fire would also reduce the potential for direct or indirect effects to bull trout populations. As previously described, prescribed fire would be managed to burn at

low-to-moderate intensity and severity. Hand piles within RCAs would be limited to 6 feet in diameter and would be distributed across the burn unit.

This prescribed burning would occur on 15.6 acres within USFWS designated bull trout critical habitat located outside spawning and rearing habitat. Given the low fire intensities, limited extent, and the relatively wet nature of streamside RCAs, little, if any, tree mortality or consumption of down and dead material would be expected. In the event of a rainstorm, unburnt groundcover would be available to filter run-off following a prescribed burn. Project design features (FF-3) would protect bull trout and their habitat if undesirable fire behavior is present. Effects to this WCI, bull trout, or their habitat from this activity are expected to be localized, negligible, and immeasurable.

Transportation Management—As described above in the relevant WCIs, implementation of road activities within the RCA could have temporary negative effects to some WCIs. In the future, these improvements are expected to have positive effects (measurable and immeasurable) on this and other WCIs. As described in the Sediment WCI section of the hydrology section, ON sediment may be exposed but there is limited influence to bull trout and their habitat because of the location of the proposed road activities. Effects from these actions would be minimized by design features related to RCAs (FH-1), specific work restrictions (FH-25 and TS-4), and sediment controls (TS-6), which should improve potential spawning and rearing or migratory habitat in the future. Additionally, this project helps to reduce stream temperatures by promoting streamside vegetative growth. Both are important components of promoting quality bull trout habitat for generations to come. Once the habitat is more conducive, bull trout may migrate into tributaries currently unoccupied and start repopulating over the long-term timeframe.

Road maintenance has the potential to contribute to temporary sediment increases. These increases are included in the sediment analysis. Road maintenance activities are designed to prevent the deterioration of roads due to regular use and natural erosion. In particular, road maintenance helps to limit sediment input and turbidity from road systems over time. However, maintenance activities themselves can contribute sediment to streams. The amount of fine sediment contributed is generally proportional to the frequency, timing, and intensity of maintenance, a road's location on the landscape, and the quality and effectiveness of its drainage (i.e., ditchline extension, number of stream crossings, etc.). Mitigations in the project design features (TS-4, TS-6) have minimized this risk by requiring work is done in dry conditions, implementing sediment control measures, and not allowing side cast waste material within RCAs. These mitigations would be expected to decrease the likelihood of sediment delivery, disturbance of bull trout, or degraded habitat. Therefore, effects from these actions are expected to be negligible.

There is a temporary increase (2% ON) in the Pikes Fork 6th HUC from proposed road treatments. This HUC has small pockets of habitat utilized by bull trout and there is USFWS designated critical habitat within this subwatershed. Vegetation between the action and streams is expected to filter sediment before it reaches streams, which should protect bull trout and their habitat. The amount of proposed activities (construction of motorized trail – 0.97 miles and road closure activities – 0.93 miles) are not expected to have substantial effects. Therefore, effects to this WCI, bull trout, or their habitat are expected to be negligible and localized. The resulting short-term (1% ON) and long-term (1% ON) sediment reductions should be beneficial to all life stages of bull trout and their habitat.

Road Reconstruction—This activity would occur on existing roads templates but would require some shaping of the existing road bed and some realignment (blading and installation of drainage features). The project activity would occur on 0.9 miles within the RCA. This activity occurs on an average of 45.14 ft. from the streambank along an 832 foot section of an unnamed perennial tributary to North Fork China Creek not occupied by bull trout (see 3.3.1, Fish Species section) and not designated by USFWS as bull trout critical habitat. These roads are currently closed to all motorized use and in a state of storage. Though disturbance from this action is likely to occur, based on the limited distance, project design features (FH-25, TS-4), and BMPs, the effects would be negligible, localized, and immeasurable.

Temporary Road Construction—Most temporary road construction is located outside of RCAs with only a short amount (0.6 mile) proposed within an RCA. There is only 0.02 miles of new temporary road construction, the other 0.58 miles would occur on existing road templates. The vegetation buffer between temporary road construction and streams would decrease the likelihood that sediment from the construction of temporary roads would reach streams. Effects to this WCI, bull trout, or their habitat from this activity are expected to be localized, negligible, and immeasurable.

Converting Unauthorized Roads to NFS Roads—Road maintenance activities would reduce sediment entry into streams from existing roads through reshaping road surfaces, installing additional relief culverts, adding or enhancing waterbars, and redirecting road surface runoff. Approximately 0.7 miles are located inside the RCA. These roads are already in place and therefore most of the disturbance to this WCI has occurred. Design Features FH-25 and TS-4 would help minimize sediment delivery to streams. Therefore, effects to this WCI are expected to be localized, negligible, and immeasurable.

Culvert Replacement—The proposed action would reduce the number of impassable barriers identified in the 2003 and 2004 Forest culvert inventory. This activity is beneficial to bull trout populations and could lead to repopulation within tributaries in both subwatersheds.

Recreation Management—The proposed action includes construction of motorized trail and new trailhead, as well as, designation of existing non-motorized trail. Trail construction could temporarily increase sediment production. There are 6.6 miles of construction within the RCA; however, only 0.4 miles is new construction. The remaining trail construction (6.2 miles) would occur on existing road prisms. Sediment delivery resulting from construction should not be substantial enough to affect bull trout or their habitat. Vegetation between the trail construction and streams should filter exposed soils. Future sediment delivery is expected to be minimal because of efforts to make a sustainable trail through proper and adequate drainage and grade. Effects to bull trout or their habitat are expected to be negligible because there is very limited trail construction in Forest “suitable but unoccupied” bull trout patch, no trail construction in bull trout critical habitat, and minimal sediment delivery to streams.

Non-motorized trail authorizations for both winter and summer recreation are not expected to measurably affect sediment delivery. In many cases, non-motorized trails are co-located on existing ML 1 or ML 2 roads, in these cases sediment delivery from the road is incorporated into overall sediment delivery estimates. Field reviews of non-motorized trails not co-located

on roads were made in May and June of 2014 and did not find accelerated sedimentation problems. Additionally, all stream crossings including bridges were in good condition.

New trailhead construction is proposed at the junction of FS 385/312 Roads in the Pikes Fork subwatershed which is directly adjacent to Pikes Fork. The new trailhead is located inside the RCA and near USFWS designated critical habitat. The site is located in a previously disturbed area and is located 68.5 feet from Pikes Fork. The proposed actions are located outside of bull trout spawning and rearing locations. Fish survey data (n-14) have not found bull trout in Pikes Fork within the project area, but changing fish barriers could allow bull trout to repopulate this creek. Vegetation, aggregate surface, and proper drainage features (ditch) between the trailhead and the creek would reduce potential sediment effects and ensure proper riparian function. Trailhead construction would result in some disturbance (tree removal and soil disturbance). The current location is in need of vegetation and streambank restoration. The Pikes Fork Trailhead Rehabilitation and Monitoring Plan (Appendix B of the fisheries technical report, available in the project record) would require restoration and fence activities prior to new trailhead construction, which would improve the current site and mitigate potential temporary and short-term effects from implementing the new trailhead. The long-term effects to bull trout or their habitat from building a trailhead facility near Pikes Fork are uncertain. For example, the facility could encourage a much larger human footprint than currently occurring through use of the restrooms, walking around the site, dispersed camping, and other activities. The effects of this facility in the long-term timeframe are not discountable, may grow outside of the proposed site, and have direct localized effects on this WCI.

Alternatives C and D

Recreation—New trail construction for the motorized trail would occur on 0.1 miles within the RCA compared to 0.4 miles in the proposed action. The reduction of RCA miles as a result of this alternative would not have a different effect than described in the proposed action because the activities are not occurring adjacent to designated critical bull trout streams and are outside Forest “occupied” or “potentially suitable” bull trout habitat. As a result, this action is expected to have negligible effects on this WCI.

Alternative D

Vegetation Management—This alternative includes an additional 10 acres of thinning with no product removal, 9 acres of thinning with product removal, and 1 acre of mixed treatment with product removal. The treatments would not occur closer than 50 feet from streams, and this buffer should be substantial enough to protect this WCI. Furthermore, this treatment is not occurring near designated critical bull trout habitat and is outside of the Forest “unoccupied but suitable” habitat model. Therefore, the addition of these acres is expected to have negligible effects on this WCI.

Alternative F

Transportation Management—This alternative includes an additional 0.1 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Temporary Road Construction—This alternative includes 0.2 miles inside the RCA. Project design features (FH-25, TS-4) should mitigate any potential effects construction may

have on this WCI. Therefore, effects from these activities are expected to localized and negligible.

Recreation—New trail construction would occur during building of the motorized trail, of which there is 0.1 miles within the RCA. Additionally, there is a reduction of RCA trails from 6.6 miles to 5.6 miles compared to Alternative B. This action is expected to have similar effects to those described in the proposed action above.

Temporal Effects of Alternatives B, C, D, and F

Temporary and Short-term Effects—The proposed action may have negligible negative effects based on multiple project implementations described above.

Long-term Effects—The Middle Crooked River subwatershed could experience a slight positive improvement because of the promotion of LWD recruitment and road decommission/closure activities. In Pikes Fork subwatershed, culvert replacements should result in a measurable positive effect. Uncertainty of effects associated with the usage of the new trailhead is not expected to outweigh the positive effects of all other management actions.

Alternative E

Transportation Management—This alternative includes an additional 0.7 miles of road decommissioning and 0.7 miles of road closure (ML1) within the RCA. The benefits of these activities are similar to the effects common to all action alternatives described above.

Temporary Road Construction—This alternative does not include any RCA temporary road construction. Therefore, effects to this WCI are expected to be negligible.

Recreation—This alternative does not include the motorized trail and trailhead, resulting in reduced effects in the RCA. The positive effect to this WCI may also be realized in a reduced footprint at the proposed trailhead site. The resulting positive effect to this WCI is expected to be localized and immeasurable.

Temporal Effects of Alternative E

Temporary and Short-term Effects—The proposed action may have negligible negative effects based on multiple project implementations described above.

Long-term Effects—The Middle Crooked River subwatershed could experience a slight positive improvement because of the promotion of LWD recruitment and road decommission/closure activities. The Pikes Fork subwatershed could experience a slight positive effect because of a reduced footprint at the proposed trailhead site. Further, culvert replacements would reestablish passage for all life stages of bull trout. As a result, management actions should result in an immeasurable positive effect to this WCI.

3.8.4 Fisheries Resource Indicators—Affected Environment and Environmental Effects

3.8.4.1 Indicator: Effects to WCIs associated with Bull Trout and Critical Habitat

Affected Environment

Please refer to *Pathways and Watershed Condition Indicators (WCIs) Affected Environment and Direct and Indirect Effects Analysis* above for information on the affected environment for WCIs associated with bull trout and critical habitat.

Environmental Effects

Direct and Indirect Effects

Effects information for all WCI indicators is summarized in Table 3-126 for the proposed action (Alternative B) and Table 3-127 for all other action alternatives and the No Action Alternative (Alternative A). More detailed information about potential impacts is given in the narratives above. These tables detail the potential temporary (0–3 years), short-term (3–15 years), and long-term (15+ years) effects.

Table 3-126. Effects of management actions on Watershed Condition Indicators for the Becker Integrated Resource Project under the Proposed Action

Watershed Condition Indicator	Summary of Functionality Rating by 6th HUC		Proposed Action (Alternative B)	
	Middle Crooked River	Pikes Fork	Middle Crooked River - Temporary/ Short-term/Long-term Effects (+/-/o)	Pikes Fork - Temporary/Short-term/Long-term Effects (+/-/o)
Local Population Size	FUR	FUR	M:-*/-*/+*	M:-*/-*/+*
Growth and Survival	FUR	FUR	M:-*/-*/+*	M:-*/-*/+*
Life History Diversity and Isolation	FUR	FUR	M:-*/-*/+*	M:-*/-*/+*
Persistence and Genetic Integrity	FUR	FUR	M:-*/-*/+*	M:-*/-*/+*
Stream Temperature—Bull Trout	FUR	FR	M:-*/-*/+*	M:-*/-*/+*
Sediment/Turbidity—Bull Trout and Substrate Emeddedness and Substrate Embeddedness	FUR	FUR	M:-/-/+	M:-/+/+
Chemical Contamination/Nutrients	FA	FR	M:-*/-*/o	M:-*/-*/o
Physical Barriers	FUR	FUR	I:+/+/+	I:+/+/+
Large Woody Debris	FA	FA	M:o/o/+*	M:o/o/+*
Pool Frequency and Quality	FR	FR	M:-*/o/+*	M:o/o/o
Large Pools/Pool Quality	FR	FR	M:-*/o/+*	M:o/o/o
Off Channel Habitat	FR	FA	NI:o/o/o	NI:o/o/o
Refugia	FUR	FR	M:-*/-*/+*	M:-*/-*/+*
Width/Depth Maximum Ratio	FA	FA	M:-*/o/+*	M:o/o/o
Streambank Condition	FR	FA	M:-*/-*/+*	M:-*/-*/-*
Floodplain Connectivity	FUR	FR	NI:o/o/o	NI:o/o/o
Change in Peak/Base Flows	FR	FR	M:o/o/+*	M:o/o/o
Change in Drainage Network	FUR	FUR	M:+*/+*/o	M:+*/+*/o
Road Density/Location	FUR	FUR	M:o/+/+	M:o/+/+
Disturbance History	FR	FR	M:-*/+*/+*	M:o/o/o
Riparian Conservation Areas	FR	FR	M:-*/-*/+*	M:-*/-*/+*
Disturbance Regime	FUR	FR	M:-*/+*/+*	M:o/o/o
Integration of Species and Habitat Conditions	FUR	FR	M:-*/-*/+*	M:-*/-*/+*

Note: Effects to WCI functionality classes consists of: M = Maintain (within functionality class), D=Degrade (change functionality class), NI = No Influence, I = Improve (change functionality class).

Note: "+" means an improvement in the condition of an indicator, not necessarily an increase in the number or measurement of an indicator; "-" means a degradation in the condition of an indicator, not necessarily a decrease in the number or measurement of an indicator; "o" means no impact on the indicator. An asterisk "*" following a "+" or "-" means the impact is immeasurable or negligible.

Table 3-127. Effects of management actions on Watershed Condition Indicators (WCIs) for the Becker Integrated Resource Project for all alternatives

WCI	Alterative A		Alterative C		Alterative D		Alterative E		Alterative F	
Subwatershed	**Middle Crooked River**	**Pikes Fork**	**Middle Crooked River**	**Pikes Fork**	**Middle Crooked River**	**Pikes Fork**	**Middle Crooked River**	**Pikes Fork**	**Middle Crooked River**	**Pikes Fork**
Local Population Size	M:-*/-*/-*	M:-*/-*/-*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*
Growth and Survival										
Life History Diversity and Isolation										
Persistence and Genetic Integrity										
Temperature	M:o/o/o	M:o/o/o	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*
Sediment/Turbidity	M:o/o/o	M:o/o/o	M:-/-/+	M:-/+/+	M:-/-/+	M:-/+/+	M:-/+/+	M:-/+/+	M:-/-/+	M:-/+/+
Chemical Contamination/Nutrients	M:o/o/o	M:o/o/o	M:-*/-*/o	M:-*/-*/o	M:-*/-*/o	M:-*/-*/o	M:-*/-*/o	M:-*/-*/o	M:-*/-*/o	M:-*/-*/o
Physical Barriers	M:-/-/-	M:-/-/-	I:+/+/+	I:+/+/+	I:+/+/+	I:+/+/+	I:+/+/+	I:+/+/+	I:+/+/+	I:+/+/+
Substrate Embeddedness	M:o/o/o	M:o/o/o	M:-/-/+	M:-/+/+	M:-/-/+	M:-/+/+	M:-/+/+	M:-/+/+	M:-/-/+	M:-/+/+
Large Woody Debris	M:o/o/o	M:o/o/o	M:o/o/+*	M:o/o/+*	M:o/o/+*	M:o/o/+*	M:o/o/+*	M:o/o/+*	M:o/o/+*	M:o/o/+*
Pool Frequency and Quality	M:o/o/o	M:o/o/o	M:-*/o/+*	M:o/o/o	M:-*/o/+*	M:o/o/o	M:-*/o/+*	M:o/o/o	M:-*/o/+*	M:o/o/o
Large Pools/Pool Quality	M:o/o/o	M:o/o/o	M:-*/o/+*	M:o/o/o	M:-*/o/+*	M:o/o/o	M:-*/o/+*	M:o/o/o	M:-*/o/+*	M:o/o/o
Off Channel Habitat	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o
Refugia	M:o/o/o	M:o/o/o	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*
Width/Depth Maximum Ratio	M:o/o/o	M:o/o/o	M:-*/o/+*	M:o/o/o	M:-*/o/+*	M:o/o/o	M:-*/o/+*	M:o/o/o	M:-*/o/+*	M:o/o/o
Streambank Condition	M:o/o/o	M:-/-/-	M:-*/-*/+*	M:-*/-*/-*	M:-*/-*/+*	M:-*/-*/-*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/-*
Floodplain Connectivity	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o	NI:o/o/o
Change in Peak/Base Flows	M:-*/-*/-*	M:o/o/o	M:o/o/+*	M:o/o/o	M:o/o/+*	M:o/o/o	M:o/o/+*	M:o/o/o	M:o/o/+*	M:o/o/o
Change in Drainage Network	M:o/o/o	M:o/o/o	M:o/+*/+*	M:o/+*/+*	M:o/+*/+*	M:o/+*/+*	M:o/+*/+*	M:o/+*/+*	M:o/+*/+*	M:o/+*/+*
Road Density/Location	M:o/o/o	M:o/o/o	M:o/+/+	M:o/+/+	M:o/+/+	M:o/+/+	M:o/+/+	M:o/+/+	M:o/+/+	M:o/+/+
Disturbance History	M:-*/-*/-*	M:o/o/o	M:-*/+*/+*	M:o/o/o	M:-*/+*/+*	M:o/o/o	M:-*/+*/+*	M:o/o/o	M:-*/+*/+*	M:o/o/o
Riparian Conservation Areas	M:-*/-*/-*	M:-*/-*/-*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*
Disturbance Regime	M:-*/-*/-*	M:o/o/o	M:-*/+*/+*	M:o/o/o	M:-*/+*/+*	M:o/o/o	M:-*/+*/+*	M:o/o/o	M:-*/+*/+*	M:o/o/o
Integration of Species and Habitat Conditions	M:-*/-*/-*	M:-*/-*/-*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*	M:-*/-*/+*

Note: Effects to WCI functionality classes consists of: M = Maintain (within functionality class), D=Degrade (change functionality class), NI = No Influence, I = Improve (change functionality class).

Note: "+" means an improvement in the condition of an indicator, not necessarily an increase in the number or measurement of an indicator; "-" means a degradation in the condition of an indicator, not necessarily a decrease in the number or measurement of an indicator; "o" means no impact on the indicator. An asterisk "*" following a "+" or "-" means the impact is immeasurable or negligible

3.8.4.2 Indicator: Effects to Bull Trout Population Characteristics and Critical Habitat

Affected Environment

Desired Condition for Bull Trout Critical Habitat—The *Designation of Critical Habitat* identified Crooked River, Pikes Fork of the Crooked River, and Banner Creek as critical habitat for bull trout (USDI FWS 2010b). Protecting bull trout critical habitat is essential in long-term recovery efforts. Bull trout appear to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Habitat characteristics including water temperature, stream size, substrate composition, cover, and hydraulic complexity have been associated with distribution and abundance (Jakober and MacMahon 1997, Rieman and McIntyre 1993). Bull trout exhibit patchy distributions because even under pristine conditions, the required habitat components are not present throughout river basins.

Stream temperature and substrate composition are important characteristics of suitable bull trout habitat. Bull trout have repeatedly been associated with the coldest stream reaches within basins. Very cold water is required for incubation (<8 °C [46 °F]), and juvenile rearing appears to be restricted to areas with cold water (15 °C [59 °F]) (MBTSG 1998). However, because they can display several life history types within a single geographic area, they can also be found in larger, warmer river systems that may cool seasonally or provide migratory corridors and important forage bases.

Many factors can potentially limit the distribution of spawning and rearing habitat for bull trout including; barriers, water temperature, interactions with nonnative fish species, geomorphic processes, or human disturbances. These factors are often not independent of one another. Factors considered in managing bull trout habitat are: (1) sediment in spawning and rearing habitat; (2) water temperature; and (3) habitat connectivity.

High quality bull trout habitat is typically characterized by abundant cover in the form of large wood, undercut banks, boulders, clean substrate for spawning, interstitial spaces large enough to conceal juvenile bull trout, and stable channels. Juveniles prefer larger substrate and deep pools along with other forms of complex cover (MBTSG 1998). Because habitat has been degraded in many basins and bull trout populations in these basins may be depressed, the fish may use less optimal habitat.

Adult bull trout are top predators and like other top predators they require a large prey base and home range. Sub-adult and adult migratory bull trout move throughout and between basins in search of prey. Adult and sub-adult bull trout are largely piscivorous. Their food preferences include whitefish, smelt, sculpins, eggs drifting following red construction, and other salmonids. Juvenile fish are benthic foragers and also feed on drifting insects.

Primary Constituent Elements (PCEs) as identified in the *Designation of Critical Habitat for Bull Trout* (Federal Register Vol. 75/ 75 FR 2269) are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of the young, dispersal, genetic exchange, or sheltering. Table 3-128 describes the PCEs and their corresponding WCIs.

Table 3-128. Description of Primary Constituent Elements (PCEs) and corresponding Watershed Condition Indicators (WCIs)

PCE #	PCE Description	Corresponding Pathway Indicator (WCIs)
1	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	Sediment, channel conditions and dynamics (wetted width/maximum depth ratio, stream bank condition, floodplain connectivity), riparian conservation areas
2	Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	Temperature, physical barriers, refugia
3	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Water quality (temperature, sediment, chemical and nutrient contaminants), channel conditions and dynamics (wetted width/maximum depth ratio, stream bank condition, floodplain connectivity), changes in peak/base flows, riparian conservation areas
4	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.	Habitat elements (substrate embeddedness, LWD, pool frequency and quality, large pools, off-channel habitat, and refugia)
5	Water temperatures ranging from 2 to 15 C (36 to 59 F), with adequate thermal refugia available for temperatures at the upper end of this range.	Temperature
6	Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12%) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.	Sediment, substrate embeddedness
7	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal departures from a natural hydrograph.	Flow/hydrology (changes in peak /base flows and drainage network Increase)
8	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	Water quality (temperature, sediment, chemical contaminants and nutrients)
9	Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.	Persistence and genetic integrity

Current Condition—Stream data for this analysis comes from information stored in the Forest Fisheries Database.

Crooked River

- Sampled n-2 (1994, 2000), no bull trout found.
- USFWS designated critical bull trout habitat.
- Bull trout utilize this river as foraging, migration, and overwintering (FMO) habitat outside the project area.

Pikes Fork of Crooked River

- Sampled n-3 (1994–1996), no bull trout found.
- Idaho Department of Fish and Game sampled n-11 (2003), no bull trout found.
- This fork is inside of the Boise National Forest patch model for suitable but unoccupied bull trout habitat.
- USFWS designated critical bull trout habitat.
- Bull trout have been found upstream outside of the project area.
- Bull trout utilize this river as foraging, migration, and overwintering (FMO) habitat outside the project area.

Sawmill Creek

- Sampled n-6 (1993–1999), no bull trout found.
- This creek is located within Boise National Forest patch model for suitable but unoccupied bull trout habitat.

Banner Creek

- Sampled n-10 (1993–2014), bull trout found.
- This creek is located inside Boise National Forest patch model for suitable but unoccupied bull trout habitat.
- This creek is USFWS designated critical bull trout habitat.

Beaver Creek

- Sampled n-8 (1997–2006), no bull trout found.
- The headwaters of this creek are located inside Boise National Forest patch model for unsuitable bull trout habitat.

West Fork Beaver Creek

- Sampled n-2 (1993, 2006), no bull trout found.
- This creek is located inside Boise National Forest patch model for unsuitable bull trout habitat.

Little Beaver Creek

- Sampled n-5 (1993, 2006), no bull trout found.
- This creek is located inside Boise National Forest patch model for unsuitable bull trout habitat.
- No detection of bull trout environmental DNA (eDNA) in 2014 (Carim et al. 2015).

China Fork of Beaver Creek

- Sampled n-2 (2006), no bull trout found.

Edna Creek

- Sampled n-7 (1993, 1995, 2006), no bull trout found.
- This creek is located inside Boise National Forest patch model for unsuitable bull trout habitat.
- A positive detection of bull trout environmental DNA (eDNA) in 2014 (Carim et al. 2015).

Whoop Um Up Creek

- Sampled n-2 (1993), no bull trout found.

Lamar Creek

- Sampled n-2 (1993), no bull trout found.

Environmental Effects

Appendices in the fisheries technical report (project record) display suitable/occupied, suitable/not-occupied, and unsuitable bull trout habitat overlayed with Alternative B vegetation, transportation, and recreation proposed activities.

Direct and Indirect Effects

Alternative A

Alternative A does not propose any new management activities. As explained in the *Pathways and Watershed Condition Indicators (WCIs) Affected Environment and Direct and Indirect Effects Analysis* above, some WCIs, and hence PCEs would continue a negative trend. These WCIs could have a direct influence over bull trout population characteristics and critical habitat. As a result, immeasurable negative effects in all timeframes could continue to bull trout population characteristics and critical habitat.

Action Alternatives

Primary Constituent Elements

For each Primary Constituent Element, effects of project activities on bull trout population characteristics and critical habitat for the action alternatives are described below.

1) Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) contribute to water quality and quantity and provide thermal refugia.

   None of the proposed activities would interrupt springs, seeps, groundwater sources, or water connectivity.

2) Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

   No water quality barrier would be created during implementation of the proposed actions. Episodes of temporary limited turbidity may occur during some project activities; however, these episodes are not expected to constitute a water quality degradation which would create a water quality barrier. A temporary barrier only lasting a few days would be created during culvert replacement construction.

3) An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

Effects to the prey base are highly unlikely because no insecticide treatments would occur in any alternative. Some macroinvertebrates could be displaced or smothered entirely during construction (culvert replacement) which may result in an episode of heavy turbidity. These effects are expected to be localized and fish should be able to find a new food base up- or down-stream of the construction site. Furthermore, macroinvertebrates residing near the construction sites should re-inhabit the disturbed areas rather quickly. Other proposed actions (vegetation management, prescribed fire, and some transportation management) have a vegetation buffer between project activities and streams that would filter sediment. Therefore, effects to this PCE from any alternative are expected to be localized and negligible.

4) Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.

Existing large woody debris would not be affected by any alternative. Overall, channel complexity/structure, wetted width-to-depth ratios, and usable habitat area should not be substantially affected by any alternative. A small section of the channel (10 feet) up- and down-stream of the new AOP structure could be affected during culvert replacement. However, this work would mimic the natural structure of the creek. During culvert replacement, a 25% Over Natural increase in the Middle Crooked River 6th HUC sediment could fill pools and negatively affect stream width/max/depth ratios and pool quality in the temporary timeframe. However, no designated bull trout critical habitat exists in this subwatershed and project activities would not occur anywhere near critical habitat. Furthermore, multiple project design features and the vegetation buffer between the proposed activities and streams should filter exposed soils. As a result, effects to this PCE would be negligible.

Proposed actions located within critical bull trout habitat within the Pikes Fork 6th HUC could increase sediment by 2% above background rates in the temporary timeframe. However, this increase would not change channel complexity because very little sediment is likely to enter streams.

5) Water temperatures ranging from 2–15 °C (36–59 °F), with adequate thermal refugia available for temperatures at the upper end of this range.

Currently, baseline conditions are functioning at risk for both Middle Crooked River and Pikes Fork subwatersheds. Monitoring data from the USFS Rocky Mountain Research Station has indicated maximum weekly maximum temperatures (MWMT) are on average 15 °Celsius with a minimum of 9 °C and a maximum of 19.6 °C for both 6th HUCs. RCA proposed activities, with the exception of culvert replacement activities, would not affect this PCE because project design features and distance buffers between project activities and streams would protect this indicator. Though culvert replacement activities could reduce shade around the construction site by removing existing vegetation, the vegetation removal would not substantively change the temperature within streams.

In the long term timeframe, proposed thinning activities would result in benefits by enhancing the growth of retained trees. Also, road decommissioning and closure activities would result in increased stream shade by eliminating perennial stream

crossings. The intent of RCA vegetation treatments is to promote the establishment of larger trees and increase canopy cover effectively reducing the amount of solar absorption and irradiation along the stream in the future.

6) Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12%) of fine substrate less than 0.85 mm (0.03 inches) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.

   All action alternatives would maintain the existing condition of the Sediment/Turbidity (Bull Trout – Other Fishes) WCI which is functioning at unacceptable risk in both the Middle Crooked River and Pikes Fork subwatersheds. Approximately 15.6 acres within USFWS designated bull trout critical habitat and 0.05 acres within Forest "suitable but unoccupied habitat" bull trout patch of vegetation treatment is proposed, including 1.35 acres near Edna Creek and 1.32 acres near Beaver Creek 600 feet upstream of Crooked River.

   The transportation system represents the largest overall contributions and reductions in sediment delivery over the life of the project. Effects of trail management actions on sediment delivery were incorporated into estimates of sediment delivery related to roads. Increases in sediment delivery in the temporary timeframe are attributed to temporary road construction, road reconstruction, and road realignment. Decreases in sediment delivery are attributed to road decommissioning, road realignment, and road closure. Most of the sediment inputs represented in the *Hydrology Resource Technical Report* are occurring in the Middle Crooked River subwatershed where very little designated critical habitat occurs and no known spawning and rearing areas exist.

   Short term increases in turbidity associated with culvert construction within bull trout critical habitat is not expected to last more than the duration of the construction period (days). While all action alternatives would result in a measureable negative effect in the temporary timeframe, this effect is not expected to be significant to this PCE because it is not occurring near known bull trout spawning and rearing areas. Small incremental improvements to this PCE and the Sediment/Turbidity WCI are expected as a result of project implementation in the long-term timeframe.

7) A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal departures from a natural hydrograph.

   Under each of the action alternatives, a slight immeasurable improvement to this PCE is expected in the Middle Crooked River subwatershed due to vegetation management activities, prescribed fire, and road decommissioning/closure activities. Vegetation thinning and prescribed fire would restore vegetation conditions toward desired conditions and reduce the risk of uncharacteristic wildfire, as well as reduce effects of fire exclusion on overall water yield. The combination of these actions would result in a stream flow regime more reflective of an undisturbed watershed of similar size and characteristics.

8) Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

   Water quantity and/or quality may experience episodes of low and heavy intense turbidity periods during culvert replacement and transportation management activities. These activities would occur in the temporary and short-term timeframes, with a temporary increase in turbidity in a portion of the channel. However, this increase should not result in a considerable inhibition of normal behavior to any bull trout that may be present downstream. The disturbance could displace any bull trout within the immediate area, but would not result in bull trout mortality or degradation of their habitat.

9) Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.

   All of the alternatives would remove existing fish culvert barriers and open new fish habitat in the Middle Crooked River and Pikes Fork subwatersheds. Non-native brook trout are present in other tributaries in these subwatersheds and may hybridize with bull trout or access the newly accessible habitat. However, bull trout would most likely continue to inhabit Crook River, and hopefully reestablish in Pikes Fork in the long-term timeframe.

3.8.5 Interrelated and Interdependent Actions

Interrelated actions are part of a larger action and depend on the larger action for their justification; interdependent actions are actions that have no independent utility apart from the proposed action (50 CFR 402.02). No interrelated or interdependent actions are associated with this project.

3.8.6 Cumulative Effects

Within the Middle Crooked River and Pikes Fork 6th HUCs, the following State, Federal, and private activities are currently taking place and are expected to continue in the future:

- Road maintenance and use
- Trail maintenance and use
- Camping at designated and dispersed campsites
- Fishing and hunting
- Fuel wood gathering and Christmas tree cutting (private activities authorized by Forest Service permit)
- Noxious weed control by biological control agents and chemical spraying (Boise County and Forest Service joint projects)
- Sheep grazing allotments
- Snowmobile use
- Recreation (e.g., hiking, horseback riding, cross country skiing, kayaking)

Past and ongoing management actions have been considered in describing the existing baseline conditions for all WCIs and population and habitat characteristics. Foreseeable future activities that may have additional effects on WCIs and population and habitat characteristics are listed above. These actions are ongoing and have been considered in

describing the existing conditions. As a result, no additional or cumulative effects would be either indirectly or directly related to the planned management actions for all alternatives.

3.8.7 Summary of Determination of Effects

3.8.7.1 Determination of Effects and Rationale

Based on the effects analysis completed for each Pathway/WCI and the associated PCE analysis, the IDT determined the *Becker Integrated Resource Project* would be *Likely to Adversely Affect* bull trout and bull trout designated critical habitat. The basis for this conclusion is summarized below:

- Bull trout (adults and juveniles) in the Pikes Fork subwatershed may be stressed, injured, or killed during fish handling activities prior to dewatering.
- Fish passage through the work area may be blocked during culvert replacement and transportation management activities.
- Project-related sediment in the Pikes Fork subwatershed would be carried downstream, possibly displacing fish or altering behaviors, but should not result in bull trout mortality or degradation of their habitat.
- The proposed activities (all action alternatives) would have a negative effect on PCEs 2, 8, and 9.

Though temporary adverse effects to individual fish could occur during culvert replacement or transportation management activities, including incidental handling injury and mortality, these effects are not expected to degrade overall subpopulation size, growth and survival, life history diversity, or genetic integrity of bull trout populations. Removing and replacing culverts and improving the road system would help increase the baseline population toward a restore rating in the long-term timeframe, and would reduce fish migration barriers and improve access to miles of quality fish habitat. The new AOP structures would reestablish passage for all life stages of bull trout resulting in increased resiliency of subpopulations by reconnecting fragmented habitats within and between watersheds, helping to restore various life history patterns and emphasizing genetic integrity.

3.9 HYDROLOGY

This section incorporates by reference the hydrology technical report (project record), which contains the detailed data, methodologies, analyses, conclusions, maps, references, and technical documentation. This section summarizes the effects of the alternatives to the hydrology resources.

3.9.1 Analysis Scale, Data Sources, and Methodology

3.9.1.1 Analysis Scale

The Becker Integrated Restoration Project includes approximately 14,462 acres of the Middle Crooked River 6th field Hydrologic Unit Code (HUC) (170501110504) and 3,475 acres of the Pikes Fork 6th field HUC (17501110503), both of which drain to the North Fork Boise River via the Crooked River. The project area is nested within the Crooked River 5th field HUC (1705011102), which is nested within the North and Middle Fork Boise River subbasin 4th field HUC (17050111).

Spatially, direct, indirect, and cumulative effects were tracked at the subwatershed scale (6th field HUC—National Hydrography Dataset). This scale was chosen because the spatial scale of proposed management activities (approximately 19,000 acres) is consistent with typical subwatershed scales (10,000–40,000 acres); additionally, broader national and Boise National Forest (Forest)-specific watershed goals, such as those described in the Watershed Condition Framework (USDA Forest Service 2011) and Forest Aquatic Conservation Strategy (USDA Forest Service 2010a), utilize subwatershed scales for depicting resource conditions and functionality.

Analysis timeframes were chosen to be consistent with Forest Plan Standards SWTS01 and SWTS04 (USDA Forest Service 2010a), and consist of temporary (0–3years), short-term (3–15 years), and long-term (15+ years) timeframes.

3.9.1.2 Data Sources

Data and descriptions used in this analysis leverage numerous sources located in the project record, some of which include field data, notes and photos collected by hydrologists and fisheries biologists; the Becker Transportation Analysis; the fisheries, vegetation, fuels , transportation, recreation, and soils technical reports; Idaho Department of Environmental Quality (IDEQ) Beneficial Use Reconnaissance Program (BURP) data; 2012 Integrated Report database (IDEQ 2014); USFS Pacfish Infish Biological Opinion Effectiveness Monitoring (PIBO) data; USFS Rocky Mountain Research Station (RMRS) monitoring data; BNF aquatics survey database (ASD); Agency-wide, Forest, and District Geographic Information System (GIS) databases; and the District Soil and Hydrologic Reconnaissance Report (Wendt et al. 1973).

3.9.1.3 Methodology

Sediment production was estimated using a combination of several models. The BOISED model was utilized to calculate inherent/natural background sediment yields as well as sedimentation from prescribed fire and vegetation thinning; the GRAIP_Lite (Geomorphic Roads Analysis and Inventory Package_Lite Package) model was utilized for sediment delivery from roads (Nelson et al. 2014); and the Megahan/Ketcheson (MK) Sediment

Delivery Model (Megahan and Ketcheson 1996, Ketcheson and Megahan 1996) was used to estimate sediment travel distances and the likelihood of management-induced sediment being delivered to streams. The results of each of these models are combined to provide an estimate of annual sedimentation (tons per year) as well as a percent over natural background sedimentation (% ON) for the existing condition as well as the Proposed Action and additional alternatives considered.

The following activities proposed under the action alternatives were analyzed in the effects analysis:

- Road management activities—construction (system and temporary), realignment, reconstruction, change in management level designation, addition of unauthorized routes to the system, decommissioning, conversion to motorized and/or nonmotorized trail, and AOP culvert replacements
- Vegetation management activities—commercial thinning, noncommercial thinning, activity fuels burning, and natural fuels burning
- Recreation management activities—trail construction, trail designation, and trailhead construction

Snow grooming associated with Park N' Ski routes was not analyzed because no evidence exists to suggest it would affect primary hydrology indicators (temperature and sediment). Seasonal restrictions on motorized and mechanized travel restrictions for both areas and designated routes/uses were not analyzed because the infrastructure (road and trails) are accounted for in the effects analysis. Additionally, area closures to motorized over-snow travel were not expected to result in effects (either positive or negative) to any analysis indicators due to lack of ground/vegetation disturbance, and season-of-use closures on existing roads were not expected to measurably influence the overall effect. Differences in effects related to designation of a motorized trail for either ATV (50 inches or less) or UTV (60 inches or less) were not analyzed because the overall difference is expected to be negligible considering the majority of the proposed motorized trail exists on old road prism. Designation and/or movement of trailhead facilities at Beaver Creek Summit was not analyzed because the location of this activity is near the ridge top far from streams and effects of the adjacent road system have been accounted for in the road/sediment analysis.

The Forest Plan outlines criteria to aid interdisciplinary teams (IDTs) in delineating RCAs for perennial and intermittent streams, ponds, lakes, reservoirs, and wetlands (USDA Forest Service 2010a, Appendix B, p. B-32 through B-41). The objective of RCA delineation is to provide boundaries around streams for which management activities must consider and maintain riparian processes and functions that are important to overall stream and aquatic habitat functionality. Individual management activities may affect riparian process and functions in different ways and magnitudes depending on the type of activity and its proximity to the stream channel, as well as the characteristics of the stream channel at that location. For the Becker Project, RCAs were identified by the IDT using Option 2 as described in the Forest Plan (USDA Forest Service 2010a, Appendix B), which utilizes site potential tree heights (SPTHs) based on the dominant Potential Vegetation Group (PVG) in the stand. Option 2 indicates that one SPTH is the RCA buffer distance for intermittent stream channels (as well as ponds, lakes, reservoirs, and wetlands) and two SPTH is the RCA buffer distance for perennial stream channels. Because the project area contains a wide array

of PVGs, the dominant PVG based on the most recent vegetation data was used to delineate RCAs.

3.9.2 Analysis Process/Pathways and Indicators

Analysis indicators represent metrics used to describe the cause and effect relationships between components of the Proposed Action and desired conditions for attributes of stream health important for maintaining water quality beneficial uses and quality aquatic habitat. Analysis indicators have been taken, where appropriate, from the list of Watershed Condition Indicators (WCIs) in the Forest Plan (USDA Forest Service 2010a, Appendix B). Temperature, sediment, and chemical contaminants indicators in the Water Quality Pathway have been designated as primary indicators because they are water quality and habitat components that the action alternatives may directly affect. Other relevant and influenced WCIs included in the analysis were designated as secondary indicators, which may influence or be influenced by the primary indicators. These secondary indicators include streamflow hydrology pathway indicators of change in peak/base flows and changes in drainage networks, and watershed condition pathway indicators of road density and location, disturbance history, disturbance regime, and riparian conservation areas. For this analysis, the substrate embeddedness WCI is combined with the sediment/turbidity WCI as it was determined that the overall effects would be identical and did not warrant a separate analysis. WCI analyses are split between the Hydrology Resources Report and the Fisheries Resources Report with references between the two.

The following assumptions exist for this analysis:

- Assumptions associated with the characterization of existing (baseline) conditions for analysis indicators.
- Assumptions associated with the application of sediment models to estimate existing and future sediment yields for the alternatives analyzed. Assumptions for sediment modeling are included in *Hydrology Technical Report* (project record).
- The assumption that all project design features identified in Chapter 2 would be implemented in a timely and effective manner.

3.9.2.1 Water Quality Pathway—Primary Indicators

Indicator: Stream temperature (bull trout and other fishes)

Concern: Vegetation harvest (commercial harvest and precommercial thinning) and prescribed fire could reduce the amount of vegetative stream shading, resulting in increased stream temperatures with a potential reduction in water quality beneficial uses and quality of aquatic habitat. Changes in the transportation system, specifically the amount and extent of disturbance at road or trail stream crossings, may affect stream shading and subsequently stream temperature.

Methods: Qualitative assessment of stream shading canopy and area of streams affected by management activities. Analysis includes the number of stream crossings and extent and location of vegetation thinning in RCAs.

Indicator: Sediment/Turbidity (bull trout and other fishes) and Substrate Embeddedness

Concern: Vegetation harvest (commercial harvest and precommercial thinning); construction of landings; prescribed fire; and road and trail management actions (including road decommissioning, reconstruction/realignment, road and trail construction, road surfacing and drainage improvement, road and trail management level/designation status, and AOP culvert replacements) could increase sediment delivery to streams, thereby negatively affecting water quality beneficial uses and aquatic habitat.

Methods: Estimated changes in sediment yield from existing and proposed activities were analyzed using GRAIP_Lite, BOISED, and MK sediment models.

3.9.2.2 Changes in Streamflow Hydrology Pathway—Secondary Indicators

Indicators: Changes in Peak/Base Flows and Changes in Drainage Network

Concern: Vegetation harvest (commercial harvest and precommercial thinning); landing construction; prescribed fire; and road and trail management actions (road decommissioning, reconstruction/realignment, road and trail construction, and road surfacing and drainage improvement) could alter the streamflow hydrology within the analysis area. Increases in water yield can lead to increased streambank erosion, channel extension, and accelerated sedimentation to streams; while improvements to summer stream base flows may also occur.

Methods: The discussion for changes in streamflow hydrology is based on an assessment of transportation and vegetation management activities in relation to effects on water yield and streamflow generation processes. Changes in drainage network are analyzed in relation to changes in the transportation system.

3.9.2.3 Changes in Watershed Condition Pathway—Secondary Indicators

Indicators: Road Density and Location; Disturbance History; Disturbance Regime; and Riparian Conservation Areas

Concern: Vegetation harvest (commercial harvest and precommercial thinning); landing construction; prescribed fire; and road management actions (road decommissioning, reconstruction/realignment, road construction, road surfacing and drainage improvement, and AOP culvert replacements) could alter the overall watershed condition. Changes in the overall watershed condition may affect the water quality beneficial uses, wetland and floodplains, and aquatic habitat.

Methods: The discussion for changes in watershed condition is based on a synthesis of information, including road densities, natural and anthropogenic disturbance processes, riparian area functions and processes, and overall watershed functionality.

3.9.3 Water Quality Primary Indicators—Affected Environment and Environmental Effects

The existing conditions of all the analysis indicators used for the hydrology analysis within the project area range from functioning appropriately (FA) to functioning at unacceptable risk (FUR) and are identified in Table 3-129. These functionalities reflect how current

conditions, represented by various monitoring data, field visits, and geospatial data, compare to desired conditions described in the Forest Plan and tailored to suit the affected subwatersheds. Existing conditions are the result of natural processes as well as past or ongoing management activities as documented in the cumulative effects analysis. Monitoring data and field visits were used to characterize existing conditions. While numerous monitoring data are available for the various WCIs analyzed within the analysis area, a complete understanding of current conditions for WCIs across the entire analysis area is not possible due to natural variability and the large size of the area. Where possible, data have been analyzed with general statistics (mean, maximum, minimum, and standard deviation) to characterize the existing condition throughout the analysis area for one functionality rating.

Table 3-129. Current condition of analysis indicators for hydrology

Pathways and Indicator	Middle Crooked 6th HUC Watershed	Pikes Fork 6th HUC Watershed
Water Quality Watershed Condition Indicators		
Stream Temperature—bull trout and other fishes	FUR	FR
Sediment/turbidity—bull trout spawning areas	FUR	FUR
Chemical Contaminants/excess Nutrients	FA	FR
Streamflow/Hydrology Watershed Condition Indicators		
Change in Peak/Base Flows	FR	FR
Change in Drainage Network	FUR	FUR
Watershed Condition Watershed Condition Indicators		
Road Density and Location	FUR	FUR
Disturbance History	FR	FR
Disturbance Regime	FR	FR
Riparian Conservation Areas (RCAs)	FR	FR

Note: FA = Functioning Appropriately, FR = Functioning at Risk, FUR = Functioning at Unacceptable Risk, NA = Not Applicable

Baseline existing conditions reflect the natural physiography of the area as well as human influence in the form of past timber harvest and fuel wood gathering, an extensive transportation system, historic mining, past wildfires and fire suppression, livestock grazing, and broad recreational uses. In general, past activities have been accounted for in the existing baseline condition of analysis indicators via field surveys within the project area. These influences have affected streams, riparian areas, and the overall hydrologic function of the project area. Monitoring data indicate that instream fine sediment and stream temperatures are not meeting desired conditions. Road densities are high within the project area, and many primary access roads are located directly adjacent to streams. Vegetation is documented as being outside desired conditions because fire suppression has altered the natural fire regime (see the vegetation technical report [project record]). Altering the fire regime increases the risk of wildfire in the area, and if a fire were to occur, could result in negative effects to or loss of aquatic habitat (see the fuels technical report [project record]). No 303(d) listed streams or Total Maximum Daily Loads (TMDLs) exist within the analysis area (IDEQ 2014), and alteration of riparian areas by disturbances other than roads is generally low. Existing functionality for each analysis indicator are discussed further in the following sections.

3.9.3.1 Stream Temperature (bull trout and other fishes)

Affected Environment

The desired condition for stream temperature (bull trout and other fishes—tailored to suit conditions for bull trout [see *Fisheries Technical Report* available in the project record] as directed in the Forest Plan [USDA Forest Service 2010a, Appendix B]) is a 7-day average maximum temperature in reach during the following life stages: incubation 2–5 degrees Celsius (°C), rearing 4–12 °C, spawning 4–9 °C, adults <15 °C.

This indicator is functioning at risk (FAR) in both the Middle Crooked and Pikes Fork subwatersheds (**Error! Reference source not found.**). Monitoring data from the USFS ocky Mountain Research Station indicates that maximum weekly maximum temperatures (MWMT) for the Middle Crooked 6th HUC averages 15 °C, with a minimum of 12.9 °C and a maximum of 19.6 °C. The Pikes Fork 6th HUC averages 14 °C, with a minimum of 9 °C and a maximum of 19.1 °C.

Environmental Effects

Elevated stream temperatures are detrimental to cold water fisheries and negatively affect the ability of species such as bull trout to spawn, rear, and inhabit streams identified as potential habitat (Rieman and McIntyre 1993). Temperature analysis for this project focuses on shade alteration along perennial streams. While intermittent streams are important contributors to quality aquatic habitat, they are assumed to be dry or at low flows during critical summer periods when stream temperatures are a limiting factor for aquatic habitat. Overall, management actions proposed in all action alternatives are not expected to measurably alter stream shade. A detailed analysis of effects tied to individual actions for each action alternatives is included below.

Direct and Indirect Effects

Alternative A

Alternative A would perpetuate the existing condition with regard to stream temperature in all timeframes. The Temperature (Bull Trout—Other Fishes) WCI would continue to be functioning at risk (FR) due to elevated stream temperatures. Existing stream-temperature estimates are based on temperature monitoring conducted throughout the analysis area and are summarized in baseline data tables (available in the *Hydrology Technical Report* in the project record).

Roads—Roads which cross streams and roads within RCAs can negatively affect stream temperature where the road or crossing reduces vegetation canopy and potential shade adjacent to perennial streams Under Alternative A, 122 perennial stream crossings would remain in the Middle Crooked subwatershed and 36 perennial stream crossings would remain within the Pikes Fork subwatershed (Table 3-130). Additionally, road density within RCAs would remain at 9.4 and 8.9 mi/mi^2 in the Middle Crooked and Pikes Fork subwatersheds, respectively (see *Changes in Drainage Network and Road Density and Location* section below).

Table 3-130. Number of perennial stream crossings by alternative

Subwatershed	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Middle Crooked	122	103	103	103	101	101
Pikes Fork	36	35	35	35	35	35

Vegetation—Alternative A would not change the existing vegetation condition with respect to stream shade; however, this alternative would leave the project area at high risk to wildfire. If a fire were to occur, it may result in negative effects to stream temperature by eliminating vegetation canopy over streams.

Nonmotorized Trails—Fifty-three perennial stream crossings and approximately 16 miles of trail exist within RCAs associated with the non-motorized "agreement routes" that would be authorized under all action alternatives. Trail which cross streams and trails within RCAs may negatively affect stream temperature in locations where the trail or crossing reduces vegetation canopy and potential shade adjacent to perennial streams. Field-inventoried stream crossings do not appear to have measurably altered stream shade from vegetation removal (see the hydrology technical report in the project record for photos). Additional stream shade at these locations has been provided by the installation of footbridges. Because the footbridges are narrow and have a small impact on vegetation, effects to potential shade-providing vegetation and subsequent stream temperatures is negligible

Action Alternatives

All action alternatives would maintain the existing functionality of the Temperature (Bull Trout—Other Fishes) WCI in the short and long term, which is functioning at risk (FR) in both the Middle Crooked and Pikes Fork subwatersheds. Within both subwatersheds, the percent of stream shading and, inversely, stream temperature is expected to immeasurably decrease under each action alternative in the temporary (0–3 years) and short term (3–15 years) and immeasurably increase in the long term (15+ years). Immeasurable changes in shade mean the magnitude of the effect is anticipated to be small, localized, and/or negligible in the context of the entire analysis area. Small differences in effects exist between Alternatives B, C, and D and Alternative E and F with regard to the Temperature (Bull Trout—Other Fishes) WCI.

Roads—All action alternatives include changes to the transportation system that may affect stream shading at stream crossings. The majority of roads with proposed management actions are located within the Middle Crooked subwatershed; however, some road decommissioning is proposed within the Pikes Fork subwatershed.

Perennial road/stream crossings would be reduced under all action alternatives from road decommissioning activities. Road decommissioning is expected to increase long-term stream shade by eliminating between 19 and 21 perennial stream crossings in the Middle Crooked subwatershed and one perennial stream crossing in the Pikes Fork subwatershed. These crossings would, over time, become vegetated and provide additional shade to the stream.

Road realignment is not expected to affect shading. Only 0.1 miles of realignment are proposed in RCAs. This 0.1 mile segment is located within the RCA boundary, but in the outer site potential tree height along the NFS Road 393 realignment, which would not impact stream shade.

Temporary road construction is proposed for 0.6 miles of existing unauthorized routes within RCAs with one stream crossing identified. Effects to shade from temporary road construction is expected to be negligible because RCA temporary roads are being co-located on existing unauthorized routes and temporary routes would be decommissioned and reclaimed after use (Design Feature TH-4).

Culvert Replacements—All action alternatives include 23 AOP culvert replacements. These culvert replacements are expected to temporarily reduce shade around the construction site by removing existing vegetation on road fills during construction. The magnitude of impact associated with this disturbance would vary based on individual site conditions, but impact is expected to be negligible in the context of the entire subwatershed and would be partially mitigated by Design Features FH-19 and FH-24, which limit impacts to riparian vegetation. Stream shade at AOP culvert replacement sites is expected to recover to preconstruction levels in the long term.

Vegetation Thinning—All action alternatives include vegetation thinning within and outside RCAs which is classified into two groups: non-commercial thinning (with no product removal) and commercial timber harvest (with product removal). Because vegetation thinning only occurs within the Middle Crooked subwatershed, no effects from vegetation management actions are anticipated in the Pikes Fork subwatershed.

Thinning prescriptions are proposed to treat upland vegetation (conifer trees) with the intention to shift vegetation conditions toward desired conditions (Purpose and Need 1 and vegetation technical report available in the project record). Upland vegetation and the associated need for treatment, as discussed in Purpose and Need 1, exist in areas outside and within RCAs, where upland vegetation extends down the hillslope to adjacent riparian plant communities.

Streams throughout the project area are predominantly A and B type channels (Rosgen 1996) with a narrow zone of riparian plant communities. These riparian plant community zones are approximately 5 to 30 feet wide from the channel depending on stream entrenchment, valley narrowness, and stream floodplain access. Option 2 RCA widths (see discussion of RCA widths in section 3.8.1.3), however, contain a substantial amount of upland vegetation, which assists in providing for important RCA functions and processes to varying degrees based on individual functions and distance from the channel.

Consideration of riparian functions and processes for designing treatments (to address the need with regard to upland vegetation within RCAs) led the IDT to develop additional treatment criteria in the form of designated distances and activity limitations. These additional treatment distances and activity limitations (see section 3.8.1.3 for an illustration of the buffer widths and vegetation and fuels activities) are intended to be implemented in conjunction with Option 2 buffer designations in a manner that protects RCA values while treating vegetation conditions to reduce risks of uncharacteristic disturbance (i.e., wildfire and insect infestation).

Commercial timber harvest with product removal is limited to outside the first site potential tree height (SPTH) along perennial streams. Based on Design Feature FH-27, limited commercial harvest may occur within the second SPTH where equipment is able to operate on existing routes within that zone. This buffer distance is expected to retain existing streamside shade during all timeframes. Previous work has indicated that one SPTH or more

provides sufficient protection of streamside shade such that effects to temperature from harvesting outside that distance would be negligible (Beschta 1987, Moore et al. 2005).

Non-commercial thinning would be allowed up to 50 feet from perennial streams and up to "an existing shade tree height," which was assumed to be 35 feet for analysis purposes, from perennial streams in plantations and 15 feet along intermittent streams. The total acres of thinning, with no product removal treatment within the first SPTH in RCAs, would be approximately 372 acres (out of 4,518 acres of overall RCAs within the project area in the Middle Crooked subwatershed). Additionally, noncommercial thinning within the first SPTH would be limited to cutting material smaller than 8 inches dbh. The no-cut buffer distances and the 8-inch diameter limit within the first SPTH are intended to limit the reduction of trees that have the potential to provide shade along streams. At 50 feet from the stream channel (or 35 feet in plantations), material smaller than 8 inches in diameter would not be large enough to cast shadows that would shade the stream.

Within plantations, an "existing shade tree height" buffer is proposed. This tree size was modeled at 35 feet and is expected to be the size of an average shade tree height, meaning trees located farther than 35 feet from the channel would not be expected to cast shadows that would reach the stream. Intermittent streams are expected to be dry during the time period when stream temperatures are a limiting factor for aquatic species, therefore, thinning along intermittent channels would not be expected to affect stream temperatures. The 15-foot buffer associated with thinning along intermittent channels is designed to maintain streambank stability. For non-commercial thinning along perennial streams, reducing canopy cover from smaller trees would not be expected to affect stream shade outside of no-cut buffers.

Stream shade from adjacent vegetation comes primarily from riparian plant communities directly adjacent to the stream and from trees directly adjacent to the stream along the streambank. Generalized curves depicting microclimate and shade contributions to streams as a function of distance from the channel in STPHs (Figure 3-103) indicate that processes controlling stream shade and micro-climatic variables decrease exponentially with distance from the channel. Eighty percent of effective shade comes from approximately ½ SPTH distance from the channel.

Based on existing literature, silvicultural prescriptions, and professional judgment, noncommercial thinning activities within RCAs are not expected to measurably reduce long-term stream shade. However, due to the range of stand conditions, topography, channel orientations, and vegetation species within the project area, it is unclear what kind of temporary and short-term effects to stream shade would occur and the degree to which shade may or may not be reduced at site-specific locations as a result of RCA thinning. A primary objective of silvicultural prescriptions is to shift forest stand conditions toward long-term desired conditions. Thinning is expected to reduce competition between individual trees and increase availability of sunlight and nutrients to grow larger trees over time, therefore increasing shade in the long term.

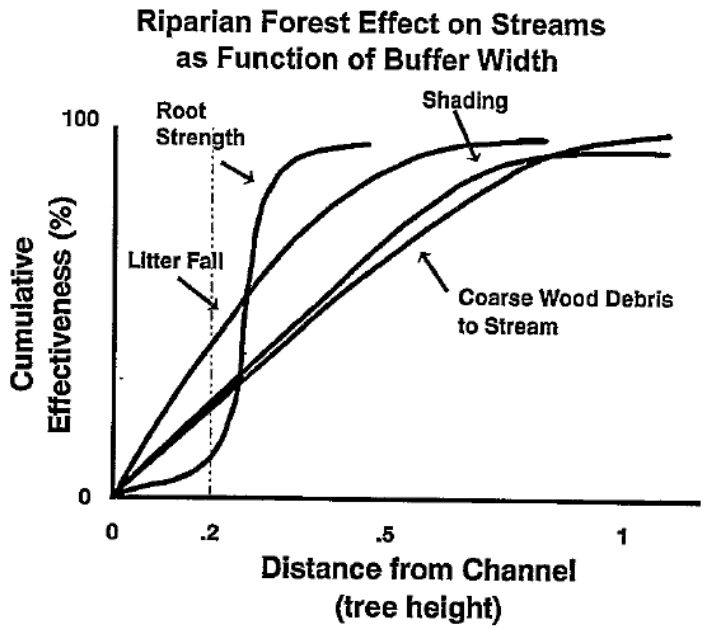


Figure V-12. Generalized curves indicating percent of riparian ecological functions and processes occurring within varying distances from the edge of a forest stand.

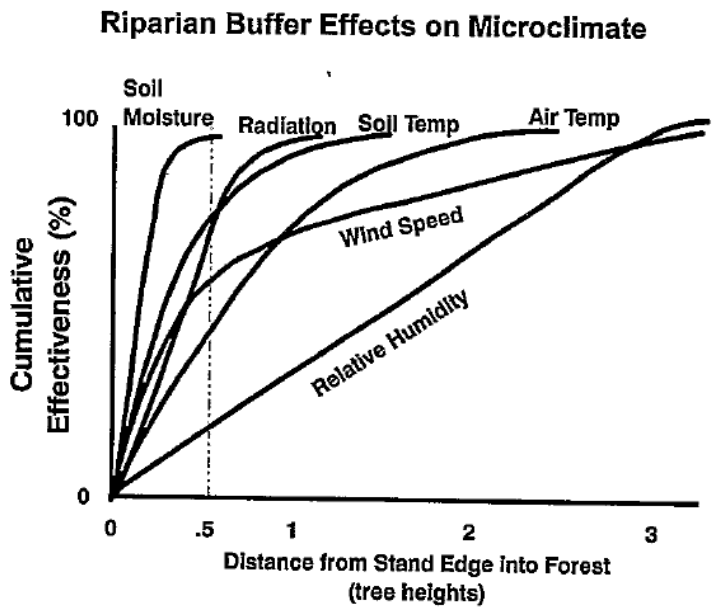


Figure 3-103. Generalized curves indicating percent of riparian functions and processes occurring within varying distances from the edge of a forest stand (Source: FEMAT 1993)

Prescribed Fire—All action alternatives include prescribed fire activities to reduce fuel loads of both naturally occurring fuels and fuels generated by thinning activities. Because prescribed fire is only proposed to occur within the Middle Crooked subwatershed, prescribed fire is not expected to affect stream shade within the Pikes Fork subwatershed. Design criteria stipulate that no direct fire ignitions would occur within 75 feet of stream channels (the 75-foot distance is a requirement under the Idaho Forest Practices Act), though backing fire would be allowed to occur throughout RCAs. Burn prescriptions and windows for burning are generally designed to occur when fuel and weather conditions allow for a low-to-moderate intensity fire to achieve desired vegetation conditions and to reduce the potential for escape (see the fuels technical report in the project record). This strategy effectively limits the overstory mortality and reduces the potential for loss of shade over streams.

Recent research has investigated the effect of prescribed fire on stream temperature and other riparian attributes. Arkle and Pilliod (2010) studied the effects of prescribed fire on stream and riparian attributes in central Idaho and found that no statistically significant change in maximum stream temperature occurred as a result of prescribed fire. It is expected that a backing prescribed fire would burn at reduced intensity within the RCA, as compared to the uplands, due to increased relative humidity and fuel moisture within RCAs. Fire backing within the RCA could lead to isolated torching of individual and small groups of trees, which could reduce shade around streams. However, this effect is expected to be limited and would not measurably influence stream temperatures.

In general, limits on the locations of ignitions of prescribed fire are considered counterproductive to achieving the desired fire intensity, because heat and fuel consumption are best controlled by ignition patterns both inside and outside RCA boundaries. A 75-foot ignition buffer provides additional flexibility to utilize vegetation and topographic features to control fire spread and flame lengths adjacent to streams. Ignitions occurring within the RCA, up to 75 feet from the stream, are not expected to affect overall stream temperatures because prescribed fire intensity and severity would be controlled through ignition patterns and burn prescriptions that would limit the reduction in stream vegetative canopy and subsequent shade.

Treating activity-related fuels within the project area is not expected to affect stream shade because activity fuels would be burned in piles located greater than 50 feet from stream channels. Piles would be limited to less than 6-foot diameter, and include no more than 60 piles per acre. Overall, alteration of stream shade associated with fuels treatments is expected to be negligible, due to incorporation of burn prescriptions that would limit fire intensity and burn severity. Using ignition patterns to control fire spread and limits on the locations, size, and density of handpiles would also minimize impacts (Design Features FF-1, FF-3, and FF-5).

Recreation/Trail Management—Recreation management activities that may affect stream shade include designation of a motorized trail, designation of non-motorized trails, and new trailhead construction. For the proposed motorized trail, perennial stream crossings are the most likely locations where trail designation would impact stream shade. Because the new motorized trail does not include perennial stream crossings, it is not expected to measurably affect stream shade.

A new trailhead to access a motorized trail is proposed at the junction of NFS roads 385 and 312. Trailhead construction is proposed to occur along Pikes Fork Creek within the RCA and within an existing disturbance of dispersed recreation sites that have been used for parking and camping in the past. Construction would include graveling the parking lot, installing a vault toilet, placing barrier rock, and building an interpretive kiosk. As a part of this construction, existing impacts at the site, in the form of eroding stream banks and unauthorized stream crossings, are planned to be re-vegetated and access blocked (see photos in the hydrology technical report [project record]). These actions are expected to enhance stream shade and benefit the stream temperature indicator in the long term as currently impacted streambanks are stabilized and re-vegetated.

Fifty-three perennial stream crossings and approximately 16 miles of trail associated with the non-motorized "agreement routes" would be authorized under all action alternatives. Trail/stream crossings and trails within RCAs may negatively affect stream temperature in locations where the trail or crossing reduces vegetation canopy and potential shade adjacent to perennial streams. However, because of the narrow width of the non-motorized trails (single track width, where not on existing road prism) and small impact on vegetation, effects to potential shade-providing vegetation and subsequent stream temperatures would be negligible (see photos in the hydrology technical report).

Alternatives B, C, and D

Roads—Because Alternatives B, C, and D would remove 21 perennial crossings, resulting in 96 perennial stream crossings in the Middle Crooked subwatershed, these alternatives would benefit the Temperature WCI.

Alternatives E and F

Roads/Trails—Alternatives E and F would remove 23 perennial stream crossings, resulting in 94 perennial stream crossings in the Middle Crooked subwatershed. The two additional crossings are associated with roads that would be converted from system routes to non-motorized trails. This conversion results in a slightly larger benefit to the Temperature WCI than is expected under Alternatives B, C, and D.

Cumulative Effects

All Alternatives

Past and ongoing management actions have been considered in describing the baseline existing condition for the Temperature WCI. No foreseeable future activities would have any additional effect on the Temperature WCI. As a result, no additional or cumulative effects would be related, either indirectly or directly, to the planned management actions.

1.1.1.1 Sediment/Turbidity (bull trout and other fishes) and Substrate Embeddedness

Affected Environment

The desired condition for Sediment/Turbidity (bull trout and other fishes—tailored to suit conditions for bull trout [see *Fisheries Technical Report* available in the project record] as directed in the Forest Plan [USDA Forest Service 2010a, Appendix B]) is less than 12% fines in gravel (<0.85 millimeters [mm]), <20% surface fines (<6 mm).

This indicator is functioning at unacceptable risk in both the Pikes Fork and Middle Crooked subwatersheds (Table 3-129). Stream surveys indicate that surface fine sediment less than 6 mm in size is elevated. Data from the Forest Aquatics Database, PIBO, and BURP show average surface fines to be 31%, 40%, and 46%, respectively. GRAIP_Lite sediment analysis indicates that 322 tons/year and 200 tons/year of road-related sediment are being delivered to streams in the Middle Crooked and Pikes Fork subwatersheds, respectively. See hydrology technical report (project record) for a complete description of sediment modeling methods and results, including maps of GRAIP_Lite sediment delivery estimates (Figure 3-104).

Environmental Effects

Sediment analysis for the Becker Project includes analysis of the proposed actions related to vegetation management, prescribed burning, transportation management, and recreation management. While each of the individual actions is included in sediment delivery estimates, the focus of much of the sediment analysis effort is directly related to roads.

Forest roads are significant sources of sediment (Megahan and Kidd 1972; Megahan 1983; Megahan and Bonn 1989; Ketcheson and Megahan 1996; Madej 2001). Roads may directly affect natural sediment and hydrologic regimes by altering stream flow, sediment loading, sediment transport and deposition, channel morphology, channel stability, substrate composition, stream temperatures, water quality, and riparian conditions within a watershed (Quigley and Arbelbide 1997). Roads alter surface and subsurface water flow, concentrate water, expose and alter soil, increase the slope angles on cuts and fills, and decrease infiltration. Roads can adversely affect fish habitat by increasing sediment loads, altering channel morphology and destabilizing streambanks, modifying the drainage network, creating barriers to movement, and increasing the potential for chemical contamination *(Gucinski 2001).* Surface erosion from forest roads affects the fine sediment budget and may impose a chronic condition of sediment inputs to streams, directly affecting the stream substrate and the health of aquatic life (Luce et al. 2001).

Overall, results of the sediment analysis indicate that chronic sedimentation from the existing road network would be reduced through road decommissioning and road realignment. Increases in sediment yield are expected during the temporary timeframe associated with implementation of project activities (such as temporary road construction and road reconstruction); however, reductions in sediment yield are expected in the short- and long-term timeframes.

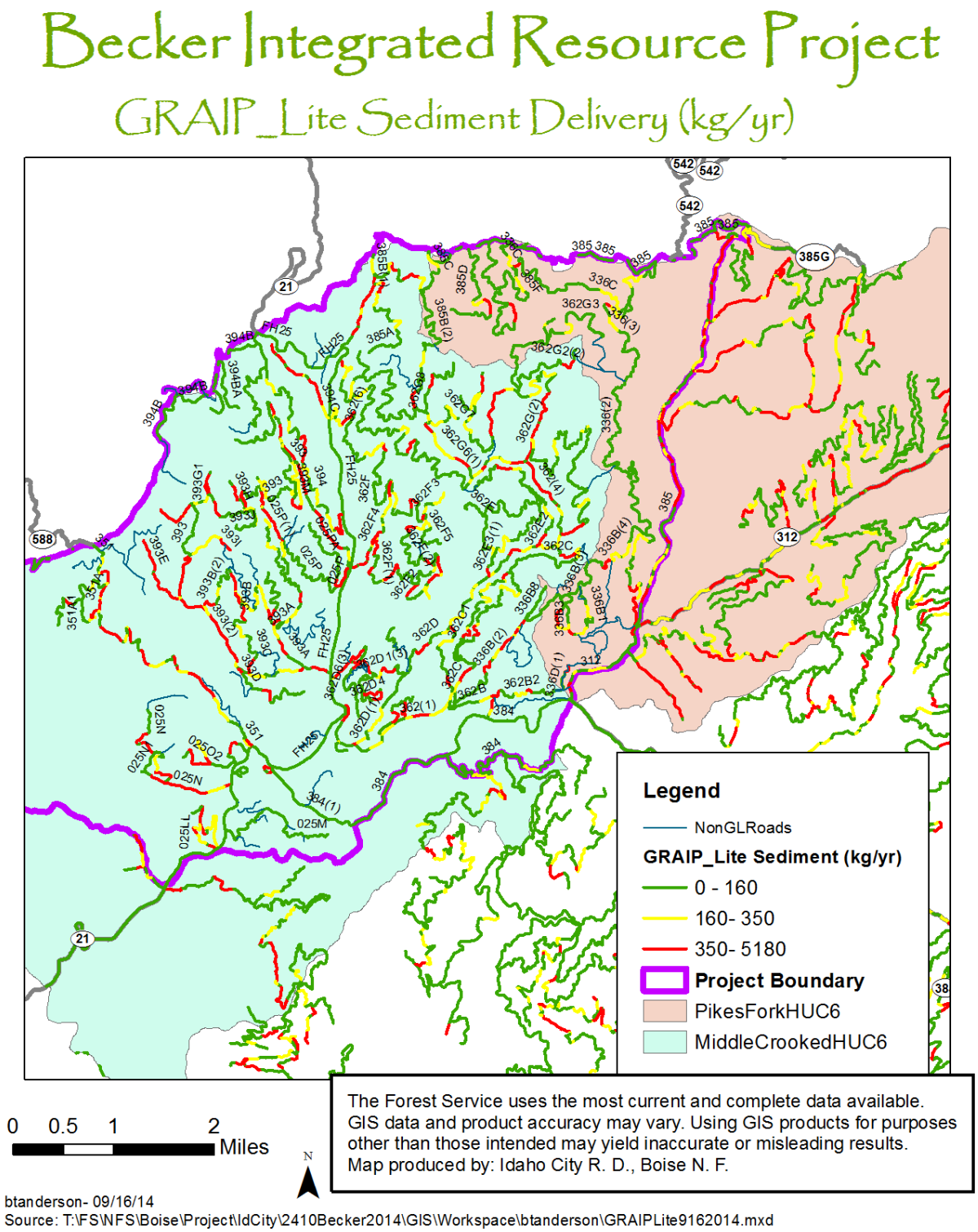


Figure 3-104. GRAIP_Lite sediment delivery estimates for the project area

Direct and Ind*i*rect Effects

Alternative A

Alternative A would perpetuate the existing condition with regard to sediment in all timeframes. The Sediment/Turbidity (Bull Trout – Other Fishes) WCI would continue to be functioning at unacceptable risk (FUR) in both subwatersehds due to elevated in-stream sediment.

Roads—Based on an analysis of the current road system using GRAIP_Lite and BOISED, it is estimated that 322 tons/year and 200 tons/year of sediment would continue to be delivered to streams in the Middle Crooked and Pikes Fork subwatersheds, respectively (Figure 3-105, Figure 3-106, Table 3-131, Table 3-132). The transportation system would be left unchanged under Alternative A and would continue to contribute high amounts of sediment.

Nonmotorized Trails—Alternative A would not authorize the non-motorized trail system; however, the existing system would remain under agreement. Approximately 16 miles of trails within RCAs are associated with the non-motorized “agreement routes”. Trail/stream crossings and trails within RCAs may deliver sediment to streams where trail tread is adjacent to streams and actively eroding. Field inventoried trail segments do not appear to have measurable sediment delivery currently occurring (see photos in hydrology technical report [project record]). Trail tread appears to be in good condition and active erosion or gully initiation is not occurring.

Vegetation—Alternative A does not address vegetation conditions, which are at a high risk for uncharacteristic wildfire. If a fire were to occur, sediment delivery would likely increase above current levels depending on fire size and severity.

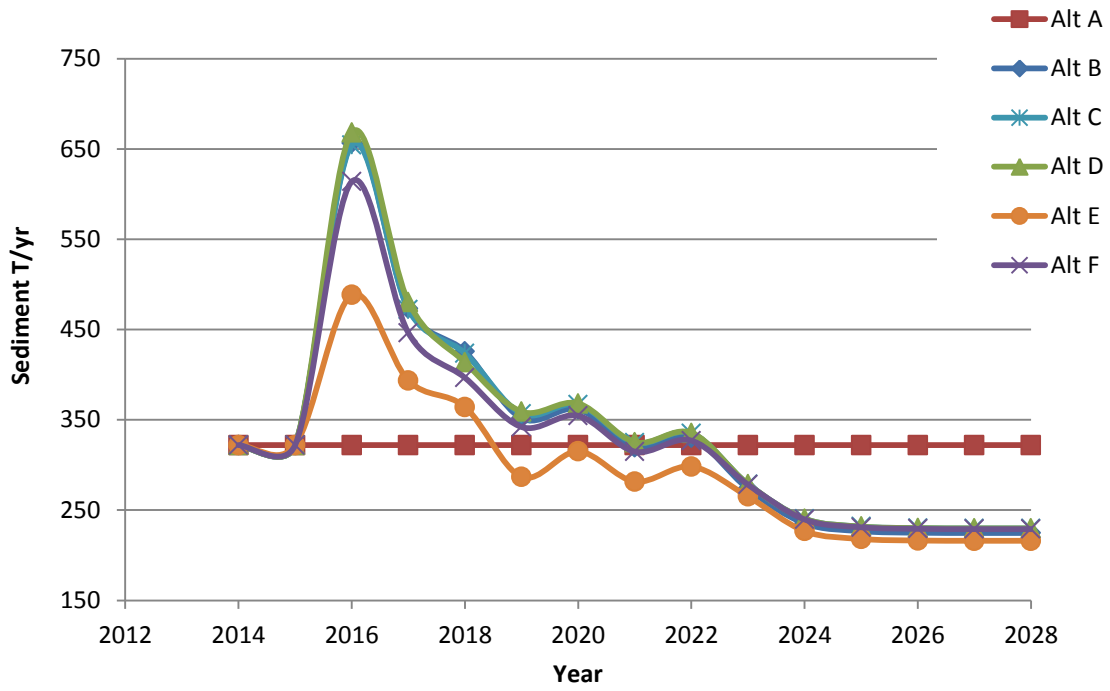


Figure 3-105. Middle Crooked River subwatershed sediment modeling results

Table 3-131. Middle Crooked River subwatershed sediment modeling results

	Alt-A		Alt-B		Alt-C		Alt-D		Alt-E		Alt-F	
	T/yr	%ON	T/yr	%ON	T/yr	%ON	T/yr	%ON	T/yr	%ON	T/yr	%ON
Temp	322	24%	657	49%	655	49%	668	50%	489	37%	614	46%
Short	322	24%	352	27%	357	27%	359	27%	287	22%	342	26%
Long	322	24%	225	17%	230	17%	230	17%	216	16%	229	17%

Note: the values shown for each timeframe represent the highest year of sediment delivery within that timeframe. For the temporary timeframe, this occurs during 2016; and for the short-term timeframe, this occurs in 2019. All values for the long-term timeframe are constant.

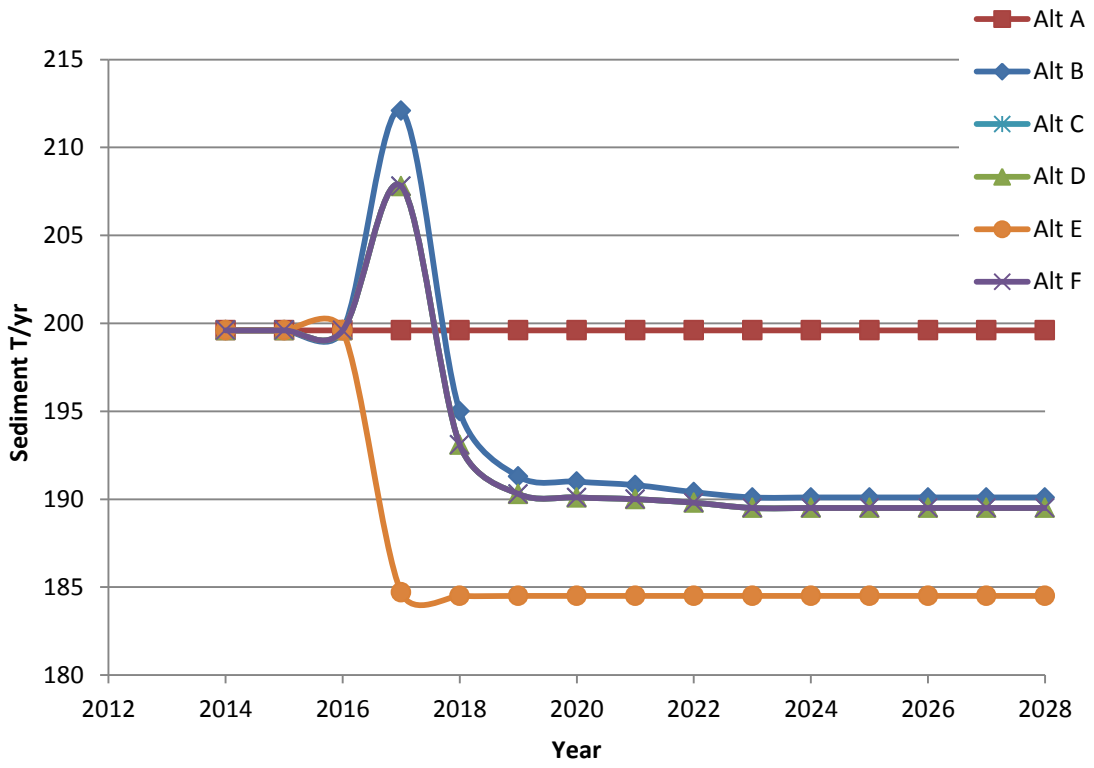


Figure 3-106. Pikes Fork subwatershed sediment modeling results

Table 3-132. Pikes Fork subwatershed sediment modeling results

	Alt-A		Alt-B		Alt-C		Alt-D		Alt-E		Alt-F	
	T/yr	%ON	T/yr	%ON	T/yr	%ON	T/yr	%ON	T/yr	%ON	T/yr	%ON
Temp	200	33%	212	35%	208	35%	208	35%	185	31%	208	35%
Short	200	33%	191	32%	190	32%	190	32%	185	31%	190	32%
Long	200	33%	190	32%	190	32%	190	32%	185	31%	190	32%

Note: the values shown for each timeframe represent the highest year of sediment delivery within that timeframe. For the temporary timeframe, this occurs during 2016; and for the short-term timeframe, this occurs in 2019. All values for the long-term timeframe are constant.

Action Alternatives

All action alternatives would maintain the existing functionality of the Sediment/Turbidity (Bull Trout—Other Fishes) WCI, which is functioning at unacceptable risk in both the Middle Crooked and Pikes Fork subwatersheds. Under each action alternative, sediment delivery to streams would measurably increase in the temporary timeframe (0–3 yrs) and measurably decrease (below current levels) during the short- (3–15 yrs) and long-term (15+ yrs) timeframes. Each of the individual actions proposed for the action alternatives was analyzed to determine effects on the sediment indicator; a detailed discussion is included below. While all action alternatives would result in a measureable improvement in the Sediment/Turbidity WCI in the long-term timeframe, elevations in stream fine sediment conditions are expected to continue in the long-term in both subwatersheds due to the number

of roads located within RCAs. Therefore the Sediment/Turbidity WCI would incrementally improve under all action alternatives, but remain FUR in the long-term.

Roads—All action alternatives include road treatments throughout the project area including temporary road construction, road realignment, and road reconstruction (heavy and light), road closure, and road decommissioning. These changes in the transportation system represent the largest overall contributions and reductions in sediment delivery over the life of the project. Increases in sediment delivery in the temporary timeframe are attributed to temporary road construction, road reconstruction, and road realignment. Decreases in sediment delivery in the short- and long-term timeframes are attributed to road decommissioning, road realignment, and road closure (conversion of maintenance level (ML) 2 roads to ML 1 roads, or conversion of ML2 roads to ML2 Admin Only). Design Features FH-7, FH-8, FH-27, FH-28, FH-29, TS-1, and TS-4 would be implemented in association with these alternatives to help control sediment. Sediment modeling for roads was completed using a combination of the GRAIP_Lite and BOISED models. See the hydrology technical report (project record) for detailed descriptions of the analysis methods and assumptions incorporated in model estimates of sediment delivery from roads. Differences in road-related sediment delivery by alternative are discussed below.

Culvert Replacements—All action alternatives include 23 AOP culvert replacements. Short-term increases in turbidity associated with crossing reconstruction are anticipated but are not expected to last more than the duration of the construction period (Yenko 2007). Furthermore Design Features FH-9, FH-10, FH-14, FH-15, FH-16, FH-17, FH-18, FH-20, FH-22, FH-23, FH-24, FH-25, and FH-26 would be employed to minimize sediment delivery and turbidity during construction.

Vegetation Thinning—All action alternatives include thinning with product removal (commercial timber harvest) and thinning with no product removal (cutting of non-commercial material). These activities are proposed to treat upland vegetation (conifer trees) both within and outside RCAs (Table 3-131). Sediment delivery to streams is not expected to occur from these activities due to the incorporation of buffer distances from streams (section 2.4.2)

Thinning with no product removal is proposed both within and outside RCAs (section 2.4.2). This activity involves fallers cutting trees with chainsaws and hand piling or scattering material, and may occur within 15 feet (of intermittent streams), 50 feet (of perennial streams), and 35 feet (of intermittent and perennial streams within plantations). Ground disturbance from these activities would be limited because no heavy equipment or machinery would be used. Therefore, the soil would not be exposed, and erosion and sediment delivery to streams would not occur.

Thinning with product removal is proposed both within and outside RCAs. This activity involves fallers or tracked machinery cutting trees and tractors/skidders using cables/tongs to yard material to landings—to be loaded on trucks or flown from units using helicopters. These activities may occur outside the first site potential tree height along both intermittent and perennial streams; however, no ground-based equipment (skidders, feller-bunchers, tractors) is allowed to travel off existing routes, and no skid trails would be constructed within RCA boundaries (Design Feature FH-27). No construction of landings would occur within RCAs; and, if existing landings used for the project are located within RCAs, erosion

control measures would be used to minimize sediment delivery (Design Feature FH-5). All landings would be reclaimed when activities are completed (Design Feature FH-6). Based on these limitations and results of sediment modeling, no sediment delivery to streams is expected to occur from thinning with product removal.

Both the BOISED model and the MK sediment delivery model were used to estimate sediment contributions from vegetation thinning activities. The BOISED model simulates sediment delivery from commercial timber harvest but does not incorporate information about the proximity of those activities to streams; thus sediment amounts related to commercial timber harvest from BOISED are likely an over-estimate. Estimates of sediment contributions from commercial timber harvest from BOISED are included in overall project sediment delivery estimates displayed in Figure 3-105 and Figure 3-106. The MK sediment delivery model was used to further refine sediment delivery estimates to determine if eroded material from commercial timber harvest units would be delivered as sediment to streams.

Based on MK modeling, it is estimated that sediment may travel up to 85 feet from tractor skid trails, 5 feet from helicopter yarding, 8 feet from tractor yarding, and 81 feet from landings (Table 3-133). As stated above, BOISED modeled amounts of sediment delivery for commercial timber harvest may be an over-estimate of the amount of sediment that is contributed to streams because sediment is only expected to travel 85 feet from areas of soil disturbance before becoming deposited on the hillslope. BOISED, however, does not account for the RCA buffer distances included in **Error! Reference source not found.** 2.4.2. No onstruction of new landings would occur within RCAs, and BMPs to control erosion during use and reclamation would be used (Design Features FH-5 and FH-6). See the hydrology technical report (project record) for a complete discussion of methods and assumptions incorporated in model estimates of sediment delivery distances from the MK and BOISED models. See discussion below for differences in effects between action alternatives.

Table 3-133. MK Model sediment travel distances

Activity	Sediment Travel Distance (feet)
Helicopter logging	4.5
Tractor skid road	85.2
Tractor yarding	7.5
Prescribed burn	4.9
Landings/Road construction	111.3
Existing road - good	26.7
Existing road - moderate	30.7
Existing road - poor	39.6
Existing road - serious	61.5
New road construction	119.8
Road reconstruction (heavy)	70.2
Road reconstruction (light)	54.1
Landing (concentrated drain)	81.4

Prescribed Fire—All action alternatives include the application of prescribed fire both in treating activity-related fuels and broadcast burning natural fuels. Estimates of sediment delivery related to the application of prescribed fire were completed using the BOISED model and are included in the sediment delivery estimates displayed in Figure 3-105 and

Figure 3-106. It is expected that prescribed fire applications in the form of broadcast burning would increase sediment delivery amounts in the temporary and short term and would stabilize or cease approximately 3 years after implementation.

Implementation of activity fuels treatments, including piling and burning of thinned material, is allowed within RCAs, but is limited to 50 feet from the stream and includes limits on the size and density of handpiles (Design Feature FF-5). These criteria are expected to result in no measureable sediment delivery from activity fuels treatments, because vegetative buffers surrounding burned piles are expected to control any erosion produced from the resulting pile burn scars. Implementation is staggered throughout the project area over a 5-year period. Overall, sediment delivery amounts associated with fuels treatments are expected to be minor, due to incorporation of burn prescriptions that would limit fire intensity and burn severity. The use of ignition patterns would also control fire spread and limit the size and density of handpiles (Design Features FF-1, FF-3, and FF-5). In general, the low severity and intensity of burning under prescribed fire conditions limits the amount of consumption and alteration of ground cover and duff that is important for maintaining erosion control. No measureable differences in effects exist among the action alternatives with respect to prescribed fire activities.

Recreation/Trail Management—All action alternatives include authorization of existing and proposed trail systems for both motorized and non-motorized use with the exception of Alternative E, which does not include authorization of a new motorized trail loop system. Effects of trails management actions on sediment delivery are incorporated into estimates of sediment delivery related to roads displayed in Figure 3-105, Figure 3-106, Table 3-131, and Table 3-132. Major differences in trail-related effects involving sediment have to do with the designation of a new motorized trail and trailhead considered in all action alternatives with the exception of Alterative E. The motorized trail includes segments in both the Middle Crooked and Pikes Fork subwatersheds. Alternative E also includes decommissioning of ML-1 routes that are converted to motorized trails under the other action alternatives.

New trailhead construction is proposed at the junction of NFS Roads 385 and 312 in the Pikes Fork subwatershed, directly adjacent to Pikes Fork Creek. Sediment delivery from trailhead construction is not represented in sediment modeling results due to lack of a routine within the models to simulate this activity. Sediment delivery from this action is expected to be negligible with the incorporation of best management practices BMPs during construction (Design Feature FH-25), and based on the trailhead design characteristics. The trailhead design involves surfacing of the parking area with aggregate to minimize surface erosion, a 67-foot setback of the parking area from the creek to provide a vegetative buffer, blocking OHV access to the creek, and vegetating and stabilizing the streambank adjacent to the trailhead.

New motorized trail construction and conversion of ML-1 roads to motorized trails is included in modeled estimates of sediment delivery and is modeled as new road construction using the assumptions of BOISED. Additionally, existing ML-1 and ML-2 roads are proposed for portions of the ATV trail. Where the ATV trail is proposed on ML-1 road segments, sediment was modeled as conversion to open road. Where the ATV trail is proposed on ML-2 segments, no changes to the BOISED modeled sediment delivery were made.

Non-motorized trail authorizations for both winter and summer recreation are not expected to measurably affect sediment delivery. In many cases, non-motorized trails are co-located on existing ML-1 or ML-2 roads; in these cases, sediment delivery from the road is incorporated into overall sediment delivery estimates. Field reviews of non-motorized trails not co-located on roads occurred in May and June of 2014; these reviews did not find accelerated sedimentation problems (see photographs of non-motorized trails in the hydrology technical report [project record]). Additionally, bridges at all stream crossings were in good condition.

Alternative B

Roads—The Proposed Action would result in a temporary increase in road-related sediment delivery from 322 tons/yr to 617 tons/yr in the Middle Crooked subwatershed and from 200 tons/yr to 212 tons/yr in the Pikes Fork subwatershed associated with temporary road construction, road reconstruction, and road realignment (Figure 3-105, Table 3-131). A decrease in road-related sediment delivery due to road closure (conversion from ML2 to ML1, or ML2 to ML2 Admin) and road decommissioning is expected in the short and long term, with road-related sediment stabilizing at 225 tons/yr in the Middle Crooked subwatershed and 190 tons/yr in the Pikes Fork subwatershed.

Vegetation Thinning—The Proposed Action would result in a negligible increase in sediment delivery associated with vegetation thinning. Under Alternative B, commercial timber harvest would be implemented on approximately 4,425 acres utilizing tractor/jammer yarding. BOISED estimates an increase in sediment delivery in the temporary and short-term timeframes (8 yrs) from zero to 101 tons/yr in the first year and decreasing over time. Utilizing the MK sediment delivery model with the incorporation of RCA buffer distances, however, it is expected that sediment from commercial timber harvest units would not travel farther than the buffer distance of one site potential tree height.

Prescribed Fire—Effects of the Proposed Action with regard to prescribed fire are the same for all action alternatives. Sediment related to prescribed fire is expected to be greatest in year two of prescribed fire implementation and would result in 84 tons/yr of sediment delivery. Sediment delivery from prescribed fire is expected to return to background levels by 2026. Overall, sediment delivery amounts associated with fuels treatments are expected to be minor, due to incorporation of burn prescriptions that would limit fire intensity and burn severity, as well as the use of ignition patterns to control fire spread, and limits on the size and density of handpiles (Design Features FF-1, FF-3, and FF-5).

Recreation/Trail Management—The Proposed Action would authorize a motorized trail (50 inches or less) and trailhead, and a system of non-motorized trails. Sediment amounts associated with the non-motorized trail system are either included in road sediment calculations or are expected to be negligible (see discussion above).

Sediment delivery associated with the motorized trail is expected to increase during construction of new ATV trail segments. Alternative B would authorize approximately 0.5 miles and 1.0 miles of new motorized trail construction in the Middle Crooked and Pikes Fork subwatersheds, respectively. The only difference between Alternative B and the other action alternatives, with the exception of E, is that Alternative B includes a section of new trail construction that connects NFS Road 336 (Sawmill Cr.) with NFS Road 362G3. Field verification of trail locations completed in spring 2014 indicates that this route would bisect two intermittent drainages with steep gradients. Sediment delivery and impacts to these

RCAs were identified as a potential concern at these crossings. A proposal for an alternative route was developed during this field review and that alternative route is proposed in Alternatives C, D, and F.

Alternative C

Roads—Compared to Alternative B, Alternative C has only minor changes in the overall road system that would affect sediment. Only 15.5 miles of ML-2 roads would be converted to ML-2 Admin only roads, instead of 19.8 miles. This change is associated with roads that access Idaho Department of Parks and Recreation yurts and results in a slight increase in overall road-related sediment.

Vegetation Thinning—Compared to Alternative B, no differences in effects to sedimentation from vegetation management exist under Alternative C.

Prescribed Fire—Compared to Alternative B, no differences in effects to sedimentation from prescribed fire exist under Alternative C.

Recreation/Trail Management—Compared to Alternative B, Alternative C would alter the proposed ATV new trail construction to connect NFS Road 336 to NFS Road 363G2 instead of NFS Road 363G3 (proposed under Alternative B). This route location is expected to result in less sediment delivery than Alternative B due to the location of the trail on a ridge top outside of stream channels and connecting to existing routes.

Alternative D

Roads—Effects to road-related sediment under Alternative D are identical to Alternative C with the exception of sediment related to the additional 0.7 miles of temporary road construction (6.5 miles total) proposed under Alternative D. This temporary road construction is associated with additional acres of proposed vegetation treatment under Alternative D.

Vegetation Thinning—Alternative D includes an additional 182 acres of commercial timber harvest. Effects to sediment of these additional acres are considered negligible due to the incorporation of RCA buffer distances as discussed above. BOISED sediment results for Alternative D do, however, reflect the additional acres of commercial timber harvest proposed.

Prescribed Fire—Effects to sedimentation from prescribed fire would be the same as Alternative B.

Recreation/Trail Management—Compared to Alternative C, effects to sediment would be identical under Alternative D, with the exception that the motorized trail loop would be authorized to vehicles 60 inches or less in width. This difference would include authorizing UTV-class vehicles, which may increase the amount of motorized vehicle traffic and widen the disturbance of the template, resulting in greater erosion and subsequent sediment delivery under Alternative D. Because the ATV/UTV trail was modeled as a road using BOISED, modeled sediment values for Alternatives C and D are the same. The additional sediment produced from the designation of the motorized trail open to vehicles 60 inches or less is considered negligible.

Alternative E

Roads—Alternative E provides the greatest benefits to sediment, both in generating a smaller temporary increase in sediment and providing the largest reduction in the long-term sedimentation rate. Sediment is expected to temporarily increase to 522 tons/yr and decrease to 216 tons/yr in the long term. Smaller temporary increases are associated with less temporary road construction (1.5 miles total) and no new motorized trail construction. Although associated with recreation, sediment from the motorized trail was combined with the roads analysis. Further sediment reductions in the long term under Alternative E are associated with additional proposed decommissioning of road segments that would otherwise be incorporated into portions of the motorized trail under the other action alternatives.

Vegetation Thinning—Alternative E includes the same commercial timber harvest units proposed under Alternatives B and C, but helicopter yarding would be used on 1,166 of the 4,425 acres proposed for treatment. As discussed above, sediment delivery from vegetation thinning is not expected due to incorporation of RCA buffer distances that limit ground disturbance from equipment to outside one site potential tree height. Modeled sediment from BOISED is included in overall sediment numbers in Figure 3-105 and Figure 3-106 (acknowledging that BOISED does not consider distance to streams). Using helicopter yarding under Alternative E results in 1/3 less sediment as predicted by BOISED associated with vegetation thinning as compared to Alternative B.

Prescribed Fire—Effects to sedimentation from prescribed fire would be the same as Alternative B.

Recreation/Trail Management—Alternative E does not authorize the motorized trail or trailhead at the junction of NFS Roads 312 and 385, proposed under all other action alternatives. This strategy reduces the overall sediment contribution under Alternative E. Additional decommissioning of ML-1 routes proposed for inclusion in motorized trails also reduces the overall sediment contribution. Non-motorized trails would still be authorized under Alternative E. See the discussion above for sediment effects associated with the authorization of non-motorized trails.

Alternative F

Roads—Sediment effects from road activities under Alternative F are similar to Alternative C, barring a reduction in the miles of temporary roads (2.2 miles) due to the 377 acres proposed for helicopter yarding under Alternative F. Helicopter yarding acreage results in a smaller increase in sedimentation from temporary road construction under Alternative F. Small differences in sediment delivery in the long term are also associated with road conversions from ML-2 to ML-2 Admin Only.

Vegetation Thinning—Alternative F includes the same commercial timber harvest units proposed under Alternatives B and C, but helicopter yarding would be used on 377 of the 4,425 acres proposed for treatment. As discussed above, sediment delivery from vegetation thinning is not expected due to incorporation of RCA buffer distances that limit ground disturbance from equipment to outside one site potential tree height. Modeled sediment from BOISED is included in overall sediment numbers in Figure 3-105 and Figure 3-106 (acknowledging that BOISED does not consider distance to streams). The use of helicopter

yarding under Alternative F would result in approximately 10% less sediment as predicted by BOISED associated with vegetation thinning as compared to Alternative B.

Prescribed Fire—Effects to sedimentation from prescribed fire would be the same as Alternative B.

Recreation/Trails Management—Under Alternative F, some portions of the motorized trail would be eliminated to respond to overlap between motorized and non-motorized uses. A relatively small reduction in estimated sediment delivery as compared with the other action alternatives would occur with fewer miles of motorized trail.

Cumulative Effects

All Alternatives

Past and ongoing management actions have been considered in describing the baseline existing condition for the Sediment WCI. Foreseeable future activities that may have additional effects on the Sediment WCI are limited to activities that are also ongoing such as sheep grazing, dispersed recreation, and road maintenance. These activities were also considered in describing the existing condition. As a result, no additional or cumulative effects, either directly or indirectly related to the planned management actions, would occur.

3.9.4 Streamflow Hydrology Secondary Indicators—Affected Environment and Environmental Effects

3.9.4.1 Changes in Peak/Base Flows

Affected Environment

The desired condition in Changes in Peak/Base Flows is a watershed hydrograph that indicates peak, base, and flow timing comparable to an undisturbed watershed. This indicator is functioning at risk for both subwatersheds (Table 3-129). Though no active surface water diversions exist in either subwatershed, and past vegetation management and fires have resulted in 4% and 5% ECA for Middle Crooked and Pikes Fork subwatersheds, respectively, which is well below the amount required to detect changes in water yield, the high mileages of roads (see road density and location WCI) within these areas may route water to the channel faster and increase peak flows from precipitation events, producing the functioning at risk rating. However, stream hydrographs are dominated by spring snowmelt and not precipitation event flows. It is therefore unlikely that the largest peak flows are significantly altered by increased drainage network from roads.

Environmental Effects

Roads can act as extensions of the stream channel and route water to the stream more quickly (Gucinski et al. 2001). Harvesting vegetation reduces the amount of potential evapotranspiration from trees, which can result in measurable increases in water yield and additional negative effects in the form of increased channel and streambank scour. Existing research has shown that 20% to 30% of a watershed needs to be clear cut to result in a detectable augmentation of water yield (Stednick 1996).

The effects of selective harvest are often quantified using the Equivalent Clear Cut (ECA) method (King 1989). Past vegetation management, roads, and fires have resulted in an ECA of 4% and 5% for Middle Crooked and Pikes Fork subwatersheds, respectively. Research on water yield has, at this point, never fully quantified the effects of fire exclusion on water yield; however, Sala et al. (2001) shows that changes in successional status and species composition are tied to changes in transpiration and, in turn, water yield—indicating that fire exclusion likely reduces water yield.

Direct and Indirect Effects

Alternative A

Alternative A would perpetuate the existing condition with regard to the Changes in Peak/Base Flows WCI, which is currently functioning at risk (FR) in both subwatersheds. Functionality is FR due to high amounts of roads in both subwatersheds and vegetation conditions being outside desired conditions.

Alternative A leaves the project area at a high risk for uncharacteristic wildfire in all timeframes. This effect results in a negative trend for this indicator in the short and long term timeframes. It has been well documented that, of the numerous disturbance processes that impact wildland watersheds, fires have the greatest potential to alter water yield and streamflow generation processes (Neary et al. 2005). If a fire were to occur, it is likely that changes in vegetation cover and soil infiltration processes would also occur commensurate with soil burn severity (Parson et al. 2010) and would result in relatively large increases in peak flows.

Action Alternatives

Each of the action alternatives would maintain the existing functionality of the Changes in the Peak/Base Flows WCI in both subwatersheds, which is FR. This indicator is not expected to be affected in the temporary and short-term timeframes. Road and vegetation treatments are expected to immeasurably improve this indicator in the long term by decommissioning roads and shifting vegetation conditions toward desired conditions, primarily in the Middle Crooked subwatershed. These results are not expected to be fully realized until the long term.

Alternatives B, C, D, E, and F

Roads—The 30.9 miles of road decommissioning proposed under Alternatives B, C, and D, and the 32.9 and 31.7 miles of road decommissioning proposed under Alternatives E and F, respectively, would reduce accelerated stream flow routing by roads. Though slight differences exist in the amount of miles of road decommissioning under these alternatives, the level of effect is not measurably different.

Vegetation Thinning and Prescribed Fire—Under each of the action alternatives, an immeasurable improvement in this indicator in the long-term is expected in the Middle Crooked subwatershed due to vegetation management activities, prescribed fire, and road decommissioning. Vegetation thinning and prescribed fire would change vegetation conditions toward desired conditions and reduce the risk of uncharacteristic wildfire and effects of fire exclusion on overall water yield. The combination of these effects would result in a stream flow regime more reflective of an undisturbed watershed of similar size and characteristics. While numerous miles of roads would remain in this subwatershed, the

negative effect of roads on water yield would be incrementally reduced. The differences in effect among the action alternatives is limited to the additional acres of vegetation treatment under Alternative D. Overall, additional acres treated under Alternative D represents a small positive effect to the Peak/Base Flows WCI. Otherwise all action alternatives result in the same affect.

Cumulative Effects

All Alternatives

Past and ongoing management actions have been considered in describing the baseline existing condition for the Peak/Base Flows WCI. Idaho Power Cloud Seeding stations represent ongoing/foreseeable future activities that may affect the Peak/Base Flows WCI by increasing snowfall and subsequent runoff volumes in and around the project area. Idaho Power (2010) estimates a 10% overall increase in precipitation as a result of cloud seeding in the Upper Snake River Basin. This increased winter precipitation could result in increased peak flows, but would be difficult to quantify. In the context of the Becker Project, this potential increase in peak flows would not result in negative effects to overall hydrology and aquatics resources.

3.9.4.2 Changes in Drainage Network and Road Density and Location

Because the primary indicators for effects for both the Changes in Drainage Network and the Road Density and Location WCIs are road density and RCA road density, the affected environment and effects discussions for these WCIs have been combined.

Affected Environment

The desired condition for Changes in Drainage Network is zero or minimum change in active channel length correlated with human caused disturbance. This indicator is functioning at unacceptable risk in both subwatersheds (Table 3-129). Road density in both subwatersheds is very high (see Road Density and Location WCI), and this WCI is also functioning at unacceptable risk in both subwatersheds (Table 3-129), constituting a greater than moderate change in active channel length as roads act as a conduit to route water to stream channels.

The desired condition for Road Density and Location is a total road density of <0.7 miles per square mile (mi/m^2) for the subwatershed and no roads within RCAs. Overall road density is 4.6 mi/mi^2 in the Middle Crooked subwatershed and 6.7 mi/mi^2 in Pikes Fork; RCA road density is 9.4 mi/mi^2 in the Middle Crooked subwatershed and 8.9 mi/mi^2 in Pikes Fork.

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A would perpetuate the existing condition with regard to the Changes in Drainage Network WCI, which is currently functioning at risk (FUR) in both subwatersheds. Functionality is FUR due to high amounts of roads in both subwatersheds (Table 3-134).

Table 3-134. Road density and riparian conservation area (RCA) road density statistics

	Alt A – mi/mi^2	Alt B – mi/mi^2	Alt C – mi/mi^2	Alt D – mi/mi^2	Alt E – mi/mi^2	Alt F – mi/mi^2
Middle Crooked HUC6	4.57	3.88	3.88	3.88	3.77	3.77
Middle Crooked RCAs	9.44	7.66	7.66	7.74	7.55	7.55
Pikes Fork HUC6	6.70	6.51	6.62	6.57	6.51	6.57
Pikes Fork RCAs	8.90	8.53	8.53	8.53	8.15	8.53

Action Alternatives

All action alternatives would maintain both the Changes in Drainage Network WCI and the Road Density and Location WCI in the long term, which is FUR in both subwatersheds. The FUR rating occurs because the reductions in road miles associated with the action alternatives do not meet the desired road density statistics specified in the Forest Plan (Appendix B). However, each of the action alternatives would result in reductions in overall road densities for both subwatersheds and RCAs.

The Middle Crooked subwatershed would receive the bulk of the benefit as the majority of the road decommissioning occurs within this subwatershed. Middle Crooked road density would be reduced by 0.69 mi/mi^2 under Alternatives B, C, and D, and by 0.8 mi/mi^2 under Alternatives E and F. RCA road density in the Middle Crooked subwatershed would be reduced by 1.78 mi/mi^2 under Alternatives B and C, 1.7 mi/mi^2 under Alternative D, and 1.89 mi/mi^2 under Alternatives E and F. In the Pikes Fork subwatershed, road density would be reduced by 0.19 mi/mi^2 under Alternatives B and E, 0.08 mi/mi^2 under Alternative C, and 0.13 mi/mi^2 under Alternative D and F. RCA road density within the Pikes Fork subwatershed would be reduced by 0.37 mi/mi^2 under Alternatives B, C, D, and F, and by 0.75 mi/mi^2 under Alternative E. Overall, Alternative E results in the greatest reduction in both total road density and RCA road density of any of the action alternatives, producing the greatest improvement in the Changes in Drainage Network and Road Density and Location WCIs.

Cumulative Effects

All Alternatives

No past, present, or ongoing, or reasonably foreseeable activities would affect the Changes in Drainage Network and Road Density and Location WCIs.

3.9.5 Watershed Condition Pathway Secondary Indicators—Affected Environment and Environmental Effects

3.9.5.1 Road Density and Location

The affected environment and environmental effects for this WCI have been combined with the Drainage Network WCI and are discussed above.

3.9.5.2 Disturbance History and Disturbance Regime

The Disturbance History and Disturbance Regime WCIs effects analysis has been combined into a single section because the processes and effects associated with these indicators are complementary. Disturbance processes are an important component of dynamic soil, water, and hydrologic riparian and aquatic habitats that determine the physical and biological capability within watersheds. See the Forest Plan (USDA Forest Service 2010a, Appendix B) for a complete definition of each indicator.

Affected Environment

The desired condition for Disturbance History is less than 15% Equivalent Clear Cut (ECA) with no concentration of disturbance in landslide or landslide-prone areas, and/or refugia, and/or RCAs. This indicator is functioning at risk in both subwatersheds (Table 3-129). Past vegetation management and fires have resulted in 4% and 5% ECA for the Middle Crooked and Pikes Fork subwatersheds, respectively. Both subwatersheds have high concentrations of roads in RCAs.

The desired condition for Disturbance Regime is negligible or temporary disturbances resulting from land management activities. This indicator is functioning at risk in both subwatersheds (Table 3-129). Vegetation is documented as being outside desired conditions due to alteration of the natural fire regime from fire suppression (see vegetation technical report [project record]) resulting in a potential increase in the risk of wildfire. Furthermore, if a fire were to occur, it could result in negative effects or loss of aquatic habitat (see fuels technical report [project record]).

Environmental Effects

Direct and Indirect Effects

Alternative A

Alternative A would perpetuate the existing condition with regard to the Disturbance History and Disturbance Regime WCIs, which are both functioning at risk (FR). FR status is based on the high mileage of roads within RCAs, and vegetation conditions outside desired conditions due to fire exclusion.

Action Alternatives

All action alternatives would maintain the current functionality of the Disturbance History and Disturbance Regime WCIs in the long term, which is FR. An immeasurable degrade to these WCIs is expected in the temporary timeframe with immeasurable benefits expected in the short and long term within the Middle Crooked subwatershed. In the Pikes Fork subwatershed, these indicators are not expected to be affected to the extent they are in the Middle Crooked subwatershed due to the lack of vegetation management activities and limited road decommissioning. Benefits exist, however, in the Pikes Fork subwatershed from the proposed AOP culvert replacements, resulting in an immeasurable benefit in the long term. No substantial differences in effects to these WCIs exist among the action alternatives.

Roads—An immeasurable degrade to these indicators is expected associated with road realignment, temporary road construction, and road reconstruction in the temporary timeframe, primarily within the Middle Crooked subwatershed. Road decommissioning, road

closures, and temporary road reclamation is expected to result in an immeasurable benefit in the short- and long-term timeframes.

Culvert Replacements—Twenty-three AOP culvert replacements result in an immeasurable benefit for both subwatersheds in the long term. AOP culvert replacements provide for additional aquatic habitat access for aquatic species and reduce the risk that a road/stream crossing failure would negatively affect aquatic habitat by increasing the ability for these structures to handle increased flows and associated debris.

Vegetation Management and Prescribed Fire—Vegetation thinning throughout the Middle Crooked subwatershed is expected to benefit these WCIs in the long term by reducing stand densities and reducing the risk of uncharacteristic wildfire. For example, the risk of uncharacteristic wildfire can be attributed to fire exclusion, which causes uncharacteristic vegetation conditions potentially leading to an uncharacteristically large and severe wildfire. Within the project area, current stand densities and ladder fuels increase the potential for stand-replacement type fires, which would burn at a higher intensity and severity over a larger area for longer periods of time than in the landscape without fire exclusion. If a wildfire of larger size and higher intensity were to occur, post-fire effects would likely negatively affect many of the WCIs, including stream temperature and sediment delivery, in the long term (Ice et al. 2004). The proposed vegetation thinning would reduce stand densities and ladder fuels, therefore benefiting these WCIs.

Recreation/Trail Management—Recreation/trails management activities included in the Proposed Action are not expected to measurably affect the Disturbance History/Disturbance Regime WCIs under the three timeframes. The designation of the motorized trail system would result in the use of primarily existing routes and is expected to shift motorized use from open road systems and unauthorized routes to a designated maintained system. Establishment of a motorized trailhead is expected to better manage use at the proposed trailhead location and result in a benefit to other WCIs (Temperature, Sediment) at that site. Non-motorized trail authorization is not expected to result in effects to these WCIs because the trail system is currently in place (no new construction) and does not represent a measureable effect to any WCIs.

Cumulative Effects

Alternative A

Past and ongoing management actions have been considered in describing the baseline existing condition for Disturbance History/Disturbance Regime WCIs. Reasonably foreseeable activities that could potentially affect these WCIs include ongoing and future wildfire suppression activities. Vegetation conditions have been influenced by fire exclusion within the project area due to fire suppression. This activity would continue in the future and could result in negative effects to the Disturbance History/Disturbance Regime WCIs by increasing the risk of uncharacteristic wildfire and potential for insect infestation.

Action Alternatives

Past and ongoing management actions have been considered in describing the baseline existing condition for Disturbance History/Disturbance Regime WCIs. Reasonably foreseeable activities that could potentially affect these WCIs include ongoing and future wildfire suppression activities. Vegetation conditions have been influenced by fire exclusion

within the project area due to fire suppression. This activity would continue in the future and could result in negative effects to the Disturbance History/Disturbance Regime WCIs. When combined with the action alternatives, the negative effects of fire exclusion are reduced by vegetation and fuels treatments that shift vegetation and fuels conditions toward desired conditions, and reduce the risk of uncharacteristic wildfire and potential for insect infestation.

3.9.5.3 Riparian Conservation Areas

This WCI is discussed in the "Fisheries" section.

3.9.5.4 Effects Summary

Overall, negative effects to analysis indicators from implementing the action alternatives in the project area are expected to be temporary (0–3 years) with short-term (3–15 years) and long-term (15+ years) positive effects. Temperature and sediment would have the greatest short- and long-term positive effects. Temporarily, riparian shade is expected to decrease from AOP stream crossing installations and, potentially, from noncommercial thinning and prescribed burning within RCAs, though uncertainty exists about the degree to which these activities would reduce shade. However, stream shade is expected to improve over the short and long term through reductions in the number of overall road/stream crossings and from a reduced risk of uncharacteristic wildfire in riparian areas.

Increases in sediment delivery associated with road construction, reconstruction, and realignment are expected during project implementation; however, short- and long-term decreases in sediment delivery are expected from road closures and road decommissioning. Temporary negative effects would be outweighed by demonstrable long-term benefits, which comply with Forest Plan standards (SWST01 and SWST04; USDA Forest Service 2010a).

While differences in effects between action alternatives exist for each of the identified indicators, the overall determination of whether an indicator is being maintained, improved, or degraded, either measurably or immeasurably, does not change between the action alternatives for any of the indicators (Table 3-126 and Table 3-127). For example, sediment delivery amounts in the temporary and short-term timeframes are measurably different under Alternatives C and E due to differences in road and trail actions. The effect, however, is the same for both alternatives because the resulting sediment delivery in the long term is measurably improved.

3.10 SOIL RESOUCES

3.10.1 Analysis Scale, Data Sources and Methodology

3.10.1.1 Analysis Scale

The objective of this analysis is to estimate the potential direct, indirect, and cumulative effects of alternative management proposals on soil quality. National Forest System (NFS) lands within the Becker Integrated Resource Project boundary define the spatial extent for completing the soils resource effects analysis (Figure 3-107). Analysis indicators described in section 3.10.2 are evaluated in the context of their respective "activity areas," which represent the logical land area where effects can be analyzed (USDA Forest Service 2010a, p. Gl-1). The time frame for direct effects to soil quality is when disturbance occurs, with the duration of effects depending on the intensity of the disturbance or permanency of the feature. The unrecovered or unrestored direct effects that exist when project activities are complete contribute to cumulative effects.

Forest Plan standards and guidelines provide the overriding direction for maintaining or improving desired conditions for soil quality. This analysis estimates and compares the potential effects of the alternatives for consistency with the applicable Forest Plan management direction (including applicable laws and regulations) and for key concerns about soil resources that are identified through public involvement.

3.10.1.2 Data Sources

Data used in this analysis were collected and interpreted from various sources. These include data and analysis using the Boise National Forest geographic information system (GIS) (project record), soil health assessment field survey data (project record), and the soil-hydrologic reconnaissance survey, Idaho City Ranger District, Boise National Forest (Wendt et al. 1973), as well as data, analysis, and conclusions specific to this project that are included in the vegetation and fuels technical reports (project record). Information was integrated in part through GIS analysis, first to characterize and establish existing conditions for the soils resource within the analysis area, and then to display the spatial arrangement of indicator data to help interpret how proposed activities would affect soil quality.

Characterization of the landforms, soils, and near-surface soil elements in the analysis area used two data sources (Wendt et al. 1975, Wendt et al. 1973). This information was compiled and evaluated to describe inherent and baseline conditions for soil texture and cover (i.e., ground cover) and to identify inherent soil capabilities and limitations related to proposed management activities (i.e., erosion and compaction potential). The soil taxonomic naming conventions are to the family level using descriptions in the soil-hydrologic reconnaissance (SHR) survey, where up to four soil map units can occur within each landtype (Wendt et al. 1973).

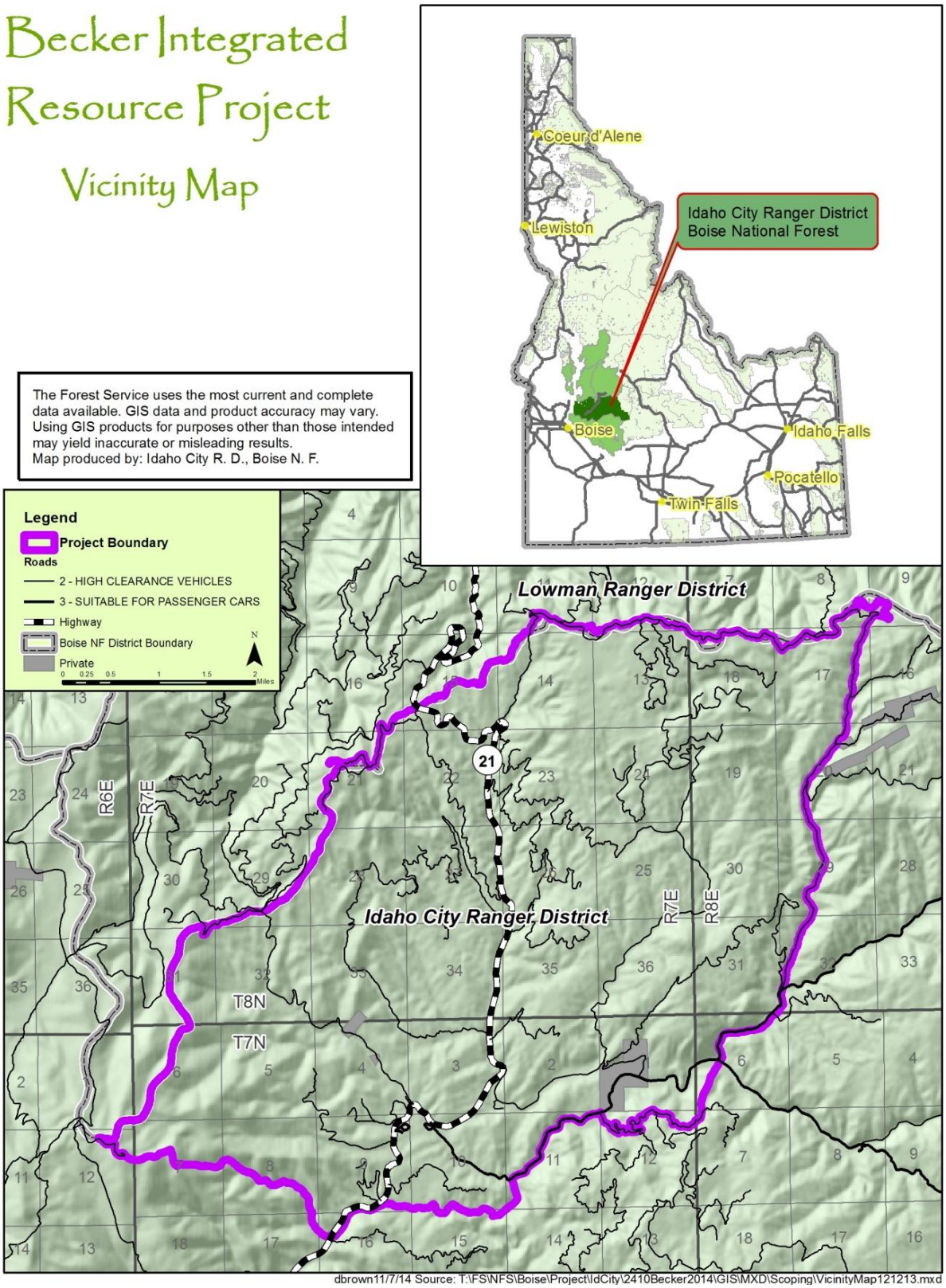


Figure 3-107. Becker project area

In addition to GIS, field data collected in 2006 using the soil health assessment (SHA) protocol informed the analysis for detrimental soil disturbance (DD), total soil resource commitment (TSRC), and slope stability. SHA data were collected using sampling transects that represent the varying soils and vegetation communities based on physiographic features that include slope; slope position (top, mid-slope, toe-slope, valley bottom); and aspect.

The GIS-based stability index mapping (SINMAP) model (Pack 1998) was used to initially identify landslide-prone areas within the project area. Information on vegetation treatment prescriptions and road activities was then drawn from the vegetation specialist and transportation specialist reports, respectively, to define the scope of analysis for where proposed activities could influence slope stability. Field investigations (SHA), combined with a review of the 2008 high-resolution digital imagery, were used as a coarse-filter validation to refine SINMAP results.

3.10.1.3 Analysis Methods

At any time, soil quality conditions across landscapes lie somewhere within a spectrum from undisturbed to total soil resource commitment (Figure 3-108). The “undisturbed” and “disturbed” categories best represent the majority of natural soil conditions within forested and nonforested settings. Soils characterized as disturbed have not had their physical and biological properties impacted to a level where soil conditions impair productivity. Soils categorized as DD or TSRC have been impacted, spatially and temporally, to a level that inhibits plant growth, often with compounding undesirable effects to watershed health (e.g., accelerated erosion, with increased sediment to waterbodies, and increased potential for the spread of noxious and nonnative plants).

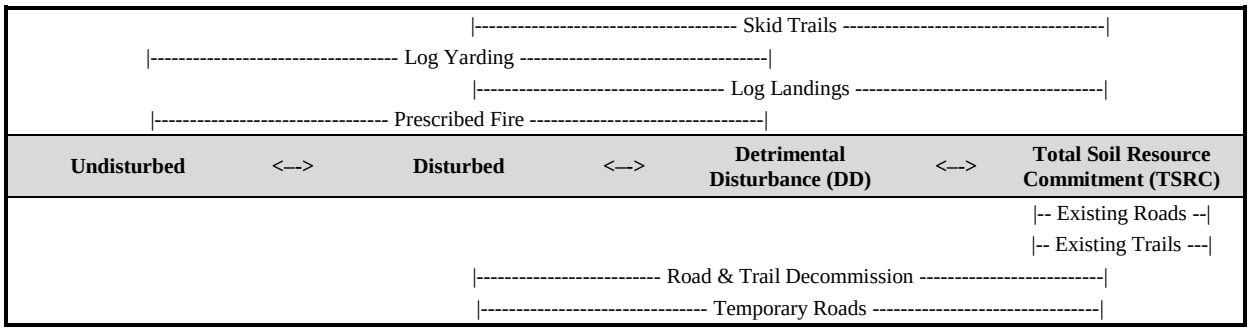


Figure 3-108. Soil Disturbance by Activity

The soil quality analysis tracks “cause and effect” relationships that characterize existing conditions and estimate potential environmental effects from proposed activities to a threshold or desired range. The threshold or desired range is defined by an indicator based on applicable Forest Plan standards and guidelines. The change in the indicator from the current condition provides a benchmark for estimating the extent and magnitude of effects from implementing the proposed action and concludes whether soil management goals and objectives are being or can be met. In many cases, quantitative analysis guides conclusions about the effects, although some conclusions are qualitative interpretations based on professional judgment using accepted assumptions that are supported by the best available information.

The analysis for estimating potential effects of vegetation management treatments (commercial timber harvest, noncommercial thinning, and prescribed fire) and roading activities on soil resources employed several assumptions based on the literature and professional judgment relative to silvicultural prescriptions, log yarding methods, wildland and prescribed fire behavior, existing vegetation conditions, and soil resource responses. The soils resource technical report (available in the project record) details these assumptions.

3.10.2 Analysis Indicators

Analysis indicators allow for comparing qualitative or quantitative estimates of potential effects to the existing conditions of soils from implementing the proposed activities (Table 3-135). This comparative analysis validates whether these potential effects are consistent with the Forest Plan's desired conditions, goals, objectives, standards, and guidelines for the applicable soils.

Table 3-135. Indicators and activity areas

Indicator	Activity Area for Direct and Indirect Effects	Analysis Method/Alternative Comparison
Detrimental Disturbance (DD)	Harvest Unit or Burn Unit	Percent change over existing condition.
Total Soil Resource Commitment (TSRC)	Project Area	Percent change over existing condition.
Slope Stability Hazard (LSP)	Harvest Unit, Burn Unit, Travel Route	Areas having moderate and high stability hazards where activities are proposed.

Note: Activity area is the smallest logical land area where the effect that is being analyzed or monitored is expected to occur (USDA Forest Service 2010a, p. Gl-1).

3.10.2.1 Detrimental Disturbance—Forest Plan Standard SWST02

The potential direct, indirect, and cumulative effects from proposed activities that result in detrimental disturbance (DD) are estimated for temporary, short-, and long term time frames. The spatial scale for estimating DD is the "activity area" as defined by the areal extent of specific actions that may cause detrimental soil impacts (e.g., commercial timber harvest unit, noncommercial thinning unit, or prescribed fire burn block) (USDA Forest Service 2010a, p. Gl-1) (Table 3-135).

DD is the alteration of natural soil characteristics that results in immediate or prolonged loss of soil productivity and soil-hydrologic conditions. At least 85% of an activity area should be in a non-detrimentally disturbed condition. Stated another way, no more than 15% of an activity area should have detrimentally disturbed soil after management activities are completed. DD can occur where soil has been displaced, compacted, puddled, or severely burned. Determination of DD excludes existing or planned classified transportation facilities, dedicated trails, landings, mining dumps or excavations, parking areas, developed campgrounds, and other dedicated facilities. DD is represented by any or all of the four characteristics described below.

- **Detrimental Soil Displacement—**Areas of 1 meter by 1 meter or larger that exhibit detrimentally displaced soil as described below:
  - The loss of either 5 centimeters or half of humus-enriched top soil (A horizon), whichever is less, or
  - The exceeding of the soil loss tolerance value for the specific soil type.

- **Detrimental Soil Compaction—**Soil compaction is generally evaluated from 5 to 30 centimeters below the mineral soil surface. Specific depths for measurement depend on soil type and management activities. Detrimental soil compaction is increased soil density (weight per unit volume) and strength that hampers root growth, reduces soil aeration, and inhibits water movement. Measurements of potential detrimental soil compaction may be qualitative or quantitative. Refer to the Region 4 Soil Management Manual for methods related to measuring/determining soil compaction.
- **Detrimental Soil Puddling—**Puddling is generally evaluated at the mineral soil surface. Visual indicators of detrimental puddling include clearly identifiable ruts with berms in mineral soil, or in an Oa horizon of an organic soil. Detrimental puddling may occur in conjunction with detrimental compaction. The guidelines for soil compaction are to be used when this occurs. Detrimentally puddled soils are not always detrimentally compacted. Infiltration and permeability are affected by detrimental soil puddling. Puddling can also alter local groundwater hydrology and wetland function, and provide conduits for runoff.
- **Severely Burned Soil—**Severely burned soil applies to prescribed fire and natural fires that are managed for resource benefits. Severely burned soils are identified by ratings of fire severity and the effects to the soil. A severely burned soil is generally soil that is within a High Fire Severity burn as defined by the Forest Service Burned Area Emergency Response Program (FSM 2520-2014-1, December 17, 2014); Debano (2000); and Parsons et al. (2010).

Standards for detrimentally disturbed soils are to be applied to existing or planned activities that are available for multiple uses. These standards do not apply to areas with dedicated uses such as mines, ski areas, campgrounds, and administrative sites. (USDA Forest Service 2010a, p. Gl-12).

3.10.2.2 Total Soil Resource Commitment—Forest Plan Standard SWST03

Direct, indirect, and cumulative effects of proposed activities that result in TSRC are estimated for temporary, short-, and long term time frames. The spatial scale for estimating TSRC is the “activity area” which is usually defined by the project boundary (USDA Forest Service 2010a, p. Gl-1) (Table 3-135).

TSRC is the conversion of a productive site to an essentially non-productive site for a period of more than 50 years. Examples include classified or unclassified roads, inadequately restored haul roads, designated skid roads, landing areas, parking lots, mining dumps or excavations, dedicated trails (skid trails also), developed campgrounds, other dedicated facilities, and some stock driveways. Productivity on these areas ranges from 0% to 40% of natural.

Standards for TSRC are to be applied to existing or planned activities that are available for multiple uses. This standard does not apply to areas with dedicated uses such as mines, ski areas, campgrounds, and administrative sites (USDA Forest Service 2010a, p. G l-50).

3.10.2.3 Landslide Prone Areas—Forest Plan Standard SWST12

Proposed management activities are evaluated to avoid increasing the potential for landslides. Landslide is a collective term that includes mass, deep-seated geologic failures and smaller localized mass erosional events such as slumps, debris flows, and debris slides. Landslides

have been documented as the dominant form of sediment delivery to streams in the Idaho Batholith (Arnold 1988, Megahan et al. 1978).

Landslides are discussed in terms of slope stability hazards. Although landslides are naturally occurring events, evaluation of road corridors and to a lesser extent timber harvest and other site-specific management actions with the likelihood of modifying landslide processes is warranted. Analysis of proposed activities on landslide prone (LSP) areas estimates the potential direct, indirect, and cumulative effects on fish habitat, long-term soil productivity, water quality/watershed function, and identification of risks to life and property. The spatial extend for estimating the effects proposed activities may have on slope stability is the footprint of a specific activity over the inherent landslide prone rating for a given area (Table 3-135). Refer to the Forest Plan (USDA Forest Service 2010a, Appendix B-41) for guidance on identifying and managing LSP areas.

Landslide prone areas have a tendency for rapid soil mass movements typified by shallow, noncohesive soils on slopes where shallow translational planar landsliding phenomena is controlled by shallow groundwater flow convergence. The initiation is often associated with extremely wet periods, such as rain-on-snow events. It does not include slow soil mass movements that include deep earth-flows and rotational slumps, nor snow avalanche or rock fall areas. Translational slides have been documented as the dominant form of landslides for the majority of the Forest (USDA Forest Service 2010a, p. Gl-26).

3.10.3 Characterization of the Soils Resource

Elevations for the project area range from about 5,000 feet to 8,100 feet. Climate is representative of the upland continental setting of the Interior Rocky Mountains. long, cold winters have heavy snowfalls, which usually melt by mid-May. Summer brings warm days and cool nights, and short, intense convective thunderstorms with considerable lightning that increases the danger for wildland fires. Gradual changes to and from spring and fall often include rapid changes in weather, either rain-on-snow events or intense rainstorms.

Precipitation and temperature for the project area are described using historical data from the Idaho City weather station (WRCC 2014) and Deadwood Dam weather data adjusted to the geographic location using Rock:Clime (Elliot et al. 1999). These weather stations best represent the climate variability from the south and north, respectively, for the project area. Records show average precipitation is well correlated with elevation and ranges from 23 inches to 35 inches annually, with up to 60% falling in the form of snow during the winter. The highest elevations likely receive up to 60 inches of annual snowfall, with an average maximum depth across the project area of about 30 inches. The average maximum temperature (in degrees Fahrenheit [°F]) ranges from 30 °F to 82 °F, with highs in July from 82 °F to 88 °F. The average minimum temperature ranges from 5 °F to 39 °F, with low temperatures of 5 °F and 12 °F for January.

Landforms and drainages within the project area are aligned predominantly north to south, and the landscape of the project area is moderately to strongly dissected by streams, so aspects within the smaller catchments include the full range of cardinal and intermediate directions. Roughly 7 miles of the mainstem of Beaver Creek dissect the project area, leaving the project area at its confluence with Crooked River. Other major streams include Edna Creek, Little Beaver Creek, and Banner Creek, which are fed by a number of small, unnamed

first- and second-order perennial and intermittent tributaries. Stream flows are comprised of snowmelt, dominated by runoff peak flows occurring in May or early June.

The underlying geology of the project area consists of Idaho batholith granitics. The dominant rock is the medium- to coarse-grained, light gray granodiorite. The main ridges and upper slopes that mostly surround the project area were initially formed by glaciation. Subsequent climate and fluvial (water) action reduced the sharply pronounced V-shaped drainages to a high density of moderately to weakly expressed drainages with rounded, subdued topography (Wendt et al. 1973).

Slope lengths from ridgelines to drainage bottoms typically range between 700 feet and 1,500 feet, rarely reaching 2,000 feet. Roughly 90% of the landforms are in the 20% to 50% slope category, with lands exceeding 50% located along the western section of the project boundary and in the Sawmill Creek drainage to the east (GIS analysis). Within the project area, less than 2% of the lands are mapped as high and moderate hazard for landslides, which are strongly correlated to lands with slopes greater than 40% (Table 3-136).

Table 3-136. SINMAP landslide hazard ratings

Slope Stability Hazard	Stable		Low		Moderate		High	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Becker Project Area (19,327 acres)	18,078	94	918	5	201	1	130	<1

Eight landtype associations, 20 landtype units, and 8 soil map units are represented within the project area (Table 3-137; Wendt et al. 1973). Landtype and soil map unit delineations and descriptions with their respective component interpretations used in this analysis can be found in Attachment A of the soil resource technical report. The landtype association and landtype stratification more accurately describe the broadscale physiographic and ecological (abiotic and biotic) setting, whereas the differentiated soil units represent National Cooperative Soil Survey mapping. Both mapping efforts provide useful information for evaluating potential effects of proposed land management activities to soils and water.

Landtype associations and landtypes are stratified mapping levels that represent two sequential geographic scales within the land systems inventory concept (Wertz and Arnold 1972). This concept considers the lithology, geologic structure, and climate (basic components) that, over time, produce varying soils, landforms, and plant communities (manifest components). The integrated relationships between the basic and manifest components allow for recognizing the geomorphic development of the earth’s surface and understanding how certain biophysical ecosystem elements (hillslope erosion, sedimentation, stream channels, landforms, vegetation, animal life, etc.) respond to natural and management-caused disturbances (Wendt et al. 1975).

Table 3-137. Project area landtype associations and landtypes

Landtype Association Map Unit	Landtype Map Unit	Acres	Percent
F2—Low Relief Granitic Fluvial Lands	120e-2—Maturely Dissected Mountain Slope Land	7,211	37
	120e-1—Maturely Dissected Mountain Slope Land	3,562	18
	120e—Maturely Dissected Mountain Slope Land	2,371	12
F4—Strongly Dissected Granitic Fluvial Lands	120c-3—Strongly Dissected Mountain Slope Land	2,157	11
	S09-3—Stream Cut Valleys, Moderately Steep to Steep-sided, Very Narrow, Moderate to Steep Gradient	161	1
	S20-1—Stream Cut Granitic Valleys, Steep-sided, Narrow, Moderate Gradient	46	<1
	120c-11—Strongly Dissected Mountain Slope Land	40	<1
	120d-3—Steep Headlands	10	<1
F1—Granitic Fluvial Lands	120b-6—Moderately Dissected Mountain Slope Land	1,078	6
	120b-4—Moderately Dissected Mountain Slope Land	873	5
C2—Cryic Mountain Slopes	109d-1—Cryoplanated Headlands	481	2
	109b—Moderately Dissected Cryoplanated Mountain Slopes	425	2
	109-2—Cryoplanated Ridge Land	26	<1
	109a-1—Weakly Dissected Cryoplanated Mountain Slopes	2	<1
D2—Alluvial Lands	D01-1—Depositional Valleys, Steep-sided, Moderately Wide to Wide, Low Gradient	566	3
F5—Steep Granitic Canyon Slopes	S09-1—Stream Cut Valleys, Moderately Steep to Steep-sided with Narrow, Moderate Gradient	170	1
	122—Oversteepened Canyon Land	8	<1
	122-4—Oversteepened Canyon Land	1	<1
G1—Glaciated Granitic Headlands	111d-3—Steep, Benchy Glacial Headland	135	1
C1—Cryic Uplands	109-9—Cryoplanated Uplands	4	<1

Soil classifications and descriptions for the project area are listed in Attachment A of the soil resource technical report. The soils are derived from granitic parent material, with soil textures, coarse fragments, soil cover, and other factors primarily a function of slope position and aspect. At higher elevations and on steeper slopes, the soils are weakly developed with lesser amounts of organic material. Soils at the mid- and lower slope positions exhibit distinct variations as a function of aspect, with shallow, less productive soils occupying drier south- and southwest-facing slopes. Soils on northwest, north, and northeast aspects and in valley bottoms exhibit greater horizon development, higher moisture levels, and greater organic content. Composition of the surface textures and underlying parent materials suggests that soils in the project area are moderately productive (considering their origin from granitic parent material) and provide sufficient vegetation canopy and ground cover for protection against wind and water erosion.

The vegetation composition in the project area is described as 14,135 forested acres (89%), roughly 2,075 acres (11%) of nonforested vegetation, and a minor amount (<1%) of rock/barren/other lands. Elevation, slope, aspect, and precipitation are the primary drivers influencing the existing vegetation types, with about 33% of the project area classified as Potential Vegetation Group (PVG) 2—Warm Dry Douglas-fir, Moist Ponderosa Pine. Other

forested stands are predominantly PVG 1—Dry Ponderosa Pine (18%) and PVG 3—Cool Moist Douglas-fir (20%). The nonforested lands consist of deciduous brush species, with crown densities ranging from 10% to 40%. Refer to the vegetation technical report in the Project Record for more information on the forested and nonforested vegetation.

3.10.4 Detrimental Disturbance

3.10.4.1 Affected Environment

Existing conditions for the soil quality indicators are a function of inherent characteristics that have been influenced by past and current land uses. NFS lands within the analysis area provide year-round recreational opportunities that include developed and dispersed recreation (camping, motorized and nonmotorized trail uses, and snowmobiling) and big game hunting. A number of past (including historic) and ongoing disturbances have influenced the existing conditions of the indicators: Native American settlements and activities; mining; timber harvest, reforestation, and road construction; livestock grazing; insect and disease effects to vegetation; personal fuelwood gathering; and the recreation activities mentioned above. Wildland fire (1989) and prescribed fire have also influenced the existing vegetation and soil conditions, while fire suppression and fire exclusion have likely had a considerable effect on current conditions (fuels technical report available in the project record).

All of these disturbances have had some influence on soil quality, primarily due to removal of or changes in native vegetation. Some disturbances have caused residual and chronic soil displacement or compaction in localized areas that are distributed throughout the project area. Conversely, some activities may result in ground disturbance but with no reduction in soil quality. As impacts to soils ameliorate or are actively reclaimed to begin restoring productivity, soil quality conditions transition back and forth along a disturbance continuum (Figure 3-108). As previously stated, information from various reconnaissance and inventories for fuels, wildlife, and vegetation indicate that conditions for the soil quality indicators across the majority of the project area are contributing to meeting desired conditions for soils.

Detrimental disturbance (DD) is the alteration of natural soil characteristics that results in immediate or prolonged loss of soil productivity and soil-hydrologic conditions. At least 85% of an activity area should be in a nondetrimentally disturbed condition. Stated another way, no more than 15% of an activity area should have detrimentally disturbed soil after management activities are completed. DD can occur where soil has been displaced, compacted, puddled, or severely burned. Determination of DD excludes existing or planned classified transportation facilities, dedicated trails, landings, mining dumps or excavations, parking areas, developed campgrounds, and other dedicated facilities; impacts of these actions are considered total soil resource commitment (TSRC) as described below.

Standards for detrimentally disturbed soils are to be applied to existing or planned activities that are available for multiple uses. These standards do not apply to areas with dedicated uses such as mines, ski areas, campgrounds, and administrative sites (USDA Forest Service 2010a, p. Gl-12).

The spatial scale for estimating DD is the activity area, as defined by the areal extent of specific actions that may cause detrimental soil impacts (e.g., commercial timber harvest unit, noncommercial thinning unit, or prescriptive fire burn block) (USDA Forest

Service 2010a, p. Gl-1). Existing DD in the activity areas ranges from 0% to 5% and is attributed to past timber harvest, livestock grazing, dispersed recreation, off-highway vehicle use, and personal fuelwood gathering (Appendix D). The existing DD was estimated by overlaying the proposed treatment units with known disturbances from current and ongoing management activities using corporate GIS data and field observations. However, until these existing disturbances are discussed in the context of cumulative effects when combined with direct/indirect effects from activity areas associated with the proposed action or alternatives or as part of Alternative A, there is no relevance for existing DD to be consistent with Forest Plan Standard SWST02.

3.10.4.2 Environmental Effects

Direct and Indirect Effects

Direct and indirect effects on soil quality are limited to those specifically resulting from proposed management actions within activity areas delineated to implement vegetation management activities (commercial and noncommercial thinning and prescribed [Rx] fire).

Alternative A

No activities are proposed under the No Action Alternative; therefore, there are no activity areas and no direct and indirect effects. Where it exists across the project area, DD from livestock grazing, dispersed recreation, and personal fuelwood gathering are expected to persist but not increase in the temporary, short-, or long-term time frames.

All Action Alternatives

For all action alternatives, the direct and indirect effects from implementing proposed activities that create ground disturbance would increase DD in each activity area in the temporary to short term (0–15 years). The estimated increases in DD would be less than 15% for all activity areas (Table 3-138); therefore, implementing any action alternative would comply with Forest Plan Standard SWST02.

Table 3-138. Summary of Detrimental Disturbance (DD) by alternative

Alternative	Existing Condition	Direct/Indirect Effect		Cumulative Effect	
		Commercial Timber Harvest	Prescribed Fire	5 Years	10 Years
A	0%–5%	0%	0%	0%–5%	0%–5%
B		6.9%–13.2%	2.0%–3.7%	0%–11.5%	0%–5.8%
C		6.9%–13.2%	2.0%–3.7%	0%–11.5%	0%–5.8%
D		6.9%–13.2%	1.9%–3.7%	0%–11.5%	0%–5.8%
E		2.3%–13.2%	2.0%–3.7%	0%–11.5%	0%–5.8%
F		2.3%–13.2%	2.0%–3.7%	0%–11.5%	0%–5.8%

DD is not predicted to exceed 15% in any of the timber harvest activity areas. About 14 of the 75 to 78 (depending on the alternative) units or activity areas are estimated to reach 13% DD immediately following timber harvest activities. For each timber harvest unit, a time lag exists between sequentially implemented treatments. Using prescribed fire to treat activity fuels occurs 1–3 years after timber harvest, and some of the initial DD increase from timber

harvest would recover to disturbed conditions as skid trails were actively reclaimed. Following prescribed fire implementation, the same 14 units would approach 13% to 15% DD (Appendix D).

Temporary and short-term increases in DD are expected in commercial harvest activity areas where ground-based equipment (dozers/rubber tire skidders or Timco) would cut trees and use skid trails to yard logs. The primary (designated) skid trails are classified as TSRC. However, it is common to use secondary (6- to 10-pass) skid trails that either branch off primary trails or are the only trails in small harvest units, a practice that may or may not cause detrimental soil compaction and displacement (Froehlich et al. 1983). The temporary and short-term direct effects from ground-based timber harvest decrease through stabilization of skid trail disturbances described under Design Features TH-4 and TH-5; stabilization is also required under the Idaho Forest Practices Act (IDAPA 20.02.01). However, some short-term (up to 10 years) increases in DD are expected due to residual impacts from primary and secondary skid trails since expecting that stabilization would occur on 100% of the skid trails or be 100% effective is unreasonable. Also, short-term (up to 15 years) increases in DD would exist from residual impacts where roads have been decommissioned and soil quality conditions transition from TSRC.

As previously stated, DD is associated with ground disturbance that accelerates soil displacement (erosion) or causes compaction. Since noncommercial thinning (felling of small diameter or submerchantable trees) would be accomplished with hand felling by chainsaws and not result in ground disturbance, no detrimental soil impacts (erosion or compaction) would be expected from implementing this activity.

Broadcast burning and prescribed fire would be implemented to reduce existing natural fuel loads as well as harvest-related and noncommercial thinning slash. The prescription for these treatments is to burn at low-to-moderate fire intensities with low soil burn severity, thereby having little impact to soil quality (Parsons et al. 2010, Debano 2000). Activity fuels treatments include lop and scatter and whole tree yarding. The analysis assumes that lop and scatter would result in greater fuel loads compared with whole tree yarding, with a slightly increased potential for higher soil burn severity. When added to existing ground fuels, breakage and slash from commercial timber harvest and noncommercial thinning can increase the overall fuel load, which leads to longer burning duration and severely burned soils (i.e., DD). However, this is not representative of the overall effects of prescribed burning, as high intensity fire with high soil burn severity occurs infrequently in very small patches (<1 acre) that are widely distributed across each activity area. Therefore, prescribed burning would not measurably affect DD.

The anticipated low severity burn is expected to result in minimal areas of bare soil, decreasing the potential for soil detachment and sediment transport. Moderate-to-high severity burn patches would be surrounded by unburned areas on hillslopes having intact vegetation and down woody debris. Combined with the Design Feature FF-5, which limits ignitions in RCAs, the unburned vegetative buffers would be effective in interrupting overland flow and trapping eroded soil, thereby minimizing sediment travel distances (Arkle and Pilliod 2010). Any hand-constructed fireline needed for the prescribed burning would temporarily increase DD. These disturbances would be reclaimed following implementation, resulting in no net increase in DD (Design Feature FF-3). The extent of detrimental soil disturbance at the conclusion of broadcast burning and related fireline/suppression activities

is not expected to result in measurable decreases in soil quality. Nondetrimental effects from prescribed fire would ameliorate the following growing season, with any detrimental conditions considered temporary and recovering in 1 to 3 years (Robichaud and Brown 1999, Robichaud et al. 2000, Neary et al. 2005). Burning piled slash does result in microsite impacts, but with no other activity being implemented to cause DD, over 200 slash piles per acre would be needed to exceed 15% DD for any activity area (Design Feature FF-5).

Effects that Differ by Action Alternative

For DD, the fundamental difference in direct and indirect effects between the action alternatives is the level of disturbance resulting from yarding methods used to implement commercial timber harvest activities. Ground-based yarding (tractor/jammer) is proposed exclusively for Alternatives B, C, and D while Alternatives E and F employ a mix of ground-based and helicopter yarding. Direct and indirect effects of the two harvest systems on the same harvest units (activity area) differ by 5% to 9% DD (Appendix D).

Increases in DD from helicopter yarding operations are essentially immeasurable when compared with ground-based systems (Potyondy et al. 1991). The primary factor for increased DD when using ground-based log yarding is the network of skid trails. Skid trails result in immediate and short-term DD, and only through effective application of design features can ground-based yarding be implemented to maintain or achieve acceptable soil quality conditions (Design Features FH-27, FH-28, TH-4, and TH-5).

Cumulative Effects

Within the delineated activity areas, detrimental soil conditions from disturbances occurring in the last 21 years were considered as existing or residual detrimental impacts that, when combined with the direct/indirect effects of the activities proposed in the Becker Integrated Resource Project, define the cumulative effect. Permitted livestock (sheep) grazing occurs throughout the northern part of the project, with minor amounts of DD resulting around the perimeter of shipping corrals, water developments, nooning areas, and bed grounds. Similarly, DD exists around the perimeters of developed recreation sites and dispersed recreation areas that are categorized as TSRC. Timber harvest and other ground-disturbing activities contributing to DD but predating 1988 are not included in this analysis, as those impacts have recovered (Arnup 1998). Cumulative effect values in this analysis represent existing DD and additive direct effects for implementing all treatments within a 3- to 5-year time period.

Alternative A

The cumulative effect is the same as direct and indirect effects for Alternative A as described above. Localized areas where soils are currently detrimentally compacted and/or displaced from past timber harvest would recover and stabilize over time, as the causative impacts no longer exist (Arnup 1988). Existing DD from present/ongoing livestock grazing, dispersed recreation, and personal fuelwood gathering would be expected to persist but not increase. No reasonably foreseeable management activities influencing DD would be implemented under Alternative A.

All Action Alternatives

For all action alternatives, the cumulative effects for DD by activity area are consistent with Forest Plan Standard SWST02. Within 5 years of project implementation, DD would range from 0% to 11.5%. Additional recovery of disturbances in each timber harvest unit would occur between 5 and 10 years following project implementation, with DD estimates at 10 years ranging from 0% to 5.8%. (Table 3-138).

Potential impacts from implementing the the action alternatives (specifically commercial timber harvest) would cause an incremental short-term, cumulative increase in DD in all activity areas, with greater impacts in activity areas having existing disturbances from past or present/ongoing activities. Over time, the decrease in residual DD through active reclamation or passive amelioration (Arnup 1998) would bring the cumulative DD within each activity area to between 0% and 5.8% by year 10 (Table 3-138). Over the longer term (20 years or more), residual DD resulting from more severe, localized impacts having longer-lasting effects would likely exist. These impacts would be confined to small areas less than 1 acre that are randomly distributed throughout an activity area.

Existing DD from present/ongoing livestock grazing, dispersed recreation, and personal fuelwood gathering would be expected to persist but not increase in the temporary, short-, or long-term time frames. No known foreseeable future management activities are known that could measurably increase or decrease cumulative DD within the respective activity areas.

The fundamental difference in cumulative effects between the action alternatives is the level of disturbance resulting from yarding methods used to implement commercial timber harvest activities. Ground-based yarding (tractor/jammer) is proposed for Alternatives B, C, and D while Alternatives E and F employ a mix of ground-based and helicopter yarding. Cumulative effects of the two harvest systems on the same harvest units (activity area) differ by 0.6% to 2.2% DD (Appendix D).

3.10.5 Total Soil Resource Commitment

3.10.5.1 Affected Environment

TSRC is the conversion of a productive site to an essentially unproductive site for a period of more than 50 years. Examples include classified or unclassified roads, inadequately restored haul roads, designated skid roads, landing areas, parking lots, mining dumps or excavations, dedicated trails (skid trails also), developed campgrounds, other dedicated facilities, and some stock driveways. Productivity on these areas ranges from 0% to 40% of natural.

Standards for TSRC are to be applied to existing or planned activities that are available for multiple uses. This standard does not apply to areas with dedicated uses such as mines, ski areas, campgrounds, and administrative sites (USDA Forest Service 2010a, p. Gl-50).

The spatial scale for estimating TSRC is the activity area, which is usually defined by the project boundary (USDA Forest Service 2010a, p. Gl-1). The existing condition for TSRC in the activity area is approximately 4.7% and can be attributed to impacts from existing transportation facilities, some limited past timber harvest, past and current livestock grazing, developed and dispersed recreation, off-highway vehicle use, and personal fuelwood gathering.

Similar to DD, until the existing TSRC is evaluated in the context of cumulative effects when combined with direct/indirect effects from the proposed action or alternatives or as part of Alternative A, there is no relevance of the existing conditions to Forest Plan Standard SWST032.

3.10.5.2 Environmental Effects

Direct and Indirect Effects

The TSRC activity area for direct/indirect and cumulative effects is the 19,327-acre project area. The rationale for this delineation is based on guidance in the Forest Plan (USDA Forest Service 2010a, p. Gl-1). TSRC acres were estimated by overlaying the developed recreation facilities, transportation facilities, and past harvest data in GIS with the project area boundary, field observations of a subset of TSRC sites, and review of high-resolution imagery. Attachment C of this document contains the TSRC analysis methodology, including a table of estimated TSRC by activity and assumptions made when estimating TSRC.

Alternative A

No activities are proposed under the No Action Alternative, therefore no direct/indirect effects would change TSRC. Where it exists across the project area, TSRC from livestock grazing, dispersed recreation, and personal fuelwood gathering would be expected to persist but not increase in the temporary, short-, or long-term time frames.

All Action Alternatives

All action alternatives proposed constructing new NFS roads and trails, decommissioning roads, and constructing trailhead (Table 3-139).

Table 3-139. Action alternative features influencing Total Soil Resource Commitment (TSRC)

TSRC Feature	Alternative					
	A	B	C	D	E	F
NFS Roads (miles)	136.5	136.5	136.5	136.5	133.6	133.6
NFS Roads—Decommission (miles)	—	–22.8	–22.8	–22.8	–24.8	–23.6
NFS Motorized Trails (miles)	—	4.2	4.0	4.0	0.0	2.9
NFS Nonmotorized Trails (miles)	19.5	44.5	44.5	44.5	47.4	47.4
Recreation Trailhead (number)	—	2	2	2	1	2

For all action alternatives, construction of skid trails and log landings, construction of travel routes, and construction of recreation facilities would increase TSRC. For some activities (e.g., construction of skid trails, log lands, and temporary roads), the increase would be short term (0-15 years) as those disturbances would be rehabilitated to DD or disturbed conditions. Decommissioning NFS and unauthorized routes would decrease TSRC over the long term. In addition to road decommissioning, Design Features FH-6 (rehabilitate landings), FH-27 (use existing disturbances as skid trails), and TH-5 (rehabilitate skid trails and temporary roads) would be necessary to achieve soil restoration objectives and consistency with Forest Plan Standard SWST03. Disturbance activities, data, and calculations used to derive TSRC estimates are located in the soil resource technical report.

An interim increase of 1.1% to 1.7% in TSRC would occur from constructing and using log landings, skid trails, and up to 3.2 miles of temporary road to facilitate commercial timber harvest (see soils technical report available in the project record). The determination that these direct effects would be temporary is addressed through Design Features FH-6 and TH-5, which require that these disturbances be reclaimed when they are no longer needed for timber harvest, essentially alleviating the increased TSRC. Constructing about 4.8 miles of new specified road and realigning 1.2 miles of NFS roads would slightly increase TSRC over the existing conditions by about 0.1% (Table 3-140 and Appendix D). Decommissioning roughly 30.9 miles of existing NFS (22.8 miles) and unauthorized routes (8.1 miles) would reduce TSRC by 0.6%.

Table 3-140. Total Soil Resource Commitment (TSRC) by alternative

TSRC Feature	Cumulative Effects by Alternative (%)					
	A	B	C	D	E	F
National Forest System (NFS) roads (includes 8.4-mile State Highway 21)	3.33%	2.83%	2.83%	2.83%	2.77%	2.77%
NFS road—New Construction		0.02%	0.02%	0.02%	0.02%	0.02%
NFS Road—Reconstruction/relocation		0.10%	0.10%	0.10%	0.10%	0.10%
NFS Road—Decommission		-0.47%	-0.47%	-0.47%	-0.51%	-0.49%
Unauthorized Roads	0.71%	0.45%	0.45%	0.45%	0.46%	0.45%
Unauthorized Roads—Decommission		-0.13%	-0.13%	-0.13%	-0.13%	-0.13%
Temporary Road—Construction		0.00%	0.00%	0.00%	0.00%	0.00%
NFS Motorized Trails—Construction		0.04%	0.04%	0.04%	0.00%	0.03%
NFS Nonmotorized Trails—Construction	0.11%	0.25%	0.25%	0.25%	0.27%	0.27%
Recreation Disturbances	0.50%	0.53%	0.53%	0.53%	0.52%	0.53%
Skid Trails		0.31%	0.31%	0.32%	0.19%	0.27%
Landings		0.00%	0.00%	0.00%	0.00%	0.00%
Livestock Disturbances	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%
Cumulative TSRC	**4.7%**	**4.0%**	**4.0%**	**3.8%**	**3.8%**	**3.9%**

Values based on 19,327 acre project area.

Most of the forested stands within the project area are roaded and have previously been logged, most notably in the 1980s and most recently in 1995. Remnants of old skid trails are evident, many of which could be reused to implement the proposed commercial harvest. The remnant trails have varying levels of vegetative cover, and the existing effects are discontinuous across the spectrum of soil disturbance. Therefore, existing effects are difficult to quantify from a soil quality perspective. Some of the proposed primary skid trails would be colocated over existing disturbances, and this TSRC is already accounted for under existing conditions.

Based on the configuration of harvest units, 108 to 141 log landings with an average size of 0.5 acres would be needed to implement the proposed commercial timber harvest. The actual number of landings and their equivalent impact area may vary, as the preference is to minimize new construction/ground disturbance and locate landings in currently disturbed areas or collocate them within existing road prisms. The log landings would temporarily increase TSRC, but disturbance would be rehabilitated to DD or disturbed conditions. Project Design Feature FH 6 requires that newly constructed landings be ripped and reshaped to provide acceptable infiltration and surface drainage, that slash be distributed to cover

approximately 30% of the reshaped surface, and that the area be planted with a Forest Service–approved seed mixture once harvest activities are completed. Depending on existing or potential resource impacts that might occur, any dispersed recreation areas that are reused as landings may or may not be fully restored.

Proposed trailheads would be located in areas already identified as existing TSRC from dispersed recreation. Construction of the trailheads would slightly increase TSRC as the disturbance footprint would be slightly greater than the existing disturbance. New motorized trail construction of 1.6 to 2.1 miles would increase TSRC. Conversion of existing routes (either NFS or unauthorized) to motorized or nonmotorized trails would slightly decrease TSRC over the long term as the disturbed width of the route feature would effectively narrow. Margins along the route prism would recover to DD and eventually to a disturbed condition. This recovery would occur primarily through passive amelioration based on the varied intensity of impact when the original route was constructed and the inherent properties that contribute to soil-forming processes. While the potential change in TSRC can be estimated, it is inappropriate to attempt to quantify the transition to DD or disturbed conditions.

Minor differences in direct/indirect effects occurring in year 1 between the action alternatives cannot be attributed to any one action (Table 3-139). The key feature contributing to decreased TSRC is the proposed decommissioning of 22.8 miles of NFS roads under Alternatives B, C, and D; 24.8 miles under Alternative E; and 23.6 miles under Alternative F (Table 3-139).

Cumulative Effects

With none of the alternatives affecting soil quality outside the project area, the activity area for assessing cumulative effects consists of the 19,327-acre project area. The existing conditions for TSRC reflect the past and present/ongoing impacts of the travel routes and long-term disturbances.

Alternative A

The cumulative effects for Alternative A are the same as the direct and indirect effects described above for this alternative. Existing TSRC from present/ongoing travel routes, limited livestock trailing, developed and dispersed recreation, and personal fuelwood gathering would be expected to persist but not increase in the temporary, short-, or long-term time frames. No reasonably foreseeable management activities influencing TSRC would be implemented under Alternative A.

All Action Alternatives

Given the minimal potential for any of the past/ongoing actions to increase TSRC, cumulative effects from implementing any action alternative would decrease when compared with existing conditions (Table 3-140). At the conclusion of implementing all activities, TSRC is estimated to range between 3.8% and 4.0%, an overall decrease of 0.7% to 0.9% compared with existing TSRC. Any action alternative would be consistent with Forest Plan Standard SWST03.

The action alternatives would increase cumulative TSRC in the temporary and short term by about 0.5%. In the long term, rehabilitation of log landings and primary skid trails and road decommissioning would decrease TSRC; with road decommissioning accounting for up to a 0.6% reduction.

Similar to direct and indirect effects, a 0.2% difference in cumulative TSRC exists between the action alternatives because of the miles of road decommissioning proposed under each alternative: 22.8 miles under Alternatives B, C, and D; 24.8 miles udner Alternative E; and 23.6 miles under Alternative F.

3.10.6 Slope Stability

3.10.6.1 Affected Environment

Proposed management activities are evaluated to avoid increasing the potential for landslides. Landslide is a collective term that includes mass, deep-seated geologic failures and smaller localized mass erosion events such as slumps, debris flows, and debris slides. Landslides have been documented as the dominant form of sediment delivery to streams in the Idaho batholith (Arnold 1988, Megahan et al. 1978).

Landslides are discussed in terms of slope stability hazards. Although landslides are naturally occurring events, road corridors and, to a lesser extent, timber harvest and other site-specific management actions with the likelihood of modifying landslide processes should be evaluated. Analysis of proposed activities on landslide prone (LSP) areas includes estimating the potential direct/indirect and cumulative effects on fish habitat, long-term soil productivity, water quality/watershed function, and risks to life and property. The spatial extent for estimating the effects that proposed activities may have on slope stability is the footprint of a specific activity over the inherent LSP rating for a given area. Identifying and managing LSP areas is guided by the Forest Plan (USDA Forest Service 2010a, Appendix B-41).

Landslide initiation is often associated with extremely wet periods, such as rain-on-snow events. Landslides to not include slow soil mass movements, such as deep earth flows and rotational slumps, nor do LSP areas include snow avalanche or rock fall areas. Translational slides have been documented as the dominant form of landslides for the majority of the Forest (USDA Forest Service 2010a, p. Gl-26).

Understanding the primary factors that regulate slope stability (i.e., soil moisture, root strength, and slope gradient) and the disturbances (management-related or natural) that have greater potential to initiate landslides (Megahan et al. 1978) is important to avoid or prevent landslides. Section 3.2 provides baseline conditions to identify existing slope stability concerns and provide context for evaluating potential effects to slope stability from proposed management activities.

Slope stability hazards were initially identified through analysis of high-resolution digital imagery intersected with slope hazard GIS data (SINMAP, Pack et al. 1998). This coarse filter did not reveal large-scale landslide scars or features, nor did it provide indications of obvious stability hazards within the activity areas. Field verification was completed in 2008 on a portion of the project area, focused where management actions are proposed on moderate and high slope stability hazard areas. This ground reconnaissance identified no

specific locations of slope instability as a result of natural and past/ongoing management activities or any hillslope failures or stability concerns attributed to past timber harvest activities.

3.10.6.2 Environmental Effects

Direct and Indirect Effects

The activity area for assessing direct and indirect for slope stability is the 19,327-acre project area. The analysis focused on locations where management activities are being proposed on lands with moderate and high slope stability hazards. These locations present the greatest likelihood for management activities to influence the natural processes that affect slope stability. Management actions considered include the individual vegetation treatment activity areas, corridors for existing and proposed travel routes, and site-specific locations for developed recreation facilities. The rationale for this delineation is based on Forest Plan guidance (USDA Forest Service 2010a, p. B-44). There are 1.1 miles (of 206 total miles) of existing NFS and unauthorized routes located on moderate or high LSP areas in the project area.

Alternative A

Because Alternative A would not implement any management activities, no additional direct/indirect, short-term, or long-term effects that would increase the occurrence of landslides are expected. There would be no direct/indirect effects to the three primary factors that influence slope stability (i.e., soil moisture, root strength, and slope gradient); therefore, this alternative would neither increase nor decrease the likelihood of new landslides.

All Action Alternatives

Based on the analysis and subsequent field verification of locations where instability features may exist, no direct/indirect effects are expected when implementing any of the action alternatives. All action alternatives would comply with Forest Plan Standard SWST12.

The likelihood is very low for proposed vegetation actions to increase the probability of landslide occurrence. Within the project area, less than 2% of the lands are mapped as moderate or high hazard for landslides (Table 3-136). The acres of slope stability hazards displayed in the table represent the sum of numerous smaller sites within any individual activity area; the largest contiguous patch of unstable lands (e.g., “moderate” or “high” LSP rating) within a commercial timber harvest activity area is approximately 8 acres. Project Design Feature FH-26 requires identification and field verification of moderate and high hazard landslide prone areas that coincide with proposed timber harvest, prescribed fire, new/temporary road construction, and trail construction during project implementation. Site-specific management measures are required where proposed activities increase the probability of landslides.

Review of high-resolution digital imagery intersected with slope stability hazard GIS data reveal that commercial timber harvest, noncommercial thinning, or prescribed fire are proposed on up to 65 acres of the lands identified as moderate and high hazard for slope stability (Table 3-141).

A total of 0.7 miles of existing roads (distributed across 17 road segments, with the longest segment measuring 0.1 mile) are located on land classified as moderate or high hazard for slope stability hazard (Table 3-141). Less than 0.1 mile of proposed road construction occurs on unstable lands. All of the temporary road segments are in locations having stable or low stability hazard, primarily on level ground or gently sloping ridgelines, to provide access for log haul. No temporary, short- or long-term direct/indirect effects that would increase the occurrence of landslides from maintaining, constructing, or decommissioning system or temporary roads are expected.

Table 3-141. Summary of proposed activities on "moderate" and "high" landslide prone lands

Action	Alternative					
	A	B	C	D	E	F
Vegetation Management (acres)						
Commercial Harvest–Tractor Yarding	—	43	43	43	31	42
Commercial Harvest–Helicopter Yarding	—	0	0	0	12	1
Noncommercial Thinning[a]	—	65	65	65	65	65
Natural Fuels Fire Treatments[b]	—	62	62	62	62	62
Travel Routes (miles)						
National Forest System (NFS) and Unauthorized roads—Existing	1.1	0.7	0.7	0.7	0.7	0.7
NFS Roads–Construction/realignment	—	<0.1	<0.1	<0.1	<0.1	<0.1
NFS Roads–Decommission	—	0.3	0.3	0.3	0.3	0.3
Unauthorized roads–Decommission	—	—	—	—	—	—

[a]These areas of noncommercial thinning apply to treatments with no product removal.
[b]These acres consist of areas not having other mechanical treatments.

Cumulative Effects

The area used to assess the cumulative effects on slope stability consists of the 19,327-acre project area. No large-scale management-induced landslides have been identified within the project area. Known management-induced sites are limited to small hillslope failures of cut-and-fill slopes associated with road prisms. No additional foreseeable future activities should occur within the project area other than those assessed for direct and indirect effects that may influence the occurrence of landslides.

Alternative A

Considering that no large-scale activities are being implemented or planned in the future, the existing conditions and direct and indirect effects of Alternative A represent the cumulative effects. Cumulative effects for slope stability would be limited to the susceptibility of failures from existing road-related landslides. Given the project area's disturbance history, effects of current activities are not expected to change measurably, and because no future land management activities are planned for the project area, there would be no additional or incremental cumulative effects under Alternative A beyond the previously described direct and indirect effects.

All Action Alternatives

The analysis to identify areas having slope stability concerns, combined with implementing Design Feature FH-26 (field verification), provides the rationale for consistency with Forest Plan Standard SWST12 for all action alternatives.

Given the vegetation treatment prescriptions (e.g., selectivity of tree sizes to be removed and overall low intensity of proposed timber harvest activities) and absence of landslide indicators within the project area from more intensive vegetation management since the 1960s, the probability for proposed activities, where they overlap with present/ongoing activities, to increase slope instability is low. Furthermore, with the low potential for direct/indirect effects resulting from the proposed activities, no incremental or cumulative effects would be anticipated.

Proposed road maintenance and decommissioning activities would reduce the potential for road failures at many locations, thus having a long-term beneficial cumulative effect on slope stability.

3.11 BOTANICAL RESOURCES

3.11.1 Analysis Scale, Data Sources, and Methodology

3.11.1.1 Analysis Scale

Direct, indirect, and cumulative effects were tracked spatially at the project area level with the addition of known occupied rare plant/whitebark pine habitat adjacent to the project area. This scale was chosen because this area will likely face potential impacts from proposed management activities for this resource. Temporary (0–3years), short-term (3–15 years), and long-term (15+ years) timeframes were used to depict effects to the indicators.

3.11.1.2 Data Sources

Habitat suitability for rare plant species was analyzed using currently available information, including analysis from the botanical specialist report and biological evaluation for the Project (project record); Potential Vegetation Group (PVG) and habitat type classification (Mehl et al. 1998, Steele 1981); knowledge of rare species habitat suitability (USDA Forest Service 2000); Natural Heritage Program (NHP) databases for adjacent states (Oregon Biodiversity Information Center 2014, WNHP 2014); and the Idaho Fish and Wildlife Information System (IDFG) field data collection, database, and status records of local rare plant populations (IDFG 2014b, 2015).

3.11.1.3 Methodology

Botanical surveys were conducted (K. Beall, IDT Botanist) for the project area in conjunction with the originally proposed project (botanical field surveys 2006; Sacajawea's bitterroot focus surveys 2008b; seed collection 2008c), as well as project analysis (project record). Additional field surveys of botanical resources and noxious weeds were conducted in 2014 (project record). Additionally, portions of the project area had been previously visited for other purposes, and numerous visits were made in summer 2007 to collect native seed. However, due to the large size of the project area, the entire acreage was not surveyed.

To more effectively identify habitat with a high potential to support Sacajawea's bitterroot, a model based on known information about the population within the project area and surrounding local populations was created (Forest GIS; USDA Forest Service 2015e,f,g,h). Biological and physical characteristics at each site or Area of Interest (AOI) were determined, and then used to generate parameters for what was considered habitat with high potential for occupancy by Sacajawea's bitterroot. These traits included elevation, landtype, slope, tree size class, canopy cover, and dominant vegetation type. The model was run with different variables and the results compared with what had been identified visually as potential habitat from aerial photographs based on past field experience with the species.

3.11.2 Analysis Indicators

The following are indicators of concern for botanical resources:

- Absence/presence of rare plants
- Absence/presence of rare plant suitable habitat
- Effect of activities on rare plants and habitat
- Integrity of native plant habitat

How these resources are affected by proposed activities informs the issues that were used to compare alternatives.

3.11.3 Affected Environment

Only rare plants that currently exist within or adjacent to the project area or that have potential habitat in the area will be discussed here (Table 3-142). No effects or impacts to other rare plants that the Forest considers in NEPA analysis are anticipated due to lack of suitable habitat within the project area. See the botanical technical report (see project record) for a list and habitat descriptions of plant species that are tracked by the Forest.

3.11.3.1 Rare Plant Habitat

The project elevation ranges from about 5,040 to about 8,120 feet. Area soils are dominated by granitic derived parent materials. The project area encompasses a large space and a diversity of vegetation types. Over 80% of the project area is comprised of these upland forested types: PVG 1 (Dry Ponderosa Pine, Xeric Douglas-fir), PVG 2 (Warm, Dry Douglas-fir/Moist Ponderosa Pine), PVG 3 (Cool, Moist Douglas-fir) and PVG 4 (Cool, Dry Douglas-fir). PVG 7 (Warm, Dry Subalpine Fir) and PVG 10 (Persistent Lodgepole) (Forest GIS layers) are minor vegetation types in the project area and PVG 11 (High Elevation Subalpine Fir) represents less than 1%.

Land classified as non-forested (including sagebrush, grasslands, aspen, mountain shrubs, and meadows) comprises most of the remainder (11%) of the project area, along with a fraction (less than 1%) categorized as barren rock. Riparian vegetation, which comprises nearly 11% of the project area, can be primarily categorized as riverine riparian or shrub riparian, with riverine riparian being most common in areas of proposed activity.

Table 3-142. Rare plant species for the Becker Integrated Resource Project area

Rare Plant Species Populations/Habitat	Habitat Description	Documented Location in Crooked River 5th Field HUC?	Potential Habitat in/near Project Area?
Candidate			
Pinus albicaulis Whitebark pine	Upper subalpine plant communities at cold and windy high-elevation or high-latitude sites in western North America. Occurs at 7,300–10,500 feet in Idaho.	Yes[1]	Yes[1]
Sensitive			
Bryum calobryoides Bryum Moss	Low gradient wetlands, moist soil or rocks at montane-to-subalpine elevations (5,000 ft+). Meadows to moist cliff sides.	No	Yes[2]
Douglasia idahoensis Idaho dwarf primrose/Idaho douglasia	North and east facing slopes on open, subalpine ridges in whitebark pine and subalpine fir forests (7,200–9,000 ft).	Yes[1] Extreme NE corner CR 5th HUC	Yes[2]
Lewisia sacajaweana Sacajawea's bitterroot	Relatively sparse upper slopes and ridgetops, may have overstory. Fractured bedrock, granitic soils near late snowbanks (5,400–9,500 ft).	Yes[1] + Multiple populations in surrounding 5th HUCs	Yes[1] Occupied habitat around Pilot Peak
Phacelia minutissima Small Phacelia	Sagebrush and aspen stands with late snow banks or seeps. Dense false hellebore patches, down-slope from aspen, open understory (5,000–8,200 ft).	No	Yes[2]
Boise Forest Watch			
*Allium validum** Pacific onion/Tall swamp onion	Mid-to-high elevation riparian areas, forested seeps, margins of streams in subalpine fir habitat, boggy subalpine lake edges (5,500–8,100 ft).	Yes[1]	Yes[2]
Botrychium crenulatum Scalloped moonwort	Moist meadows, creek banks, shrub- or tree-dominated wetlands, springy spots, and wet roadside areas (3,900–8,200 ft).	Yes[1] Harris Creek Summit Area	Yes[2]
Botrychium simplex Little grapefern	Wide variety of habitats including meadows and forested types (4,000–6,600+ ft) on Forest.	No	Yes[2]
Carex straminiformis Mt. Shasta sedge	Open, rocky, gravelly slopes, often near persistent snowbanks, near or above timberline (6,500–12,000+ ft).	No	Yes2
Polystichum kruckebergii Kruckeberg's hollyfern	Rocks and cliffs in subalpine-to-alpine habitats; (1,500–3,200 ft); B.C.; CA., ID, MT., NV., OR., UT, WA.	No	Yes[2]
Sanicula graveolens Sierra sanicle	Open or lightly wooded slopes or flats. Found on both granitics and basalts (2,000–6,500 ft).	No	Yes[2]
Sedum leibergii Leiberg stonecrop	Cliffs and rocky slopes with west-northwest aspect. Often with Douglas-fir (5,000–9,000 feet).	No	Yes[2]
Triantha occidentalis ssp. brevistyla Sticky tofieldia	Wet meadows, streambanks, peatlands, and marshes. Sea level to 7,900 ft. Alta., B.C.; AK, ID, OR., WA.	No	Yes[2]

Yes[1] - Documented sites are found in the project area or close by in the analysis area (5th HUC).
Yes[2] - No documented sites are known from inside the project area, but potential habitat/or undocumented populations may occur there.
**Allium validum* is no longer on the Forest Watch list.

3.11.3.2 Rare Plant Species

Idaho Pepperweed

The U.S. Fish and Wildlife Service (USFWS) maintains the list of Threatened, Endangered, Proposed, and Candidate species and posts updates of the species to be included in Section 7 Consultation (ESA) in Idaho on their Website (USDI FWS 2015). The current list includes Idaho pepperweed (*Lepidium papilliferum*) (Proposed Endangered); however, no known populations of this plant exist on the Forest, and the project area is outside the area of Proposed Critical Habitat for the species (USDI FWS 2011a,b; USDI FWS 2014a,b) and no suitable habitat exists at the proposed project site. Listing status and designation of critical habitat for this species is in transition—the USFWS has issued notices (USDI FWS 2014a,b) to designate the species as Threatened and to revise the area considered for critical habitat designation. These changes would have no effect to the habitat and impact analysis for this plant and the actions proposed here. No further discussion of the species is included in this document.

Whitebark Pine

Whitebark pine (*Pinus albicaulis*) is included on the list as a Candidate species for Boise County. Whitebark pine has been documented in the project area, and additonal undocumented occurences may be present. As a Candidate for listing, whitebark pine is now classified as Sensitive within the Forest Service Intermountain Region (R4) (USDA Forest Service 2014e).

Whitebark pine occurs in subalpine and timberline zones from British Columbia and Alberta and south to central Idaho, southwestern Wyoming, and southern California. This slow-growing, long-lived, five-needled pine of the *Strobus* subgenus is the only stone pine native to North America. Its elevation range in Idaho is generally 7,300–10,500 feet (USDI FWS 2011c). Whitebark pine may also occur incidentally at lower elevations, which has been documented in the project area.

The tree may occur in monotypic stands (especially at high elevations) or in mixed stands with other conifers (such as limber pine, subalpine fir, and/or Rocky Mountain lodgepole pine), and can act as climax, early successional, or seral co-dominant within a community. The understory is typically sparsely vegetated, dominated by elk/Ross's sedge or cushion plants at the upper extent of its elevation, and grouse whortleberry, common juniper, pink mountain heath, Oregon boxwood, Idaho fescue, and/or smooth woodrush at lower elevation occurrences (Fryer 2002).

The full-cone bearing capability of whitebark pine is not typically reached until the tree is 60 years old (lifespan may be up to 500 years). The cones are not serotinous, and the large seeds are typically cached and dispersed by Clark's nutcrackers. Whitebark pine tolerates poor soils, steep slopes, and windy exposures, and grows from treeline down to the subalpine zone in relatively dry-to-moist environments.

Whitebark pine is considered a "keystone" or foundation species in North America and, therefore, a critical part of a properly functioning ecosystem. This tree is experiencing a range-wide decline, resulting in high mortality and low recruitment due to a number of factors, including white pine blister rust, mountain pine beetle, catastrophic fires, ecosystem

changes related to a history of fire exclusion (including succession-related encroachment by other conifers), and effects of climate change (USDI FWS 2011c).

Mapped occupied high-elevation whitebark pine habitat includes approximately 128 acres within the southeast corner of the project area, on lands characterized as PVGs 1, 4, 7, 10, 11, and 99 (non-forested) (see the botanical technical report for details about PVGs of whitebark pine habitat; Figure 3-109). Fire regimes for these types range from non-lethal to lethal. This acreage is part of a larger area of occupied habitat that extends beyond project area boundaries. Contiguous with the mapped whitebark pine is additional acreage (approximately 286 acres) within the project area that has a high likelihood of supporting whitebark pine (above 7,000 feet in appropriate vegetation types; the IDT Silviculturist reports observing additional whitebark pine along the ridge north of the mapped population (S. Wagner, pers. comm.)). Modelling done for Sacajawea's bitterroot (see discussion below) in the project area is being used as a surrogate for whitebark pine habitat, as the species are frequently known to co-occur.

Whitebark pine has been documented in the project area, with the greatest concentration in and adjacent to the southwestern corner, near Pilot Peak (Figure 3-110). One recorded stand (0035040517) occurs within the project area in subalpine fir habitat type, at an elevation much lower (around 5,400 feet) than is considered typical for the Forst and from where other occupied habitat in the project area is known. (These trees were not relocated in a follow-up survey conducted May 20, 2015by the IDT Silviculturist and Botanist.) Whitebark pine is occasionally observed on the Forest (K. Beall, pers. obs.) singly or in clumps in mixed stands of conifers at a lower elevation than expected; but this is a low-frequency occurrence, as whitebark pine in these locations comprises a very minor part of the surrounding vegetative community.

What role these "disjunct" individuals or small groups play in the larger ecological scheme of the species is unkown; but protecting trees that may add to the diversity and resiliency of whitebark pine is important.

Activities with the potential to impact whitebark pine populations or potential habitat include timber harvest and removal; thinning; road and trail construction, reconstruction, and maintenance; fuels treatment, including prescribed fire and slash disposal; and invasive plant treatment. Effects of these activities on whitebark pine populations and potential habitat will be the basis of alternative comparison.

Whitebark pine and additional habitat is present at upper elevations in the project area. The boundary of the known occupied habitat is less than 0.1 miles from the proposed use of direct and indirect fuels treatment, which suggests that occupied and potential habitat may be affected by proposed activities. Documented occurrences of individual whitebark pine in a stand at a lower elevation in the project area may also be impacted by vegetation management and fuels treatment activities.

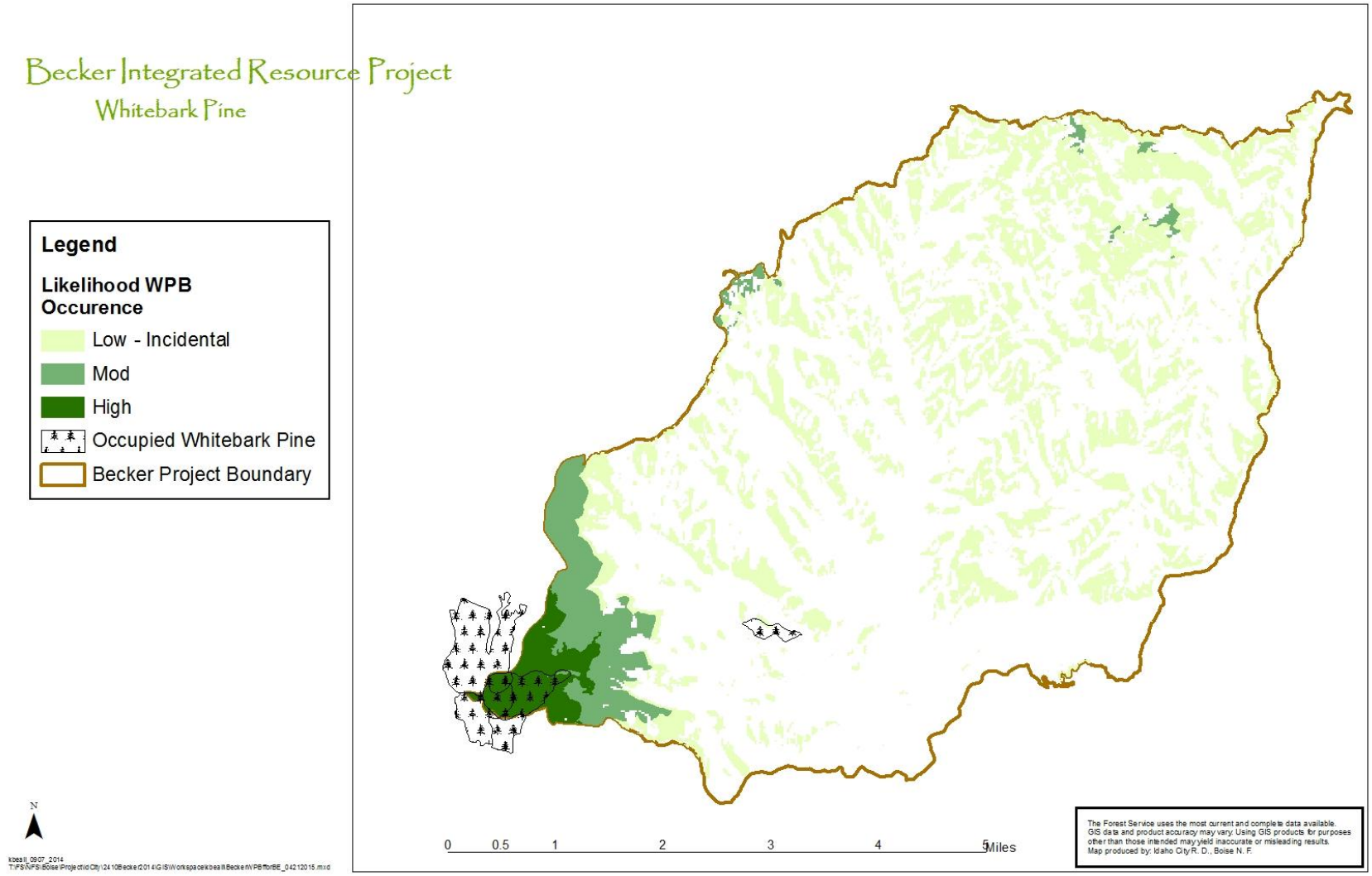


Figure 3-109. Occupied and suitable habitat for whitebark pine in the Becker Integrated Resource Project area

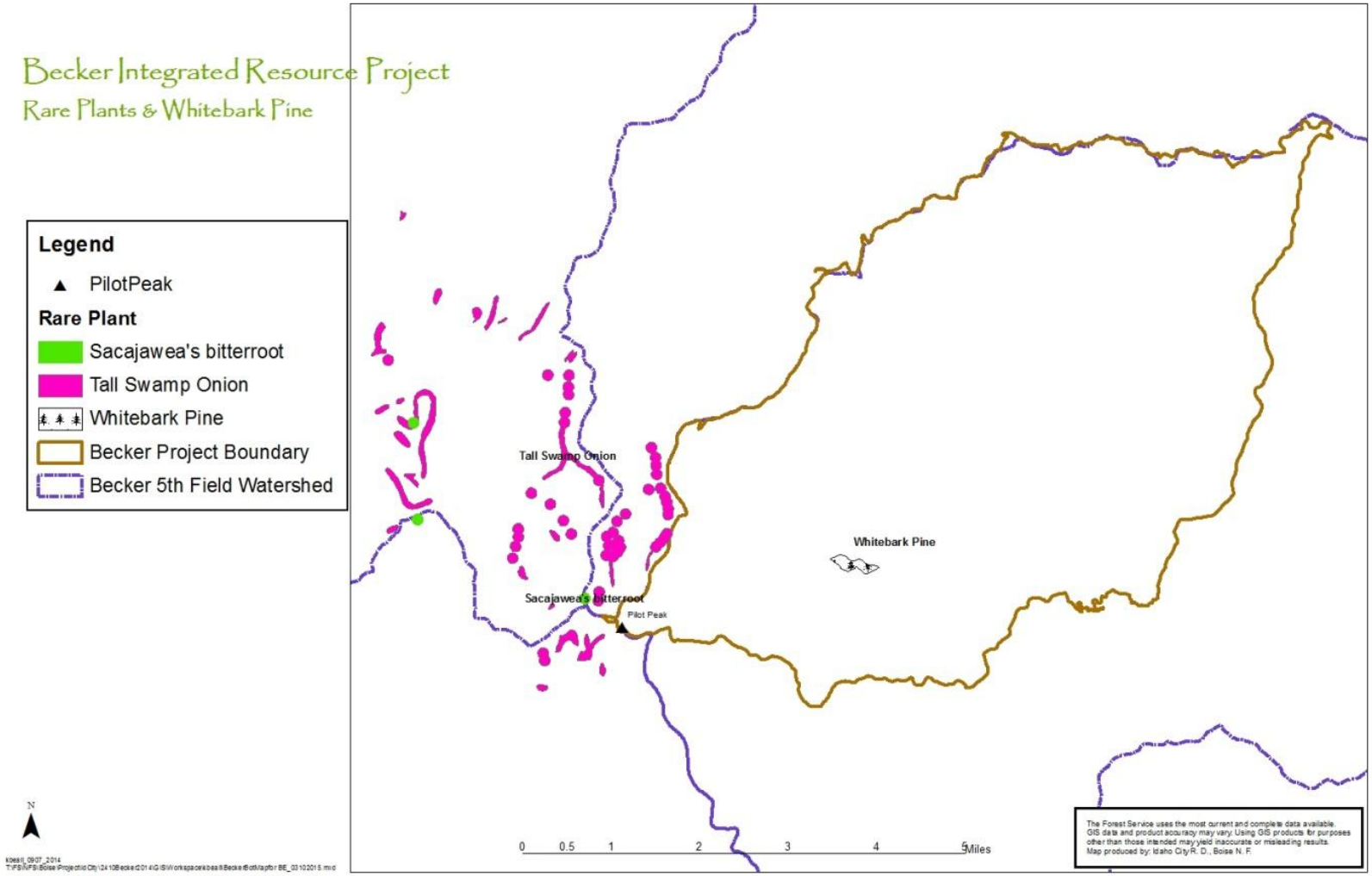


Figure 3-110. Known occupied rare plant and whitebark pine populations in relation to the Becker Integrated Resource Project area (data from Forest GIS layers)

Byrum Moss

Bryum moss (*Bryum calobryoides*) (Sensitive) is known from a variety of low gradient wetland types occurring at 5,000 feet and above. Suitable habitat is moist soil or rocks at montane to subalpine elevations, often in meadows. Soil types vary from basic to acidic rock to moist soils (Spence 1986).

The only documented site on the Forest is at Chattanooga Hot Springs near Atlanta (IDFG 2015). The original collection was made in 1941, and the population has not been relocated since that time. Suitable habitat for Bryum moss may be present within the RCAs of the project area and on riparian stream banks, meadows, moist rocky areas, seeps, or springs and may be affected by proposed culvert replacement and transportation-related activities.

Idaho Dwarf Primrose

Idaho dwarf primrose/Idaho douglasia (*Douglasia idahoensis*) (Sensitive) is a pink-flowered, mat-forming perennial endemic to central and north Idaho. It typically grows on north and east facing slopes on open, subalpine ridges in whitebark pine and subalpine fir forests at elevations between 7,200 and 9,000 feet. Its known associates are the same as those for Sacajawea's bitterroot (*Lewisia sacajaweana*) (USDA Forest Service 2000).

An Idaho dwarf primrose population occupies the extreme northeast corner of the Crooked River 5th HUC, on the ridgeline in the Wolf Mountain vicinity (BNF GIS Layer). Limited potential for this species could also occur at the uppermost elevations in the southwest corner of the project area.

No known occupied Idaho dwarf primrose exist in the project area. Approximately 360 acres within project area boundaries exceed 7,200 feet elevation. Rocky, north-facing ridges in this area may provide suitable habitat. Overlap may occur between some of the proposed activities (fuels treatments) and this suitable habitat, but most activities would not overlap this high-elevation portion of the project area.

Sacajawea's Bitterroot

Sacajawea's bitterroot (*Lewisia sacajaweana*) was recently formally recognized as a new species (Wilson et al. 2005), and is now considered to be "Globally Rare" rather than a "State Rare" taxon. Due to its limited range and rarity, it now carries a rank of G1, S1 (NatureServe 2015).

This small, perennial fleshy-leaved rosette is typically found on sparsely vegetated, gravelly openings in decomposed granite, commonly near late snow banks, upper slopes, and ridgetops. Sacajawea's bitterroot is endemic to the mountains of central Idaho. It is mapped between 5,560 and 9,200 feet elevation, although most populations are known to occur at 6,000 feet or higher. It is typically found on open balds or under an open overstory of several different conifer species (e.g., ponderosa pine, Douglas-fir, subalpine fir, lodgepole pine, and whitebark pine). The plant is often found with a specific, yet diverse, group of high-elevation forbs (USDA Forest Service 2000).

A documented population of Sacajawea's bitterroot exists in the southwest portion of the project area around Pilot Peak (Figure 3-110). Geographically, the plant extends south and west to the vicinity of Wilson, Freeman, and Sunset peaks. Undiscovered individuals within

the project area may exist on open or sparsely canopied, gravelly ridgetops and slopes at upper elevations.

Using a combination of information from the model (see data sources above) and field experience, high-quality potential habitat for Sacajawea's bitterroot would be described as follows:

- Upper-to-high elevation (the lowest elevations across range are upper 5,000 feet, but the majority of populations are above 6,000 feet, ranging to above 9,000 feet).
- Mountain sagebrush, lodgepole pine, subalpine fir, whitebark pine, or Douglas-fir/ponderosa pine are the dominant vegetation types or species present. Dominant vegetation type varies with elevation/aspect and influences the extent of canopy cover under which the plants may occur (Douglas-fir/ponderosa pine sites personally observed are extremely xeric; K. Beall, Becker IDT Botanist).
- Open to low-medium canopy cover of shrubs or conifers (including land classified as sparsely vegetated or non-forested).
- Tree size ranging from none (no trees) to medium tree size class (up to 19.9 inches diameter at breast height [dbh]).
- Course, gravelly soils or shallow duff layer overlying granitic/batholitic parent material.
- Certain understory herbaceous species are repeatedly present in or around Sacajawea's bitterroot habitat (Element Occurrence Records for *Lewisia sacajaweana*, linked to GIS layers from the Natural Heritage database [BNF GIS]).

The selected habitat model shows the portion of the project area considered to have a high potential for occupancy by Sacajawea's bitterroot (Figure 3-111). Habitat identified by this means would be field verified and searched for additional occupancy. Two stands that appear suitable for Sacajawea's bitterroot (based on field experience and aerial photography), and are contiguous with other areas identified by the model as having a high potential of occupancy, were added to that modelled habitat for a field check.

As whitebark pine is often a co-inhabitant, verification for that species would be conducted concurrently.

A population of Sacajawea's bitterroot exists in the southwestern corner of the project area (Figure 3-110). Additional habitat also exists in this area. Overlap may occur between some of the proposed activities (fuels treatments) and suitable habitat; but the boundary of the proposed activities is about 0.2 miles from documented occupied habitat, near Pilot Peak.

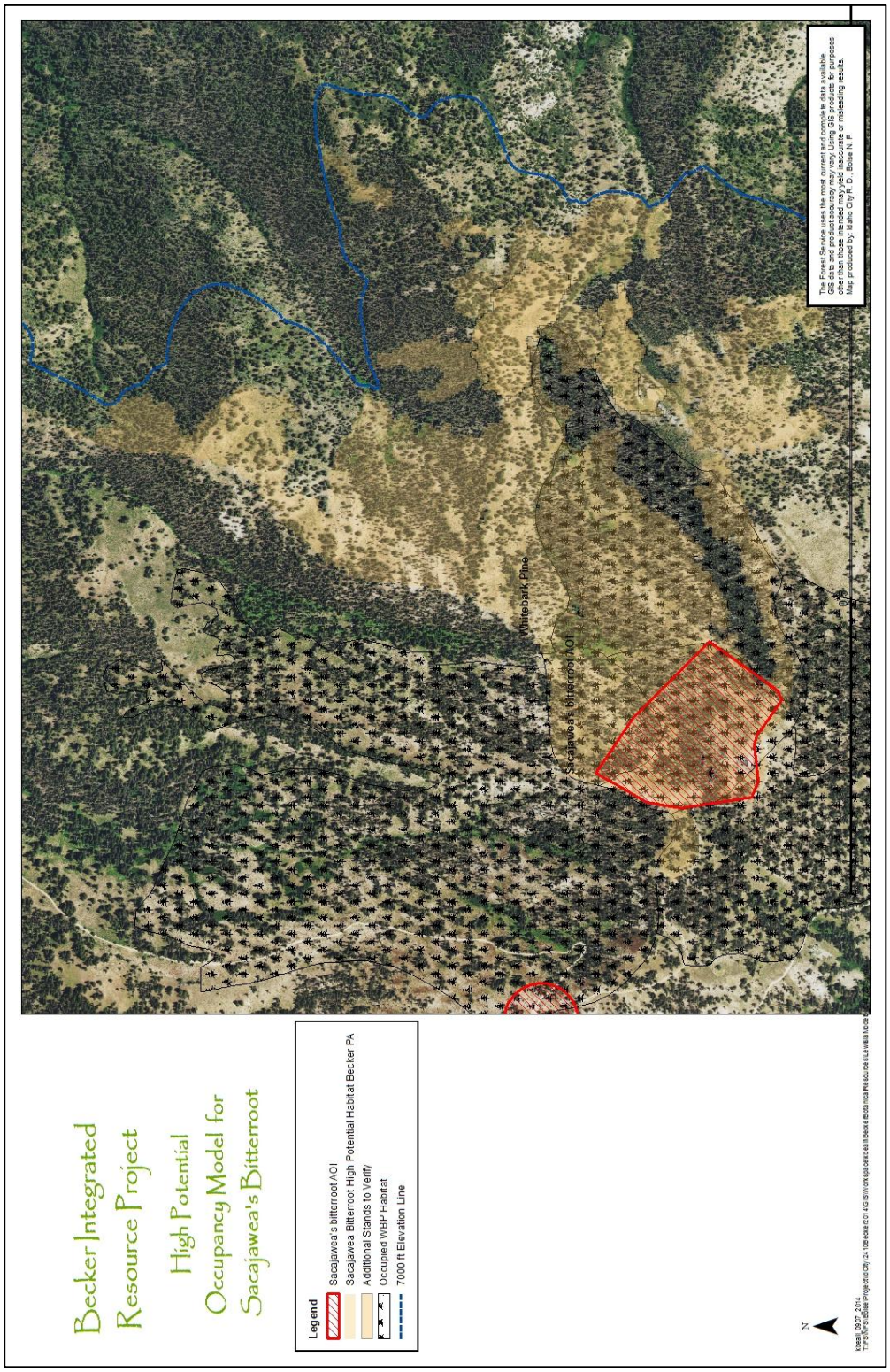


Figure 3-111. Area of occupied habitat/modelled habitat with a high potential for occupancy by Sacajawea's bitterroot and whitebark pine in the Becker project area

Small Phacelia

Small phacelia (*Phacelia minutissima*) is a tiny lavender-flowered annual that grows in upper elevations (5,000 to 8,200 feet), ephemerally moist drainages in sagebrush-steppe, or lower montane ponderosa pine or Douglas-fir forests. It is often near areas of late snow banks, typically occurring in meadows, springs, and seeps. Idaho populations occur mostly in stands of false hellebore (*Veratrum californicum*) and adjacent forbs/grasses or near mixed aspen, willow, and subalpine fir communities (Atwood 1997).

No known locations of this plant occur on the Forest (IDFG 2015). The two documented sites north of the Snake River (Soldier Mountains, Sawtooth National Forest; Hash Spring, Shoshone Bureau of Land Management) are historic; surveys conducted in the 1990s failed to relocate the sites. Multiple occurrences are known from the Owyhee Mountains.

Moist patches of aspen in the project area provide suitable habitat for this plant. Some overlap is anticipated between aspen stands and a variety of the proposed activities.

Pacific Onion

Pacific onion/tall swamp onion (*Allium validum*) has been removed from the official Forest Watch list as being more common than the new guidelines for the list dictate (rarity level of G2_S2 or above; USDA Forest Service 2015b). However, the type of upper-elevation riparian/wet meadow habitat that this species occupies is not common on the Forest, and it is particularly sensitive to disturbance. Finally, this species is still tracked by the Idaho Department of Fish and Game (IDFG 2014b).

Tall swamp onion is found in mid-high elevation riparian areas, wet meadows, forested seeps, and along stream margins in subalpine fir habitat and boggy subalpine lake edges. When in bloom in July and August, it is easily recognizable by its bright pink flowers and flat, succulent blue-green leaves. This plant is found at elevations between 5,500 and 8,100 feet (USDA Forest Service 2000).

Over 80% of the project area lies above 5,500 feet elevation, but generally, the vegetation types in most of the project area are too dry to support this species. Suitable habitat would be at the upper elevations in seeps, moist streambanks, or meadows. This plant would not occur in the dry, upland vegetation types.

Documented Pacific onion do exist in the upper reaches of Rock Creek (Lowman 5th HUC), Grimes Creek (Upper Grimes 5th HUC), and Mores Creek (Upper Mores 5th HUC) on the west and southwest side of the project area just outside the project area boundary. No known occupied habitat exists within the project area boundary, but additional suitable habitat may exist in upper-elevation riparian areas and seeps. A population of Pacific onion exists on the southwestern boundary of the project area (Figure 3-110).

No documented occurrences of Pacific onion exist within the project area. Several populations, however, do exist in the headwaters of adjacent watersheds. Thus, additional suitable, but unoccupied, habitat may exist within the project area.

Scalloped Moonwort and Little Grapefern

Scalloped moonwort (*Botrychium crenulatum*) and little grapefern (*Botrychium simplex*) are very small perennial ferns that typically occur in moist grass/forb meadows, or open

woodlands and montane forests or near streams, springs, seeps, or other wet areas. Moonworts occur over a wide elevational range (from sea level to over 10,000 feet) and members of this genus range widely in rarity (NatureServe 2014). Common associates may be strawberry, pussy-toes, bedstraw, snowberry, huckleberry, fescue, and a variety of conifer species and aspens (USDI FWS 2001).

Because of their diminutive size and the irregular appearance of aboveground fronds, they are difficult to survey, and populations can often go undetected. Plants may remain dormant underground for as long as 5 years, receiving nutrients through obligate association with endomychorrizal fungi (USDI FWS 2001). *Botrychium* species are notorious for being difficult to distinguish; and to further confuse matters, they often appear in "genus clusters", where a number of species grow in the same area.

During recent years, several populations of *Botrychium* spp., including little grapefern and scalloped moonwort, were discovered in a variety of habitats across the Forest. Three populations of little grapefern are known to occur on the Forest (IDFG 2015). The closest is in the Banner Creek Fen/Bull Trout Lake area (Lowman Ranger District), growing on the wetland margin of a Buxbaum's/water sedge community in the gaps of the lodgepole pine/shrubby cinquefoil upland community. A second population occurs at Tranquil Basin (Lowman Ranger District) in openings of mesic forbs/graminoids growing transitionally between willow/tufted hairgrass and bluejoint reedgrass communities and a drier meadow. Least moonwort has also been identified at two locations (may be considered subpopulations) in the Johnson Creek Road corridor (Cascade Ranger District), where they occupy grassy swales surrounded by lodgepole dominated uplands, characterized as PVG 7 and 10.

Currently, three documented populations of scalloped moonwort occur on the Forest (IDFG 2015). The closest (about 17 miles) to the project area is in the Harris Watershed, located along a small, unnamed stream near Harris Creek Summit in an understory of willows and other riparian shrubs.

Almost equidistant is a population located about one-third of a mile upstream from the Roaring River Research Natural Area (RNA) boundary. This population was identified in a Drummond's willow/red-osier dogwood riparian shrubland during classification work conducted by Idaho Fish and Game (IDFG 2014a). The Roaring River corridor in this area generally burned at low severity during the 2012 Trinity Ridge Fire; however, it is uncertain whether the scalloped moonwort site was burned. Fire can enhance moonwort habitat by creating new openings in forested areas, rejuvenating decadent woody riparian material, and stimulating aspen.

A third scalloped moonwort population is known from the Bear Creek RNA (Lowman Ranger District) and grows on a moist, lower terrace along the stream channel (with possible frequent flooding) under a dense shrub canopy of alderleaf buckthorn (*Rhamnus alnifolia*), with an understory of gooseberry and sedges.

No *Botrychium* species have been identified so far within the project area, but suitable moonwort habitat exists in drainages or wet areas, meadows, aspen stands, or moist swales in upland habitat. Moonworts are not likely found outside RCAs in the driest habitat types. Due to the difficulty in locating these plants, the lack of consistency in aboveground vegetative displays, and because not all suitable habitats in the project area were surveyed, it cannot be

assumed that the plants do not occur within the project area. Occupied *Botrychium* habitat likely occurs in upper elevation RCAs.

RCAs, meadows, and aspen stands surrounding the project area provide suitable habitat for moonwort ferns. Although no populations have been identified here, the difficulties of surveying for these diminutive plants makes detection less likely. A low likelihood of moonwort occurrence exists. Still, some overlap may occur with proposed activities in lower elevation, dry vegetation types in the project area; and the likelihood of undocumented occurrences in RCAs and moist, higher elevation portions of the project area is high.

Mt. Shasta Sedge

Mt. Shasta sedge (*Carex straminiformis*) is found on open, rocky, gravelly slopes, often close to persistent snowbanks at or near timberline. Its elevation range is from 6,500 to 12,000 feet (USDA Forest Service 2000).

The closest documented occurrence of this plant is located in the upper end of the Wapiti Creek (Lowman Ranger District) drainage near the boundary with the Sawtooth National Forest (IDFG 2015). The immediate terrain at the site is open and rocky with low-growing herbaceous vegetation. The surrounding habitat is a subalpine fir type, with scattered lodgepole pine and whitebark pine, and an elk sedge/forb understory.

No known occupied habitat exists in the project area, but suitable habitat for Mt. Shasta sedge populations exists at upper elevations (above 6,500 feet) of the project area near Pilot Peak on the southwest side and the project boundary/watershed divide in the northwest and the divide between Little Beaver and Sawmill creeks.

Kruckeberg's Hollyfern

Kruckeberg's hollyfern (*Polystichum kruckebergii*) occupies rocks and cliffs in subalpine-to-alpine habitats from about 4,900 feet to over 10,000 feet. Its range stretches from British Columbia across the Pacific Northwest and Sierras to the Northern Rockies. Populations sometimes consist of only two or three dwarfed plants that are difficult to distinguish from other species of sword fern (i.e., mountain hollyfern [*Polystichum scopulinum*]), with which they may co-occur.

Six recorded populations are documented in the IDFG Natural Heritage database (2015). The closest known population is a historic site on the Sawtooth National Forest in the McGown Peak area. The White Rock Peak population of Kruckeberg's hollyfern is about 1.0 mile from the Forest boundary north of Warm Lake on the Payette National Forest. Additional populations are documented in the Seven Devils in the Hells Canyon National Recreation Area (NRA), Cabin Creek Peak on the Sawtooth National Forest, and near the North Fork Owyhee River to the south, completing a semi-circle of sites around the Forest. This configuration increases the odds of this fern occupying undocumented sites in suitable habitat on the Forest. All current locations excepting the Owyhee population (4,890 feet) occur at elevations above 6,300 feet. Habitat descriptions range from rhyolite cliffs to granite rock crevices, ridges, and talus.

No known occupied habitat exists in the project area for Kruckeberg's hollyfern; but, suitable habitat and the potential for undocumented populations may exist in open, rocky areas and cliffs above 6,000 feet.

Sierra Sanicle

Sierra sanicle (*Sanicula graveolens*) occurs on both granitic or basalt soils between 2,000 and 7,800 feet elevation. Known Idaho occurrences (Payette National Forest) (IDFG 2015) are on dry, south-facing openings of decomposed granite above 6,100 feet (USDA Forest Service 2000). Suitable habitat may exist in rocky habitats in the upper elevation zones within the project area. The closest known population is to the north on the Payette National Forest.

No known occupied habitat exists for Sierra sanicle in the project area; however, suitable habitat and the potential for undocumented populations may exist in open, rocky habitats above 6,000 feet.

Leiberg Stonecrop

Leiberg stonecrop (*Sedum leibergii*) is a robust stonecrop with a large basal rosette of rounded leaves. It grows on cliffs and rocky slopes, with west and northwest exposures, on a variety of rock materials. It is commonly associated with Douglas-fir; known populations range in elevation from 5,000 to over 9,000 feet (USDA Forest Service 2000). No Leiberg stonecrop populations are known on the Forest, but known populations do exist on the Payette National Forest (IDFG 2015). Rocky areas above 5,000 feet within project area boundaries may provide suitable habitat.

No known occupied habitat exists in the project area for Leiberg stonecrop; however, suitable habitat and the potential for undocumented populations does exist in open, rocky habitats above 5,000 feet.

Sticky Tofieldia

Sticky tofieldia (*Triantha occidentalis* ssp. *brevistyla*) is a robust member of the lily family found in the northwestern United States, Canada, and Alaska. Flowers are small, greenish-white with numerous long basal leaves and strongly glandular-hairy stems. It occurs in wet meadows, streambanks, marshes, and peatlands from sea level to over 7,000 feet (FNA 2012; IDFG 2009; USDA NRCS 2013). Suitable habitat may exist in the upper elevations of the project area. This plant would not be found in the dry, upland vegetation types.

No known occupied habitat exists in the project area for sticky tofieldia (IDFG 2015); but wet meadows and RCAs at upper elevations may provide suitable habitat.

3.11.4 Environmental Effects

The actions proposed in this project vary in potential impacts to rare plant populations and suitable rare plant habitat. The varying impacts from all of the proposed activities are detailed in the botanical technical report (available in the project record). The botanical technical report also contains rankings that are the best estimates, based on type of habitat that the plants occupy (PVG, elevation, RCA/Upland), proximity of known populations, habitat availability with locations of the proposed activities, and the predicted severity of potential impacts. Table 3-143 displays a summary of the effects of each alternative to each botanical indicator.

Table 3-143. Determinations/risk ranking for rare plant species and potential habitat within the Becker Integrated Resource Project area for all allternatives

Plant Species Population/Habitat	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Candidate	**Effect or Impact**					
Whitebark pine	None	MII	MII	MII	MII	MII
Sensitive	**Impact**					
Bryum moss	None	MII	MII	MII	MII	MII
Idaho dwarf primrose	None	None	None	None	None	None
Sacajawea's bitterroot	None	MII	MII	MII	MII	MII
Small Phacelia	None	MII	MII	MII	MII	MII
Forest Watch	**Risk to Population Viability/Habitat**					
Pacific onion[a]	None	None	None	None	None	None
Scalloped moonwort	None	Low	Low	Low	Low	Low
Little grapefern	None	Low	Low	Low	Low	Low
Mt. Shasta sedge	None	Very low	Very low	Very low	Very low	Very low
Kruckeberg's hollyfern	None	Very low	Very low	Very low	Very low	Very low
Leiberg stonecrop	None	Low	Low	Low	Low	Low
Sierra sanicle	None	Low	Low	Low	Low	Low
Sticky tofieldia	None	Very low	Very low	Very low	Very low	Very low
Alternative Risk	None	Low	Low	Highest	Lowest	Lower

Note: "No Effect" and "Not Likely to Adversely Affect" are determinations used for Species Listed or Proposed Listed by the USFWS.
*For Federal Candidate species, determination language is the same as for FS Sensitive species: **NI** = No impact to any populations, species or habitat. **MII** = May impact individuals, but will not likely contribute to a trend toward Federal Listing or loss of viability to the populations or species. **BI** = Beneficial impact to the species or habitat.
[a]Pacific onion (*Allium validum*) is no longer on the Boise Forest Watch List but is still tracked by the Idaho Department of Fish and Game (IDFG 2014b)

3.11.4.1 Direct and Indirect Effects

Alternative A—No Action

Under Alternative A (No Action) none of the activities described in the Proposed Action (Alternative B) or other alternatives would be implemented, and the area would continue under current management.

Whitebark Pine

Occupied and potential habitat for high-elevation species such as whitebark pine within the project area should remain relatively static under Alternative A and ongoing Forest management activities in the short to long term.

Currently, upper level forested stands that are known to or may support whitebark pine vary in departure from Forest Plan desired conditions. Wildfires in stands departed from desired conditions may exhibit behavior outside the normal range of variability. Wildfire effects to whitebark pine would be tied to degree of departure from normal range of variability, vegetation type (PVG), and fire regime. Approximately one-third of the known occupied habitat is classified as a lethal fire regime (PVG 10, Persistent Lodgepole) where a stand

replacing fire would be predicted to naturally occur every 100 to 400 years (USDA Forest Service 2010a, Appendix A). No fires in the project area's occupied whitebark pine habitat appear in records dating to the early 1900s (BNF GIS Layer). Should a fire occur in occupied habitat within intact lodgepole pine stands, whitebark pine mortality would be expected.

Climate change also has the potential to affect habitat suitability for whitebark pine. Altered climate regimes affecting local environmental factors and biological function may improve or worsen conditions for the species, expanding or shrinking its range relative to its resiliency to change.

Bryum Moss, Pacific Onion, and Sticky Tofieldia

Plants in this group occur in a variety of hydrologic conditions (wet to moist), but most typically grow in relatively open conditions or at the fringe of forested areas. Under Alternative A, activities proposed in the project area would not occur. However, any of these activities could be proposed and implemented individuallythrough separate NEPA analysis.

Under Alternative A, proposed vegetation treatments would not occur in RCAs. The effects of thinning or timber removal for riparian species would have been largely indirect (i.e., reduction of wildfire risk, possible alteration of shade, air current, and water movement into the riparian zone or adjacent wetlands). Those changes would not occur. Pile burning in vulnerable places, such as RCAs, would not occur, eliminating risk of localized ground sterilization. If more intense wildfire activity occurs in areas where thinning treatments would normally take place to reduce fuel loads, the effect of fire in the adjacent RCAs may be more severe. While prescribed burns are not targeting RCAs, it is possible that fire will spread into the RCAs, especially in fall burn situations. Under natural conditions, wildfire would typically create gaps in the RCA vegetation, setting back succession in those areas and maintaining more diverse plant communities (Arkle and Pilliod 2010). Without fire (as in the No Action Alternative), riparian communities eventually become less diverse. When a wildfire does ignite, the intensity and severity in the RCA would likely be greater if the typical fire interval has been long surpassed.

Under Alternative A, road/trail construction, rerouting, or deconstruction activities would not occur. Traditional road maintenance would still be carried out, which would continue to disturb the habitat that develops in roadside seeps and ditches.

Under Alternative A, no new trails or trailheads would be constructed and no roads would undergo designation changes for recreational purposes. Where trails and trailheads may have affected riparian plant species, these changes would not occur. The amount of suitable rare plant habitat at these locations would remain relatively static in the short term or, in some cases, may deteriorate if unauthorized use or trail conditions are contributing negatively to riparian condition.

In areas where culvert removals are proposed, the amount of suitable habitat for wetland species could increase. Without this action, the amount of habitat would likely remain static. Culvert replacements may increase suitable habitat for some of these plants, especially if more natural conditions with a higher water table are the result. Without this activity, the amount of suitable rare plant habitat at these locations should be relatively static over the short to long term.

Scalloped Moonwort and Little Grapefern

Effects to scalloped moonwort and little grapefern habitat in moist areas would be the same as disclosed above for Pacific onion, byrum moss, and sticky tofieldia. In addition to riparian areas and moist/wet grass/forb meadows, moonwort ferns may be found in moist pockets in open woodlands and montane forests (including aspen stands). Proposed treatments in the mid-upper elevation stands would have had the greatest likelihood of impacting moonwort ferns outside the RCAs. Under Alternative A, the risk of impacts from thinning or tree removal would not occur, nor would related disturbance from skid trails, pile burning, or other related activities. Prescribed burning would not be implemented. If a major fire or other disturbance does not occur, stands would continue toward a more mature forest structure. Habitat for moonwort ferns may increase or decrease over time, depending on moisture and maintenance of openings in the stands.

Small Phacelia

The effects to riparian or wetland habitat for small phacelia would be similar to that described for other wet-area species and moonwort ferns. The risks or benefits created by project activities in RCAs would not occur under Alternative A. Habitat succession may provide more or less suitable habitat for this plant, depending on the optimal amount of canopy cover and species mix.

As upland succession proceeds, available habitat may be reduced with conifer encroachment into aspen stands and lack of fire to stimulate aspen growth. Potential risk from mechanical harvest and related activities would not be generated under Alternative A.

Idaho Dwarf Primrose, Sacajawea's Bitterroot, Mt. Shasta Sedge, Kruckeberg's Hollyfern, Leiberg Stonecrop, Sierra Sanicle

This group of plants typically occupies dry, open, and possibly rocky areas at upper-mid to high elevation. Environments suitable to this suite of plants should stay relatively static in the short-to-long term. With successional progression over time, areas that are now open may be encroached upon by conifers, reducing suitable habitat for these open grown species. Climate change may affect successional changes in the opposite direction, serving to maintain openings and reduce competition from more hydrophilic species, but also potentially favoring competitive weed species.

With proposed project implementation, prescribed fire would have the greatest potential to impact this group of plants, with a lesser risk from vegetation management activities. Under Alternative A, these activities would not occur.

Alternative B—Proposed Action

Whitebark Pine

Proposed activities would occur outside the known occupied upper elevation stands/high potential occupancy for whitebark pine (Figure 3-109 andFigure 3-111), thus reducing the threat to the majority of the species in the project area. The lower elevation stand with documented whitebark pine occurrence is not proposed for mechanical vegetation management activities. Because of the low likelihood of occupation and use of Design Features RP-1, RP-2 and RP-3, the risk of negative impacts to whitebark pine from proposed

project activities (such as thinning with product removal or mastication and associated vegetative management activities like prescribed fire, road decommissioning, temporary road construction, and construction of recreational trails outside the known occupied stands) is low.

Vegetation/Fuels Treatments—A potential low risk exists to the upper-elevation occupied whitebark pine habitat from application of fire proposed in the southwest portion of the project area near Pilot Peak. Fire would be used outside the area where known occupied and/or field-verified high-potential habitat of whitebark pine exists (Figure 3-111). Fire is a natural part of western ecosystems, and most plants in fire prone areas are adapted to living under such conditions (USDA Forest Service 2003b).While fire is a natural part of whitebark pine ecosystems (and may help reduce competition from encroaching species such as subalpine fir; maintain stands in open, seral condition; and create suitable seed caching areas for Clark's nutcracker), it can also damage whitebark seedlings and saplings. At lower elevations, the risk to trees would be greatest for undocumented whitebark pines appearing in stands where vegetation removal or prescribed burning is proposed.

Design Feature RP-2 would largely reduce the risk to occupied whitebark pine in the Pilot Peak area. No project activities would occur in known occupied and/or field-verified high-potential habitat of whitebark pine (Figure 3-111). Disjunct whitebark pine known or discovered at lower elevations would be avoided and protected to the maximum extent practicable (Design Features RP-1 and RP-3).

This prescription is not failsafe; accidental injury could occur to known trees or misidentification of trees occurring below expected elevations for whitebark pine, leading to unintentional removal or damage during thinning and activity fuels operations. Prescribed fire in a location of undiscovered whitebark pine seedlings or saplings—those being susceptible to even low intensity fire—is an additional risk. Timing of burning (late fall/spring) and stand densities can influence potential for effects to whitebark pine.

Transportation—No road or trail actions are proposed for areas above 7,000 feet, where the greatest possibility of activity overlap with whitebark pine or habitat with a high potential for occupancy would occur (Figure 3-111). If individual whitebark pine is discovered in an area proposed for new or temporary road construction or reconstruction, it would be avoided (Design Features RP-1 and RP-2) and protected to the maximum extent practicable.

Decommissioning is proposed for unauthorized route X025N5, which passes partially through the lower elevation Stand 0035040517, identified as occupied by whitebark pine (5 seedlings recorded in stand exam data). Although whitebark pine at these locations may be considered disjunct or incidental, the decommissioning action and maintenance of closed status would provide long-term benefits in protecting the species in these stands. Protecting whitebark pine that occurs at a somewhat different moisture and temperature regime than more typical occupied habitat may be important for maintaining a diverse gene pool and plasticity, thereby contributing to the longevity of the species.

Recreation—Little-to-no overlap occurs for occupied or suitable whitebark pine and proposed changes in recreational road or trail status and location or construction of new trails or facilities. No recreation-related activities are proposed in habitat identified as having a high potential for whitebark pine occupancy. If individual whitebark pine is discovered at

lower elevation locations proposed for new trails or facilities, it would be avoided and protected to the maximum extent practicable (Design Feature RP-1).

Fisheries—No overlap occurs for occupied or suitable whitebark pine habitat and proposed aquatic activities.

Indicators and Outcomes—Whitebark pine is present in the project area, along with additional suitable habitat (Figure 3-111). No direct overlap occurs between proposed activities and known high-elevation occupied whitebark pine in the Pilot Peak area or habitat identified as having high potential for occupancy (this would be field-verified). Through Design Features RP-1, RP-2, and RP-3, the risk to whitebark pine and suitable habitat are removed or greatly reduced, and the effects of project implementation are expected to range from none to short term for whitebark pine.

Determination—Implementing proposed activities in the project area for Alternative B "**may impact whitebark pine individuals but would not likely contribute to a trend toward Federal Listing or cause a loss of viability to the population or species**" (MII).

Pacific Onion, Bryum Moss, and Sticky Tofieldia

These species are known to occur in very moist environments, described variously as wetlands, moist cliffsides, wet meadows, forested seeps, stream margins in subalpine fir habitat and boggy lakesides, peatlands, and marshes. The project area provides a limited variety of riparian/wetland/moist meadow habitat, particularly in the lower-mid elevation forests proposed for treatment. Stream vegetation in this area could largely be categorized as "riverine riparian", where true riparian vegetation occupies a narrow corridor with a drier forested upland. "Shrub riparian" vegetation exists at higher elevations in areas of gentler terrain and stream gradients, with wider floodplains and expanses of true riparian vegetation.

Vegetation/Fuels Treatments—Almost 3,500 acres within the project area are characterized as RCA (defined for the Becker project as two tree [dominant spp.] heights from a perennial channel, or a single tree height from an intermittent channel). Most proposed activities would not impact habitat matching the descriptions above. The proposed vegetation treatments would have little or no effect on this group of riparian/wetland plants due to the restriction of activities adjacent to suitable habitat (no vegetation management treatments exist within 50 feet of a perennial stream outside plantations, 35 feet within a plantation; or 15 feet of an intermittent stream; Design Feature FH-27 restricts equipment to NFS roads or temporary roads or locating skid trails outside RCAs). These are plants that typically grow in water or in areas with a high water table; and proposed activities would occur outside that area.

The vegetation treatment with the highest likelihood of generating effects to suitable habitat would be broadcast burning for the proposed fire application, which would be applied in the upper elevations of the southwest corner of the project area. A potential for overlap exists between suitable riparian habitat and fire. While ignition would not occur within RCAs, backing fires would be allowed; and, under dry enough conditions, this habitat would burn; although intensity should be lower than that in the surrounding uplands due to high moisture content. (Additional protection to species in this group would be provided by Design Feature FF-3, prohibiting fireline or handline construction within the RCAs.) Early-season prescribed burning may not generate conditions that mimic the post-fire ecological conditions in riparian areas that follow a more intense wildfire (Arkle and Pilliod 2010). Under the wetter

conditions, these areas may not carry fire; and the direct risk to this riparian/wetland habitat should be low, but without the consequences and benefits of more seasonally correct timing. The long-term consequence of reducing fire in the riparian systems of dry forest types is not well studied; it may preserve habitat in the short-run, but it may affect biodiversity in the future. Generally, the risk of long-term negative consequences of broadcast burning are expected to be low for this species group's habitat.

Burn piles may be constructed in RCAs, but with Design Feature FF-5 (piles must be limited in extent and created away from streams, riparian vegetation, and wetlands/seeps), the risk to these species or suitable habitat is low. This specification reduces the negative impact of intense, localized heat that may damage underground portions of the plants.

Transportation and Recreation—It is unlikely that proposed road and trail activities (status and maintenance level changes, temporary road construction, decommissioning, and trail construction and rerouting) or proposed recreation activities would coincide with high-quality suitable habitat for plants in this group. If this were to occur, Design Feature FH-25 would reduce the impacts and mitigate negative effects. In areas of decommissioning, a long-term benefit would be expected for potential habitat following a return to more natural hydrologic conditions.

Fisheries—The most highly suitable habitat for these species in the project area would exist where culverts in high-flow areas of perennial streams were being replaced. Culverts located on intermittent streams would likely not be in moist enough habitats to sustain species in this group. While initial disturbance would occur where the culverts are removed, channels are diverted, and culverts are re-installed, the long-term impacts should be beneficial. If water tables are raised in these areas, suitable habitat may increase. Likewise increased culvert size should reduce risk of channel scouring during high water and limit resulting damage to local vegetation. Design Features FH-19 and FH-24 include methods of reducing impacts to riparian vegetation and restoring riparian sites following culvert removals or replacements.

Indicators and Outcomes—No known occupied habitat exists for any plants in this group within project area boundaries. Suitable habitat does not occur in the dry uplands comprising most of the project area. Suitable habitat for these plants would occur in portions of the project area with the highest consistent moisture levels, namely larger perennial streams or high-elevation streams or wet meadows with low channel gradients. Prescribed fire (fire is not expected to reach the Pacific onion population outside the western boundary of the project area) offers a low risk of impacts, but these effects should be short-term. Culvert replacements and any other instream work conducted may initially disturb potential habitat for these plants, but with long-term benefits of improving it. Road and unauthorized route decommissioning is also expected to yield long-term benefits in RCAs. Implementing Design Feature RP-1 would reduce the risk of project activity impacts. Project implementation for this group is expected to range from none to short-term effects only.

Determination—Implementating proposed activities in the project area for the Proposed Alternative B "**may impact Bryum moss individuals, but would not likely contribute to a trend toward Federal Listing or cause a loss of viability to the population or species**" (MII).

Forest Watch (and Former Forest Watch)—The risk of long-term loss of population viability or habitat for Pacific onion and sticky tofieldia is low.

Small Phacelia, Scalloped Moonwort, and Little Grapefern

This group of species occupies riparian areas and moist-to-wet grass/forb meadows and aspen stands. They occupy a wider range of hydrologic conditions than the species described above.

Vegetation/Fuels Treatments—The effects to riparian or wetland habitat for small phacelia and moonworts would be the same as that described above with the other wet area species. Small phacelia would be less susceptible to treatments occurring in forested stands, as it occupies more open habitat. RCA buffers (Design Features FH-27 and FH-28) would largely protect the core of suitable habitat for moonwort in forested areas from mechanical disturbance (i.e., yarding, skid trail creation), but small, grassy openings that moonworts may occupy (observed little grapefern populations occupy small, sparsely vegetated swales amidst lodgepole pine stands on Cascade Ranger District), may be perceived as devoid of vegetation and inadvertently used as landings, burn pile locations, or be bisected by skid trails, temporary roads, or recreational trails. However, mechanical vegetation treatments proposed would occur largely in the drier PVG types (Douglas fir, ponderosa pine), which would have a low likelihood of supporting moonworts. Only about 6% of the project area is characterized as PVG 7 (Dry Subalpine Fir), PVG 10 (Persistent Lodgepole), or PVG 11 (High Elevation Subalpine Fir); and no mechanical vegetation treatment is proposed in either PVG 10 or 11.

Logging systems that incur ground disturbance (tractor jammer, skid trails) may have a greater impact because of potential disruption to subterranean structures and associated endomycorrhizal fungi of *Botrychium* plants.

Where existing landings are already in place, or where wide open spaces/other disturbed areas along existing roads are used, disturbance to suitable small phacelia or moonwort habitat should be negligible. Of 146 landings (including a service landing) proposed for possible use, only one would be located in a vegetation type (PVG 10, persistant lodgepole pine) that is more likely to support suitable moonwort habitat. Where new disturbance is proposed in suitable habitat, species in this group could be negatively impacted.

Another new landing is proposed is proposed in a meadow on the spur NFS road 362G9. Under Alternative B, it would be used as a tractor landing. An aspen stand occupies the top of the meadow, and the opening below supports a diverse variety of forbs and graminoids, including false hellebore (*Veratrum californicum*). Aspen and false hellebore are generally found in moister habitats of the Forest and serve as indicators of suitable habitat for small phacelia and moonworts. To minimize risks to potential habitat for small phacelia and moonworts, additional mitigations (Design Feature RP-1) would be needed if this area were to be used as either a tractor or helicopter landing (i.e., used during fall season only; no excavation or levelling; log deck locations limited to 35 feet from edge of road on the east side; and all mechanized equipment would remain on the road surface). To avoid suppression of growth in meadow species, activity slash and disposal would only occur on the west side of the road.

Fire is a natural part of western ecosystems, and most plants in fire prone areas are adapted to living under such conditions (USDA Forest Service 2003b). This adaptability applies to rare as well as common plant species. Prescribed fire activities favor early seral species (including aspen and non-forested lands). Most species found on the Forest are adapted to living with fires that occur July–September.

Prescribed burning may cause short-term direct impacts if occupied habitat is burned, but long-term benefits may also occur by improving aspen stands as potential habitat for small phacelia and moonworts. Aspen stands and meadows would likely be too moist to burn in the spring, but they would burn in the fall as fuel moisture decreases and surrounding herbaceous vegetation cures. The annual habitat of small phacelia plants should lower the severity of negative impact from fall burning because the plants would have already dispersed seed and completed their seasonal lifecycle. Likewise, moonworts are dormant (without exposed aboveground vegetation) when fall burning would occur. The degree of risk would then vary with fire intensity, but negative impacts of low-moderate intensity burns should be temporary to short term.

Fire may play a role in maintaining forest openings and meadow habitat where moonworts are often found, but the most appropriate disturbance interval or successional stage is not known. Burning may generate changes to canopy cover and size of forest openings, thereby altering moisture and light regimes and, in turn, creating microclimatic changes in the understory. These changes may be positive or negative, and impacts could range from temporary to long term. Similar changes could occur in more open habitat suitable both for small phacelia and moonworts.

Pile burning concentrates heat in one area and has greater potential for negatively impacting plants or habitat than broadcast burning due to possible subsurface heat damage. Excessive ground temperatures can sterilize the soil and damage or kill the endomycorrhizal fungi that moonworts depends on. It can also destroy seedbanks harboring small phacelia seeds (this annual depends on stored seed for continued existence). In clearings or moist meadows perceived as dry and generally devoid of vegetation late in the season, pile burning could potentially be detrimental to these species from a site preparation or intensive heat perspective. Recovery could be long term. However, the likelihood of occupied habitat outside RCAs or in upper elevation forested PVGs (most likely to support moonwort habitat) coinciding with burn piles is low.

See the discussion for Pacific onion, bryum moss, and sticky tofieldia above for design features applying to fuels and RCAs.

Transportation—Transportation-related activities, such as proposed road and trail activities (status and maintenance level changes, temporary road construction, decommissioning, and trail construction and rerouting), may coincide with suitable habitat for plants in this group; however, most activity is planned in the drier vegetation types less likely to support small phacelia or moonwort ferns (see the discussion for Pacific onion, bryum moss, and sticky tofieldia above for design features applying to fuels and RCAs).

Road decommissioning and closures may provide long-term benefits and possibly increase suitable habitat for this group. The effects of unauthorized road conversion to NFS status and conversion of roads to trails may have short-term negative impacts if the routes pass through suitable small phacelia or moonwort fern habitat and disturbance or removal of additional native vegetation is needed to bring these segments up to Forest Service standards. Temporary roads may represent a long-term loss of potential habitat if environmental conditions do not favor a faster recovery following decommissioning (Design Feature TH-5). On roads where a status change would occur without any physical changes, no additional impacts are likely.

Recreation—Effects for small phacelia and moonwort fern habitat and any undocumented individuals relative to proposed recreation construction and activities would be the same as those described for other riparian species in similar habitat (see the discussion for Pacific onion, bryum moss, and sticky tofieldia above for design features applying to fuels and RCAs). Construction of recreational trails or facilities in the drier vegetation types, especially at the lower elevations, is unlikely to negatively affect small phacelia or moonwort habitat. If new or revised recreation facility locations are identified, additional surveys will be conducted, and mitigations will be developed to reduce impacts as needed (Design Feature RP-1).

Fisheries—Proposals benefitting fishery and hydrologic resources involve culvert replacements or removals, and all occur within RCAs. The impact on small phacelia and moonwort fern habitat would be the same as for other riparian rare plants described in this report. See the discussion for Pacific onion, bryum moss, and sticky tofieldia above for design features applying to fisheries and RCAs.

Indicators and Outcomes—No known occupied habitat exists for any plants in this group. Suitable habitat for these species occurs in aspen stands (small phacelia and moonwort ferns) and moist pockets in upper elevation forested stands (moonwort ferns). The highest quality habitat would occur in RCAs or at upper elevations; drier PVG types (especially PVG 1, 2, 4) would unlikely provide suitable habitat. Risks within RCAs are mitigated by a variety of design features (see the discussion for Pacific onion, bryum moss, and sticky tofieldia above).

While risk of impact outside the RCAs would be greatest from prescribed fire, other proposed activities in uplands—such as vegetation and fuels treatments, landing use and construction, and road and trail construction—may impact suitable habitat for small phacelia and moonwort ferns. Road and unauthorized route decommissioning may yield long-term benefits to suitable habitat. Implementating Design Feature RP-1 would reduce the risk of impacts from project activities. With design features in place, effects of project implementation for this group are expected to range from none to short term.

Determination—Implementating proposed activities in the project area for Alternative B "**may impact small phacelia individuals, but would not likely contribute to a trend towards Federal Listing or cause a loss of viability to the population or species**" (MII).

Forest Watch—The risk of long-term loss of population viability or habitat for scalloped moonwort and little grapefern is low.

Idaho Dwarf Primrose, Sacajawea's Bitterroot, Mt. Shasta Sedge, Kruckeberg's Hollyfern, Leiberg Stonecrop, and Sierra Sanicle

A known population of Sacajawea's bitterroot exists in the southwest corner of the project area. It is possible that the extent of the occupied habitat is greater than documented. Another additional suitable habitat that exists within the project area may be impacted or benefitted by proposed activities, including prescribed fire, vegetation and fuels management activities, road decommissioning, temporary road construction, and construction of recreational trails.

Additional surveys for Sacajawea's bitterroot (and whitebark pine) are planned in areas with a high probability of occupancy based on PVG, habitat type, elevation, aspect, review of aerial photos, soil type, and proximity to occupied habitat) (Design Feature RP-2). In order to

ensure protection for known occupied Sacajawea's bitterroot habitat or any habitat that is newly discovered from proposed activities within the project area, the concept of "Plant Consideration Area" (PCA) (Figure 3-112) will be applied in a similar manner to what has been developed for this species for other Forest projects (US Forest Service 2015c). A 300-meter buffer of concentric rings around a population or individuals is used to define what level of proposed activity may occur within that circle in order to protect processes and functions crucial to the plants. Ring 1 encircles the occupied habitat; Ring 2 extends 20 meters from the outer extent of the occupied habitat. The area within these inner two rings is essentially an "activity free zone" to protect the plants and their pollinators from direct effects from proposed activities. Rings 3 and 4 extend 100 meters and 300 meters, respectively, from occupied habitat and are used to buffer additional suitable habitat and pollinator foraging habitat from indirect effects such as dust transport, weed invasion, unauthorized vehicular activities, and trampling.

No activities are proposed within the PCA for known occupied Sacajawea's bitterroot habitat or in habitat identified as having a high potential for occupancy by the species inside the project area (Figure 3-111). The closest proposed activity is the direct application of prescribed fire, which would occur outside the high potential occupancy area (see discussion on prescribed fire below). Risks to the Pilot Peak population of Sacajawea's bitterroot come primarily as potential cumulative effects (grazing, unauthorized off-road vehicle use, invasive species, climate change, and other uses not included in the Becker proposal).

In Idaho, all plants in this group grow at mid-to-high elevations (above 5,000 feet) in open, dry, or rocky environments. Activities occurring below this elevation or in riparian/wetland environments are not expected to affect this group of species.

Vegetation and Fuels Treatments—Due to the elevation and/or open, rocky nature of their habitat, no impacts are expected for Idaho dwarf primrose, Mt. Shasta sedge, or Kruckeberg's hollyfern relative to vegetation management such as thinning, mastication, tree removal, creation or use of landings, or vegetation fuels activities such as slash disposal (i.e., lop and scatter, yarding, pile burning). The same is anticipated for the population of Sacajawea's bitterroot at Pilot Peak, which is over 1.5 miles from proposed vegetation management activities, where any activities within the PCA or habitat identified as high potential occupancy would be restricted.

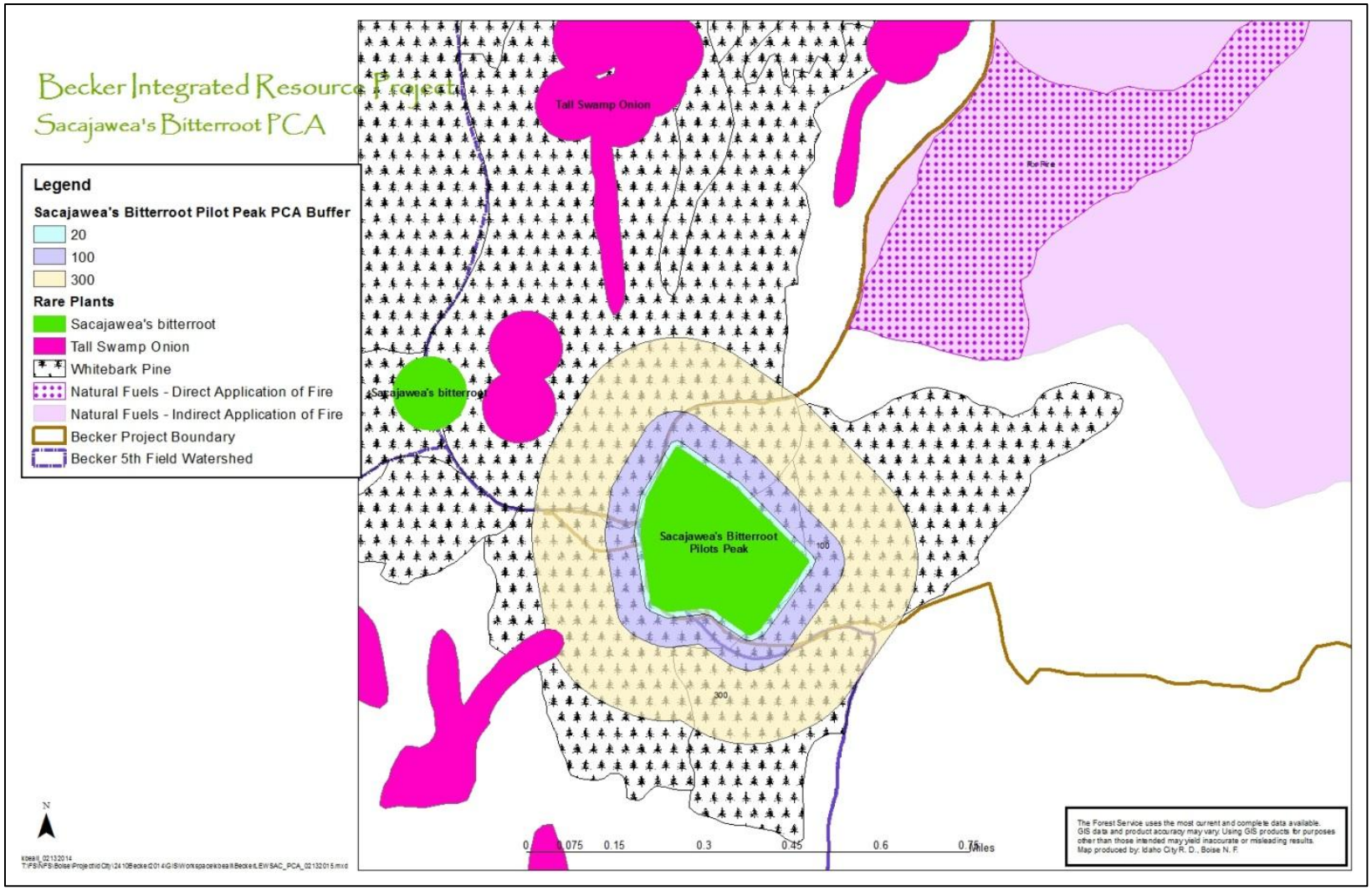


Figure 3-112. Sacajawea's bitterroot Plant Consideration Area (PCA) at Pilot Peak

These same activities may directly or indirectly impact suitable habitat for Sacajawea's bitterroot (at lower elevations), Leiberg stonecrop, or Sierra sanicle. These actions would occur in forested vegetation types, along with some associated open areas, in which actions may overlap potential habitat.. Risk of negative impacts should be low relative to actual thinning activities, due to the typically rocky, open nature of the habitat for this group of plants. Stand density near any occupied areas would likely be low, making trees near occupied areas less of a target for thinning or removal. If an undocumented occurrence did coincide with an area of proposed activity, the risk of plants being crushed or otherwise damaged as trees were felled or yarded could occur. Depending on the timing of activities, the risk could be lower for Sacajawea's bitterroot than the other species because its leaves and reproductive structures are only above the ground surface for a short time (June–mid/late July in the project area). Outside these time parameters, it should be less susceptible than other species discussed here, unless ground disturbance was more than superficial. Any species discovered prior to or during project implementation would be avoided to the maximum extent practicable, and, for Sacajawea's bitterroot, a PCA would be developed to mitigate risk to occupied and contributing habitat (Figure 3-112).

Open areas where these species might occur could be selected as landings or slash pile sites. New landings (most are already established on existing roads) in areas with a high potential for rare plant occupancy would be surveyed (Design Feature RP-1), and, if rare plants are located, the landing locations can be adjusted. No piling of slash/vegetation shall occur within any PCA for Sacajawea's bitterroot or in any habitat identified as having a high potential for occupancy (Design Feature RP-2). Pile burning concentrates heat in one area and has greater potential for negatively impacting plants or habitat than broadcast burning due to possible subsurface heat damage. Excessive ground temperatures can sterilize the soil and damage or kill the underground roots or other plant structures, severing any mycorrhizal connections. Piling could occur unknowingly in undiscovered occupied habitat because the ground would appear open after plants (Sacajawea's bitterroot) became dormant or otherwise inconspicuous late in the season.

Proposed application of fire proposed at the upper elevations of the southwest portion of the project area could impact habitat for all species in this group. This risk is greatly reduced at the uppermost elevations by excluding the activity in areas identified with high potential for occupancy by Sacajawea's bitterroot (and whitebark pine) (Design Feature RP-2). Outside this area, risks remain low due to the open, rocky, gravelly nature of typical habitat for this group of species. Ground surfaces are typically not densely vegetated and would not carry fire easily. Direct impacts from fire are unlikely. The need for line construction in the most suitable habitat is low, as these areas may act as natural fire barriers due to lower fuel loads and duff layers.

Risks would be higher in natural fuels treatment areas within potential habitat for those species at lower elevations where the fuel loads are greater. Season of burn (spring or late fall) would reduce the intensity and risk of direct fire effects, but if handline construction were needed, habitat disturbance is possible.

Transportation—No road or trail actions are proposed for areas above 7,200 feet, where the possibility of overlap with Idaho dwarf primrose would occur. Kruckeberg's hollyfern should also be unaffected as it occurs in subalpine habitats on rocks and cliffs. Undocumented Mt. Shasta sedge may occur in areas where road/trail activities are proposed. Habitat at

greatest risk for the species in this group, as a result of vegetation management and recreation road/trail construction and disturbance, are Sacajawea's bitterroot (if occurring outside the area identified as having high potential for occupancy at lower elevations), Leiberg stonecrop, and Sierra sanicle. Habitat for these species is open, gravelly areas that may be perceived as good locations for roads or trails. As all vegetation and the top layer of soil is removed from the road or trailbed, construction or other improvement transportation activities would have long-term impacts if built through an undocumented site. Construction would remove suitable, but unoccupied, habitat from the base on a long-term basis. To decrease this risk, rare plant surveys would be conducted in areas with expected long-term impacts, such as proposed road or trail locations (Design Feature RP-1). No road or trail construction would occur within a Sacajawea's bitterroot PCA (Design Feature RP-2) area identified as having high potential for occupancy.

Road or trail status changes could have negative impacts where change dictated further ground disturbance. Road decommissioning or a status change reducing use or disturbance on a route could have long-term benefits for Mt. Shasta sedge, Sacajawea's bitterroot (at lower elevations), Leiberg stonecrop, and Sierra sanicle habitat.

Recreation—Results from overlapping recreational routes or other proposals that lead to ground disturbance are described under the "Transportation" section above. No overlap with known occupied Sacajawea's bitterroot habitat/PCA would occur. Construction of the proposed trailhead facility would not affect suitable habitat for this group.

Fisheries—No overlap of suitable habitat for any of these species and proposed aquatic activities should occur. Species in this group are all located in dry, rocky, open environments, and culvert removal and replacement work would be conducted in streams and adjacent RCAs.

Indicators and Outcomes—Occupied habitat for Sacajawea's bitterroot exists in the Pilot Peak area of the project area's southwestern corner. A Plant Consideration Area (PCA) has been established for this location (Figure 3-112). This population and its surrounding PCA are outside proposed activities. No other known occupied habitat exists for any other plants in this group; although suitable habitat is present in dry, rocky areas, most likely at uppermost elevations (Sacajawea's bitterroot occupied and modelled habitat is identified in Figure 3-111).

Prescribed fire may impact habitat at these locations during proposed fire applications, although the highest quality habitat would be protected (Design Feature RP-2). Species potentially occurring at mid elevations (Sacajawea's bitterroot, Leiberg stonecrop, and Sierra sanicle) are at low risk from vegetation and fuels activities, transportation, and recreation construction; although some activities (e.g., road/trail closure and decommissioning) may provide long-term benefits. Activities relative to culverts would have no effect on the habitat for this group of plants. If additional occupied Sacajawea's bitterroot habitat is discovered prior to or during project implementation, a PCA would be developed to mitigate risk to occupied and contributing habitat. With design features in place (RP-1 and RP-2), risk should be none to low for Sacajawea's bitterroot and low for the other species in this group. Overall, effects of project implementation for this group are expected to range from none to short term.

Determination—Implementating proposed activities in the project area for Alternative B "**may impact Idaho dwarf primrose and Sacajawea's bitterroot individuals, but would not likely contribute to a trend toward Federal Listing or cause a loss of viability to the population or species**" (MII).

Forest Watch—Long-term loss of population viability or habitat for Mt. Shasta sedge, Kruckeberg's hollyfern, Leiberg stonecrop, and Sierra sanicle is a low risk possiblity.

Alternative C, D, E, and F

All Species

All of the indicator and outcome discussions and species determinations would be the same as Alternative B for Alternatives C, D, E, and F.

The differences between the Proposed Action (Alternative B) and Alternatives C, D, E, and F lie in total acreage and location proposed for some of the vegetation and fuels treatments, and road/ trail construction, facilities, and status. Culvert treatment activities are the same between action alternatives.

Vegetation and Fuels Treatments—Differences between action alternatives are relatively minor in terms of potential effects to rare plants and whitebark pine. Alternative D proposes additional vegetation management activities, but the extra acreage would occur outside known occupied habitat or habitat with a high potential for occupancy for Sacajawea's bitterroot/PCA and whitebark pine. Thse additional activities would occur at the lowest elevation in the project area, carrying a low risk of supporting undocumented populations. Should new populations of rare plant species or additional whitebark pine be discovered prior to or during project implementation under any alternative, Design Features RP-1, RP-2, and RP-3 would be applied to mitigate risk to occupied and contributing habitat.

Alternative E has fewer acres of tractor-jammer work (with more helicopter logging system use), but overall acreage to be disturbed during vegetation and fuels management activities is the same as for Alternatives B, C, E, and F. Alternative F has the least number of total landings (114 TJ/7 H), but helicopter landings are larger than those needed for tractor-jammer landings, bringing it closer to total potential ground-disturbing activity to the other alternatives. Alternative E has the second smallest number of landings; but with 20 helicopter landings, the acres of use as landings is likely higher than all other alternatives, including Alternative D. New landings would be field surveyed for rare plants and whitebark pine prior to construction (Design Feature RP-1). Monitoring for rare plants would occur at the meadow landing on NFS road 262G9 for any alternative (for tractor or a helicopter) using this location.

The total number of acres proposed for activity fuels treatments are the same in Alternatives C, E, and F as in Alternative B. Additional acreage is proposed under Alternative D, but this area carries a low risk of rare plant/whitebark pine occupancy. Known occupied habitat for Sacajawea's bitterroot/PCA and whitebark pine are outside areas proposed for activity fuels treatments. Proposed broadcast burning and direct/indirect application of fire are the same for all alternatives. Fire would only be applied under Alternatives C, D, E, and F outside the known occupied Sacajawea's

bitterroot/PCA/whitebark pine habitat and habitat identified as high potential for occupancy for these species (see Figure 3-111 and Figure 3-112; Design Feature RP-2).

Transportation—Construction of new, reconstructed, and temporary roads is proposed under all action alternatives. These actions permanently or temporarily remove vegetation and create a bare mineral surface subject to weed invasion. Alternative E proposes the least temporary road construction (about 65%–75% less; the increase in proposed helicopter logging eliminates the need for much road mileage in this alternative), while Alternative D proposes the most. However, the additional mileage in Alternative D would be built outside any known occupied habitat and would occur in the lower elevation portion of the project area, reducing the likelihood of this area supporting most of the rare plant species evaluated here. Differences in miles of proposed new and reconstructed road are minimal between Alternatives B, C, D, E, and F. The greatest risk created from these proposed road activities would occur to potential habitat for Sacajawea's bitterroot, Leiberg stonecrop, and Sierra sanicle (as described above). Roads would likely be constructed in open, gravelly habitat. Under Design Featur RP-1, areas proposed for road and trail construction would be field surveyed prior to project implementation. PCAs would be established for newly discovered populations to mitigate the risk of impacts (Design Feature RP-2). The known occupied habitat for Sacajawea's bitterroot/PCA/whitebark pine around Pilot Peak and habitat with high potential for occupancy is outside the bounds of road and trail construction and should not be affected by project proposals. Any whitebark pine discovered at lower elevations near proposed road construction would be avoided to the maximum extent practicable (Design Features RP-1 and RP-3).

A slightly greater number of road miles (approximately 6%) would be decommissioned in Alternative E and fewer miles of road would be open to public use (29% less than Alternatives B and F, and 31% less than Alternatives C and D). Road decommissioning decreases the risk of impacts from motorized vehicles or non-motorized use, reduces vectors for weed transport, and increases the amount of available habitat for native plant colonization. Reducing roads open to the public reduces the opportunity for ground disturbance and risk of weed introduction and spread. Decommissioning 16 unauthorized routes has been proposed under all action alternatives. Whitebark pine seedlings have been identified in the vicinity of the proposed decommissioning of unauthorized route X025N5 (see the discussion regarding transportation under the whitebark pine subheading for Alternative B). This action may have long-term beneficial effects for this group of five seedlings.

Recreation—More miles of road or trail would be authorized or converted to non-motorized trail in Alternative E, while the new ATV trails and trailheads proposed in Alternatives B, C, D, and F would not be constructed under Alternative E. Alternative B would have slightly more motorized trail (new or re-designated) than Alternatives C, D, and F, while Alternative E does not propose any motorized trail. Non-motorized travel generally poses less of a risk to native vegetation than motorized travel, with less associated ground disturbance and a lower risk of weed introduction and spread. All action alternatives would create a new trailhead near Beaver Creek Summit. New trail construction would be field surveyed for rare plant/whitebark pine occupancy prior to project implementation; and if occupied habitat is identified, it will be avoided to the maximum extent practicable (Design Feature RP-1). PCAs would be established for any newly discovered populations of

Sacajawea's bitterroot to mitigate risk of impacts (Design Feature RP-2.) No new trail construction activities are proposed for known occupied Sacajawea's bitterroot/whitebark pine habitat or identified areas where these species have a high potential for occupancy.

Fisheries—Proposed culvert treatments are the same for all action alternatives. No known occupied rare plant or whitebark pine habitat exists at these locations, but areas where long-term disturbance, such as culvert replacement or road construction, is proposed would be field surveyed prior to project implementation.

Direct and Indirect Effects—Summary

Overall, potential risks and impacts for rare plant species and whitebark pine are expected to be similar across all action alternatives, with a slightly increased risk for species that may occur in dry, rocky habitats at mid-elevations (Table 3-144). Design features would help reduce risk in these habitats (RP-1, RP-2, RP-3). While actions proposed in these alternatives may have either negative or beneficial impacts in sustaining or restoring native plant communities, their relevancy to suitable habitat for most of the rare plant/whitebark pine species analyzed in this report are minor due to proposed locations in areas of low habitat suitability.

Table 3-144. Summary of indicators and outcomes for rare plants and whitebark pine by alternative and habitat grouping for all action alternatives

Species or Plant Grouping	Action Alternatives
Whitebark pine	Prescribed fire, vegetative treatments, and road and trail treatments are called for in all alternatives. Possible effects to whitebark pine are similar between alternatives relative to location of occupied and potential habitat. Design features would be in place to mitigate risk to occupied habitat and those areas identified as having a high potential for occupancy. (Design Features RP-1,2,3)
Riparian, wet meadow, and wetland species: Bryum moss, Pacific onion, sticky tofieldia	Prescribed fire, vegetative treatments, road and trail treatments, facility construction, and culvert replacements are called for in all alternatives. Possible effects to Bryum moss, Pacific onion, and sticky tofieldia are similar between alternatives relative to location of potential habitat. Design features would be in place to mitigate risk to occupied and contributing habitat. (Design Feature RP-1)
Moist forested aspen, to riparian, meadow species: small phacelia, scalloped moonwort, little grapefern	Prescribed fire, vegetative treatments, road and trail treatments, facility construction, and culvert replacements are called for in all alternatives. Possible risks and benefits to small phacelia, scalloped moonwort, and little grapefern are similar between alternatives relative to location of potential habitat. Differences in treatment acreage are not in places thought to provide suitable habitat for this group. Design features would be in place to mitigate risk to any newly discovered occupied and contributing habitat. (Design Feature RP-1)
Upland species of open forested/rocky habitats: Idaho dwarf primrose, Mt. Shasta sedge, Kruckeberg's hollyfern	Prescribed fire, vegetative treatments, road and trail treatments, and facility construction are called for in all alternatives. Possible risks and benefits to Idaho dwarf primrose, Mt. Shasta sedge, and Kruckeberg's hollyfern are similar between alternatives relative to location of potential habitat. Design features would be in place to mitigate risk to occupied and contributing habitat. (Design Feature RP-1)
Upland species of open forested/rocky habitats: Sacajawea's bitterroot, Leiberg stonecrop, Sierra sanicle	Known occupied Sacajawea's bitterroot habitat and its surrounding PCA near Pilot Peak should not be affected by project implementation due to lack of proposed activities at that location under any action alternative. Habitat with a high potential occupancy for Sacajawea's bitterroot would be protected (Design Feature RP-2). It is more likely that potential habitat for Sacajawea's bitterroot (low-medium potential for occupancy), Leiberg stonecrop, and Sierra sanicle would be impacted through prescribed fire, vegetative treatments, and road and trail treatments than for other species reviewed in this assessment due to overlap in proposed activities. Risk is greatest in alternatives that propose more area of ground disturbance, i.e., specifically new/temporary road and trail construction, reconstruction, or new landings. Design features would be in place to mitigate risk to occupied and contributing habitat (Design Features RP-1,2,3). While determinations for these alternatives would not differ, they can be ranked in regards to potential impact.

3.11.4.2 Cumulative Effects

Alternative A

Since this alternative would not generate any direct or indirect effects, no cumulative effects are associated with Alternative A.

Action Alternatives

Cumulative effects for botanical resources will be tracked at the project area level with the addition of known occupied rare plant/whitebark pine habitat immediately adjacent to the project area. Cumulative effects may accrue in the habitat for the species discussed above in

conjunction with past, ongoing, and future activities and those proposed within the project area.

A variety of activities, including transportation management, prescribed burning, logging, mining, and grazing, have occurred within the watershed in the past, and active mining claims and grazing permits occur within the project boundaries. Recreational use has increased and includes summer and winter motorized and non-motorized vehicle use, dispersed camping, campgrounds, and hunting/fishing. Noxious weed treatment and firewood collecting are ongoing.

Vegetation Management and Associated Activities—Numerous timber-related, silvicultural and tree stand improvement (TSI) activities have occurred within the project area. Direct and indirect impacts of timber harvest and thinning to rare plants and potential habitat may be temporary to short term, unless site characteristics are permanently altered and as long as seed/plant propagules are available from surrounding sources. If old skid trails were not rehabilitated or were used multiple times, compacting soils or damaging underground root systems, the impacts may still be ongoing. Selective logging or high grading can impact regrowth and may alter species composition and, in turn, rare plant habitat. If past harvest activities involved overstory removal or clearcutting, changes may have occurred in factors directly affecting plant growth (soil quality, water availability, weed invasion, changes in large woody debris [LWD], microbial activity, and seed dispersal). Treatments that reduced conifer density may have provided beneficial impacts for species that occupy early seral habitats (small phacelia in aspen) or forest openings (moonwort ferns). Past vegetation management activities would have had little impact on whitebark pine, with the possible exception of individual trees located outside the more typical habitat and elevation range for the species.

Proposed vegetation management activities are predicted to have a low risk of impacting rare plants/whitebark pine or habitat, with effects ranging from none to short term in nature, due to either low habitat quality, lack of activity in suitable habitat, or protections offered through design features or mitigations. This low risk of impact reduces negative cumulative effects.

Past timber harvest practices in riparian or wet areas may have been less restrictive than those currently in place, impacting habitat for various species that either occur within the project area or nearby. The proposed project would use practices and incorporate design features to protect riparian habitat (Design Features FF-1, 5; FH-5, 19, 24, 27; IS-10), reducing negative cumulative effects.

Reseeding with nonnative grasses/forbs or undesirable species following timber harvest or fires can delay the return of native species to the site (Geier-Hayes 1995). This has been a typical past practice for both the Forest Service and private landowners along roadsides, log landings, and other areas of ground disturbance. As part of Design Features FH-19, FH-24, IS-3, IS-4, and SE-8, a botanist would be consulted on seed selection for areas where seeding is deemed necessary (i.e., skid trails, fire lines, landings) following project implementation, to ensure that appropriate species are selected. Using native seed is preferable if available; otherwise, short-lived native cultivars could be used to provide soil stabilization as long as native recolonization was not compromised. No negative cumulative effects are expected from seeding associated with proposed actions.

Transportation Activities—Past road construction and, to a lesser extent, trail construction represent a virtually permanent commitment of botanical resources as long as they remain in service. If these routes are constructed in rare plant habitat or through a stand of whitebark pine, a permanent loss of plants or habitat is expected. Even if that route is later decommissioned, conditions may no longer be capable of, or have the seed/plant propagule source available, to replicate suitable habitat. Recovery may be long term or may not return to habitable in the foreseeable future. Restoring vegetation following the closure of temporary roads may take many years, and success may be affected by the degree of initial soil disturbance.

Proposed road/trail construction and reconstruction activities are not generally located in high-quality rare plant habitat, although common native plant communities would be impacted. No construction or decommissioning activities are proposed in known occupied habitat or PCAs or areas identified with high potential for occupancy (Figure 3-111 and Figure 3-112). Risks of negative cumulative effects for rare plants and whitebark pine are low relative to transportation activities, and reduced further through Design Features RP-1, RP-2, and RP-3.

Ongoing road maintenance may affect rare plant habitat (i.e., for wetland species) in roadside seeps and drainages and around culverts. These areas are constantly subject to disturbance by equipment during ditch and culvert cleaning activities. Often, the scraped material is deposited on top of other vegetation. The combination of this activity and the proposed road treatments in the project area likely reduce the amount of long-term suitable habitat. Impacts to rare plant habitat may occur in uplands too. Plants lining roads in either riparian or upland locations also receive a constant application of dust when the road is routinely graded or as a result of normal vehicle traffic in addition to the threat of physical damage. This exposure to dust reduces photosynthetic and transpiration capability, and may, over time and in combination with proposed road treatments, negatively impact the quality of rare plant habitat along roadside seeps and riparian areas as well as upland areas. These same effects may be generated by trail maintenance, although at a lesser scale.

Past and current road and trail maintenance have contributed to the above-described effect in the project area. Occupied Sacajawea's bitterroot/whitebark pine habitat may be impacted by routine maintenance of NFS road 380a to Pilot Peak Lookout; however, no new transportation-related activities are proposed in that part of the project area, and, therefore, no resulting cumulative effects would occur. Road/trail maintenance associated with new construction or reconstruction in the project area would contribute to these described effects for habitats at lower elevations into the future. Maintenance activities necessary in riparian areas have the greatest potential to impact botanical resources; however, properly sized culverts may require less damaging maintenance than those that are currently functioning improperly, with a decreased chance of severe road-damaging blowouts.

Although individual maintenance actions may affect only a small area or feature, over time, the loss of suitable habitat through road/trail maintenance activities may grow incrementally.

Wildfire and Prescribed Burning—Two large fires burned in the north end of the project area in 1989 (Gold Fork, Sawmill), affecting over 2,000 acres. This burn may have impacted some riparian (bryum moss, small phacelia, moonwort ferns) and upland (Sacajawea's bitterroot, Sierra sanicle, Leiberg stonecrop) rare plant habitat, particularly

along the ridge between the Crooked River and Lowman Watersheds. Individual whitebark pine may have been impacted, but the fires generally occurred below typical elevation for the species. As 25 years have passed since these fires, herbaceous vegetation should have largely recovered; although, forest overstory removal, local environmental conditions may have been altered. The southern end of the watershed has escaped large fire activity. Due to the passage of time and lack of effects from these fires to whitebark pine, no cumulative effects for rare plants/whitebark pine relative to past wildfires should occur.

Prescribed fire is part of the past, proposed, and likely future actions for this project area. It is proposed for almost the entire area, but would remain outside high-elevation lands north and east of Pilot Peak where whitebark pine and Sacajawea's bitterroot habitat occurs (Design Feature RP-2). Depending on time of year and intensity, impacts from prescribed fire to potential habitat could range from none to light in open, sparsely vegetated and rocky habitat carrying low fuel loads, and light to moderate in more vegetated areas. Design features would be in place to reduce the risk of prescribed fire to rare plants and whitebark pine (Design Features RP-1, RP-2, RP-3). Beneficial effects could occur for species associated with aspen stands or canopy gaps. Typically, the results of prescribed fire should not be long term; overlap of past and proposed activities are not anticipated.

Weeds/Weed treatment—Noxious and undesirable nonnative weed species are abundant on the Idaho City Ranger District and exist within the boundaries of the project area. Past disturbance and current use of the area have created and continue to create areas susceptible to invasive species. Undesirable nonnative plant species, especially those with invasive characteristics, pose a threat to natural ecosystems by competing with native plant species for resources (USDA Forest Service 2010a). Nonnative species threaten suitable habitat for rare plant species. Although no documented invasive populations currently overlap known occupied rare plant/whitebark pine habitat, much of the project area is susceptible to weed invasion (BNF GIS Layers), and weeds are present in suitable habitat for other species.

Proposed ground-disturbing activities have the potential for increasing weed colonization vulnerability. To reduce the cumulative effects of weeds and weed treatment resulting from the combination of past disturbance (activities that enhanced opportunities for weed colonization [e.g, grazing, timber harvest, road and trail construction, recreation facilities]) and the actions proposed here, weed treatment and suppression must be actively and successfully executed. Measures to reduce the introduction and spread of weeds in the project area are part of Design Features IS-1 to IS-11.

Treatment of noxious weeds is an ongoing activity on the Idaho City Ranger District in conjunction with Boise County. Between 2012 and 2013, all major road corridors infested with weeds in the project area were treated (BNF Facts Database). The advantage gained with weed treatment generally outweighs possible negative effects, which can result from herbicide application to non-target species. While most of the Idaho-listed noxious species in the project area occupy dry, harsh habitats, some exceptions occur (i.e., the riparian species Canada thistle and oxeye daisy) that might damage potential rare plant habitat in roadside seeps and drainages. The associated affects to rare plants from using biocontrols are not known. Mechanical weed treatments may inadvertently negatively impact rare plant habitat.

Due to the difficulties of controlling weed populations and the negative impacts to other resources (including rare plants and potential habitat and possible residual effects of past

herbicide applications in the environment); the ongoing weed treatment program; and the potential for new or expanded future invasions, cumulative effects from the presence of weeds and weed treatment should be expected.

Recreation (yurts, rental cabin, organized/dispersed camping, winter and summer motorized/non-motorized recreation, hunting)—Recreational activities may or may not involve ground disturbing events that would impact rare plants or their habitat. Constructing yurts or other buildings, campgrounds, and trails that were built on or near rare plants or habitat may have had detrimental impacts. Continued operation of these facilities/activities should not greatly contribute to new negative impacts to rare plants or whitebark pine if additional ground disturbance is not incurred and project design features, regarding spread of noxious weeds/invasive species, are implemented (Design Features IS-1 to IS-11).

Proposed construction of new trails and trailheads and conversion of roads to trails is primarily confined to areas outside high-quality rare plant habitat and outside the typical range for whitebark pine. No known overlap is likely to occur with occupied habitat. Introduction or spread of weeds during the construction or future use of these trails and facilities, contributing to the effects of weeds already associated with existing facilities and trails, would generate negative cumulative effects. Design features for invasive species (Design Features IS-1 to IS-11) would help reduce risks, although they would not eliminate the probability of cumulative effects (see "Weeds/Weed Treatment" section above).

Firewood Cutting—Firewood cutting and gathering is an ongoing activity within the project area. Cutting of live or dead whitebark pine for firewood is prohibited (BNF 2015 Fuelwood Map, USDA Forest Service 2015a). While the removal of other dead trees may not have a significant impact to rare species, the method of removal and the chance for the spread of noxious weeds/nonnative invasive species during the process may. Probibiting cutting firewood within RCAs and the vegetation types (dry Douglas-fir) in which most firewood is harvested, helps diminish direct impacts to rare plant species and habitat. However, weeds are easily spread to surrounding locations. To avoid cumulative effects resulting from the combination of disturbances attributed to firewood cutting and the proposed actions, public education about weed spread during various activities needs to be pursued in conjunction with weed treatment and suppression. Firewood cutting activities, therefore, may indirectly contribute to negative cumulative effects.

Grazing—The Boise Basin and North Fork Allotments are past and ongoing activities in the project area. Sheep grazing typically uses high-elevation ridgetops and riparian areas and aspen stands, overlapping with occupied and high-quality potential habitat in the project area for both whitebark pine and rare plant habitat.

Sheep grazing typically occurs annually in at least a portion of the project area, but routes can vary each year. In 2014, the Thorn Creek band of 900 ewes and lambs passed to the southeast of Pilot Peak, travelling northeast through the project area following the Lowman/Crooked watershed divide and exiting south of Banner Mine and arriving at the Crooked River shipping corrals around August 10. After the lambs were shipped, this band was combined with another dry band that passed through the project area during late August/early September in the reverse direction, entering the project area north of Banner Mine and exiting north of Pilot Peak. Whether either group passed through occupied whitebark pine or rare plant habitat is unkown, but both pathways cross through potential

habitat. In early August, Sacajawea's bitterroot has likely receded below the ground surface level, but indirect effects of trampling are possible (soil compaction, erosion, effects to pollinators and supporting habitat). Other undocumented rare herbaceous species may also be present. Effects to mature whitebark pine may be negligible, but trampling of seedlings may occur.

In addition to possible herbivory or trampling, invasive species (see "Weed/Weed Treatment" section above) may also be introduced through grazing. Grazing, therefore, may directly or indirectly contribute to long-term negative cumulative effects.

Mining—Historic mining activities (any type) would have caused detrimental disturbance to native plant communities and rare plant habitat (e.g., Mammoth Mine in adjacent Upper Grimes Watershed is in or near occupied Sacajawea's bitterroot, whitebark pine, and Pacific onion habitat). In areas where the disturbance was severe (e.g., Banner Mine area, Hell or High Water, general placer mining), the species composition and distribution may not be the same as it was historically. These heavily disturbed sites are often difficult to revegetate due to topsoil and native seedbank removal. Sites may become heavily infested with species thriving on disturbance (i.e., noxious weeds). Past and current mining activities contribute negatively to the cumulative effects for rare plants via the initial removal of vegetation, followed indirectly by competition from incoming invasive nonnative species onto disturbed lands.

Special Use Permits (SUPs)—SUPs contributing to effects on rare plants or whitebark pine include the Pilot Peak Lookout, which is currently under permit to Idaho Power as a communications site. The building and access road were constructed in occupied Sacajawea's bitterroot habitat, with whitebark pine occurring in the surrounding area. Ongoing use of the communications site is contributing to long-term negative effects to Sacajawea's bitterroot as a result of dust from road use and maintenance (see the "Transportation" section above). Any future expansion of the footprint of existing facilities or parking would likely negatively impact the local Sacajawea's bitterroot population. However, with no project proposals overlapping with the use of the communications site, no cumulative effects would be generated.

The Idaho Transportation Department (ITD) Waste Site (NFS Road 025M) is an area of disturbance susceptible to colonization of nonnative species. This site is included in the Idaho City Ranger District treatment program. The site is an open expanse of soil/rocks that is repeatedly disturbed, and weeds are inadvertently brought in from other locations. Weed seed is then redistributed as the rock material is needed at other locales. Weeds at this location contribute to the ongoing weed management work on the Idaho City Ranger District and may be spread to locations of suitable rare plant habitat. This, in turn, would contribute cumulatively to negative effects to rare plants/whitebark pine from weeds relative to ground-disturbing activities proposed in the project area.

Determinations—Despite slight differences between alternatives in terms of rare plants and whitebark pine, all action alternatives result in the same determinations for the species (Table 3-143).

3.12 INVASIVE SPECIES (PLANTS)

This section incorporates by reference the non-native/noxious weed technical report (project record), which contains the detailed data, methodologies, analyses, conclusions, maps, references, and technical documentation. This section summarizes the effects of the alternatives to non-native/noxious weeds and addresses the issues that proposed management activities may increase the risk of exposure to noxious weeds, affect the ability to detect and monitor weed populations, and provide access and financial resources to treat established infestations in the Project area.

Non-native plants are species that do not have their origin in a local area. Non-native plants include noxious weeds, plant species that spread aggressively and are difficult to manage (GAO 2005). Noxious weeds present the most immediate and disruptive threat to ecosystem function of those non-native plants present on the Forest (USDA Forest Service 2004b; Idaho State 2011).

Of the 65 different species of noxious weeds designated by Idaho state law (IDAPA 02.06.22), spotted knapweed, diffuse knapweed, yellow star-thistle, leafy spurge, and rush skeletonweed are invaders of primary concern on the Boise National Forest (USDA Forest Service and USDI BLM 2000a). Three of these species are present in the Becker project area. Infestations of these invaders can substantially change overall biological diversity by affecting the amount and distribution of native plants and animals. They can also negatively affect recreational experiences, forest regeneration, wildlife and livestock forage, native plant resources associated with tribal rights, landscape and soil productivity, fire cycles, nitrogen cycling, riparian and hydrologic function, and water quality (USDA Forest Service 2004b; Idaho State 2011; Duncan 1997; Lacey et al 1989).

3.12.1 Analysis Scale, Data Sources, and Methodology

3.12.1.1 Analysis Scale

The following spatial and temporal scales are used for the noxious weeds effects analysis for the Becker Integrated Resource Project. Spatially, direct effects were tracked at the project area level (19,327 acres) with a 5-mile buffer for indirect and cumulative effects (147,328 acres). These scales were chosen to include contiguous infested habitat outside the project area boundaries and account for the ability of invasive species to spread. Temporally, temporary (0–3 years), short-term (3-15 years), and long-term (15+ years) timeframes were used to depict effects to indicators.

3.12.1.2 Data Sources

The following resources supplied the data used in this analysis:

- Boise National Forest noxious weed/invasive plant inventory and monitoring data
- Partner (Boise County) noxious weed/invasive plant inventory, treatment and monitoring data
- Other field survey notes/data (project record).
- Forest Plan noxious weed susceptibility GIS spatial layer and related geodatabase

3.12.1.3 Methodology

The *Interior Columbia Basin Ecosystem Assessment* identified lands that were highly susceptible to noxious weed invasion (USDA Forest Service and USDI BLM 2000). The susceptibility ratings were based on vegetation cover types and precipitation zones that have a high frequency of invasion and presence. Further refinement of the noxious weed susceptibility evaluation was conducted during the Forest Plan revision process and documented in the 2003 FEIS (USDA Forest Service 2003a). Focus species for this evaluation included diffuse knapweed (*Centaurea diffusa)*, spotted knapweed (*Centaurea stoebe* ssp. *micranthos*), rush skeletonweed (*Chondrilla juncea*), gypsyflower (Houndstongue; *Cynoglossum officinale*), and Dalmation toadflax (*Linaria dalmatica* ssp. *dalmatica*).

The effects disclosure between alternatives compares identified populations of Idaho-listed noxious weeds and the areas characterized as susceptible to the 5 primary focus species described in the *Interior Columbia Basin Ecosystem Assessment*. The disclosure also analyzes the overlap between known infestations (including additional Idaho-listed noxious weed species) and acres proposed for vegetative treatments, fuels and prescribed fire treatments, recreational facilities construction, miles proposed for road and trail reroutes/construction (system roads/trails or temporary), road/trail closures, road decommissioning and status changes, and culvert treatments. This information provides a relative comparison of potential risk for further introductions and spread of noxious weeds.

3.12.2 Analysis Process and Indicators

The vectors, or potential weed pathways, identified below were the focus of analysis.

Roads—Road construction, decommissioning and/ or re-designations are proposed under the majority of action alternatives. Most existing infestations within the project area are along or have originated from roadsides, as vehicle traffic provides ideal means for noxious weed spread along travel corridors. Roads and their associated vehicle traffic are the largest contributors to noxious weed expansion and pose the most difficult challenge to manage.

Vegetation Management Activities and Fire—Vegetation management activities and fuels and prescribed fire treatments are proposed under all action alternatives. These ground-disturbing activities and associated equipment transport influence the expansion of noxious weeds. Risks can be reduced with localized site restoration and rehabilitation. Opening of forested canopies created with either fire or mechanical means in the drier forest vegetation groups, which cover about half of this project area (e.g., PVGs 1 and 2), can also influence the spread of existing infestations and the establishment and growth of new infestations, more so than in moister forest vegetation groups.

Recreation Areas and Use—Trail and/or trailhead construction is proposed under all action alternatives. In addition to the ground-disturbing activities associated with these actions, recreational activities can contribute to the introduction and spread of noxious weeds. Changes in road/trail status are also considered. Motorized and non-motorized recreational activities are likely the second most common vector of weed seed transport and establishment because of the minimal control over allowing weed-

infested vehicles to travel NFS roads and trails. Initial infestations for noxious weeds and exotic plants frequently occur in conjunction with trailheads, trails, campgrounds and other developed recreation sites.

Culvert Removals—Culvert removals/ replacements or other treatments are proposed under all action alternatives. Culverts are associated with roads, which are the primary means of noxious weed expansion. Ground-disturbing activities create new sites for weed colonization. Dry fill slopes and riparian banks support different weed species according to the plants' moisture requirements.

Analysis indicators represent metrics used to describe the cause and effect relationships between components of the proposed action and desired conditions for a weed management program. While the goal is to eliminate invasive species when possible, where it may not be possible, weeds are managed to minimize introduction and spread. The effects of an integrated weed management program depend largely on the implementation effectiveness of detection, prevention, control, containment, and monitoring practices.

3.12.2.1 Risk of Exposure

Concern: The risk of exposure is affected by the level of activities that either transport weed seed or create potential sites for new seedlings to establish within an area. For example, the amount of vehicular traffic, recreation, and stock use and other forms of dispersed recreation can affect the potential risk for seed dissemination. Soil or ground-disturbance activities, such as fire, construction, or logging, can also affect the number of potential sites for new seedlings to become established.

The magnitude of risk of invasive species establishing or expanding in any given location is related to the degree of the ground disturbance (exposure of mineral soil vs. a relatively undisturbed ground surface), proximity of available seed/plant propagules, and means of transport. Inherently, areas of greatest disturbance in or near a weed seed source carry the highest risk of exposure and are the focus of most concern from a management perspective in an effort to prevent invasion and expansion.

Measurement

- Vectors (modes or activities capable of invasive species transport): Roads and trails, vegetation management, fire, recreation activities and facilities, culvert installations or removals.
- Number of acres, road miles or points of development overlapping documented infestations. These areas are assumed to be at risk, as well as generating greater risk of exposure to un-infested surroundings.
- Number of acres, road miles or points of development overlapping areas of susceptibility for the identified focus species.

Assumptions

- Invasive species occurring (and any new occurrences) outside areas of ground-disturbance proposed as part of the project would continue to be treated and monitored under the Idaho City District Weed program (current weed treatment under agreement with Boise County).

- Inventory, treatment and monitoring for weeds relative to the Becker Project implementation may be conducted using Forest Service employees, under agreement (e.g., with Boise County) and/or other contractors. Costs may vary by implementer.
- Priority for treatment (including inventory and monitoring) of noxious weeds within the Becker Integrated Resource project area would be based on current known occupancy and risk of spread and introduction relative to proposed ground-disturbing activities. Lands proposed for ground disturbing activities coincident with or adjacent to noxious weeds or weed vectors, and that carry a high susceptibility risk due to geographic and vegetative characteristics would be identified as high priority for treatment. Lands where there is no known or nearby weed occupancy, where geographic and vegetative characteristics typically carry a lower susceptibility risk, and where proposed activities are expected to result in little to no ground disturbance would be a lower priority for weed treatment actions.
- Detection of weeds in areas of lower priority for treatment (i.e., unroaded/untrailed lands prescribed for vegetation or fuels treatments with no known infestations, few vectors, at lower risk for weed invasion and potentially geographically remote) depends on observations by Forest Service employees (i.e., those in Timber/Silviculture, Fuels, Recreation, Engineering, Resources) and contractors working in areas where activities are to be implemented (as in Design Feature IS-5).
- Acres of noxious weeds are recorded as the total area over which an occurrence is spread. Actual plant distribution and population density varies within any given polygon, but the average occupation is assumed to be at about the 10%–20% rate.
- Estimated occupation of RCAs by invasive species is only displayed under vegetation treatments. Weeds in the RCAs are not mapped separately apart from uplands, therefore infested acres in vegetation treatments are an estimate based on ratio of upland/RCA in any given specified polygon. Types of herbicides applied in the Becker project area are the same inside and outside RCAs, although reporting criteria differs. See the non-native/noxious weed technical report (project record) for additional information on herbicide application in RCAs.
- The area occupied by invasive species for the vegetation treatments overlaps the area for the activity and natural fuels treatment and the activity fuels only treatment blocks. Therefore, acres occupied by invasive species are only displayed by vegetation treatment, with the assumption that the distribution of invasive species is the same where activities overlap.
- Snow travel is not discussed as a vector of invasive species. Risk of exposure would be very low in winter and occupation of these areas by invasive species is covered under summer activities.
- Prescribed burns would be conducted at low to moderate levels of intensity and severity. While small pockets of higher intensity or severity may occur, levels would average low to moderate across the landscape (*Fuels Specialist Report*).

3.12.2.2 Ability to Detect and Monitor Weed Populations

Concern: Noxious weed detection is strongly connected to the frequency and length of time various management activities occur in an area during the year, consistency between personnel to detect or document sites, and the amount of visitation by the general public. For example, in areas where other resource management activities are low and administrative visits are infrequent, the likelihood of detecting new noxious weed populations is also low. If a new infestation becomes established, a couple of years could potentially pass without detection, thus, creating a large weed seed source that would take several years to eliminate. For example, the Supplemental Draft Environmental Impact Statement for the Frank Church–River of No Return Wilderness reported an actual scenario where a new weed infestation expanded from 2 to 15 acres in a 3-year timeframe (USDA Forest Service 1999). Thus, the ability to detect and monitor weed populations can influence the size and density of new weed populations.

Measurement

- Amount of use and visitation in area, including estimates for persons conducting weed inventory/ or treatments, other Forest employees and Forest visitors that may report weed infestations. Measurement would be qualitative (i.e., high, medium, low) for comparison between alternatives.

3.12.2.3 Ability to Treat Established Infestations

The ability to treat established infestations is affected by the accessibility, financial flexibility, or treatment restrictions associated with an area. The degree of accessibility would influence the costs, logistics, timing, and scope of treatment. Also, effective treatment depends on the application of chemicals, bio-controls, fire, or other means (e.g., mechanical) during certain time windows. If not treated at the correct phenological stage, eradication or control effectiveness is reduced. In addition, the ability to finance treatments may be limited, given that some activities (e.g., timber harvest) and associated funding sources may not be allowed in certain areas.

Measurement

- Accessibility (distance, allowable mode of transportation) to infested sites. Accessibility affects treatment costs and logistics for treatment.
- Timing (ability to access/treat) at most effective time.
- Presence/absence of non-target plant species and sensitive environments that may be impacted by weed treatment and may limit access or treatment methods.

Assumptions

- All acres are inventoried and all acres require post-implementation monitoring
- Cost is estimated as if inventory/treatment/monitoring were to be implemented through a cooperative agreement with Boise County
- Weed treatment rate would be $80/acre where motorized access is available, and $120/acre where access would be non-motorized

- Costs may be lower if
  - Pre-treatment inventory is conducted by qualified Forest personnel working concurrently in area.
  - The area demonstrated to be weed free or otherwise not in need of follow-up treatment and monitoring

3.12.3 Affected Environment

3.12.3.1 Risk of Exposure

Idaho-Listed Noxious Weeds

Noxious weeds have already altered plant communities within the 19,327-acre project area. Five species of Idaho-listed noxious weeds have been identified within the Becker project area perimeter: diffuse knapweed (*Centaurea diffusa)*, spotted knapweed (*Centaurea stoebe* ssp. *micranthos)*, rush skeletonweed (*Chondrilla juncea)*, gypsyflower (Houndstongue; *Cynoglossum officinale*), and Dalmation toadflax (*Linaria dalmatica* ssp. *dalmatica)* (Table 3-145). The most serious infestation to date within the project area is from spotted knapweed, occurring across approximately 17% of the project area (this percentage excludes portions of weed populations that cross the project boundary), followed closely by rush skeletonweed at about 13%. In much of the project area, these species co-occur. Mapped weed populations appear most prevalent adjacent to roads and trails.

Table 3-145. Acres of mapped infestations of Idaho-listed noxious weeds within the 19,327-acre project area

Invasive Noxious Weed		Mapped Acres of Infestation inside Becker Project Area[a]	Average Annual Rate of Spread Percent[b]
Common Name	Scientific Name		
Diffuse Knapweed	*Centaurea diffusa* (CEDI3)	44 (+16 OB)*	18-40
Spotted Knapweed	*Centaurea stoebe* ssp. *Micranthos* (CESTM)	3318 (+137 OB)*	24-40
Rush Skeletonweed	*Chondrilla juncea* (CHJU)	2556 (+526 OB)*	10-50
Gypsyflower (Houndstongue)	*Cynoglossum officinale* (CYOF)	19(+18 OB)*	Unknown
Dalmatian Toadflax	*Linaria dalmatica* ssp. *Dalmatica* (LIDAD)	1010	8

[a]Includes mapped portions of populations which cross the Becker project area boundary and are immediately adjacent.
[b]Sources: Karl et al. 1996, USDA Forest Service 2003a

Within 5 miles of the Becker project area boundaries, an additional six Idaho-listed species are found (Table 3-146). Weeds within this buffer area were also identified and displayed because several of these have a high potential rate of spread and may provide source material for new or additional populations within the project area boundary.

Table 3-146. Species of Idaho-Listed Noxious Weeds Present within 5 Miles of the Becker Project Area Boundary

Invasive Noxious Weed		Infestation Acres within 5 Miles of Becker Boundary	Average Annual Rate of Spread (%)
Common Name	Scientific Name		
Hoary Alyssum	*Berteroa incana* (BEIN2)	29	Unknown
Nodding Plumeless Thistle (Musk Thistle)	*Carduus nutans* (CANU4)	0.6	15
Canada Thistle	*Cirsium arvense* (CIAR4)	304	10
Field Bindweed	*Convolvulus arvensis* (COAR4)	0.1	Unknown
Oxeye Daisy	*Leucanthemum vulgare* (LEVU)	64	Unknown
Scotch Cottonthistle	*Onopordum acanthium* (ONAC)	0.3	16
Diffuse Knapweed*	*Centaurea diffusa* (CEID3)	635	18-40
Spotted Knapweed*	*Centaurea stoebe* ssp. *Micranthos* (CESTM)	15981	24-40
Rush Skeletonweed*	*Chondrilla juncea* (CHJU)	9403	10-50
Dalmatian Toadflax*	*Linaria dalmatica* ssp. *dalmatica* (LIDAD)	904	8
Gypsyflower*	*Cynoglossum officinale* (CYOF)	907	Unknown

*These species are also present inside the Becker project area boundaries.

In the 5-mile area surrounding the project area, spotted knapweed and rush skeletonweed are also the dominant weed species (Table 3-146). Gypsyflower is more widespread in this buffer area and covers a similar acreage as Dalmatian toadflax. Diffuse knapweed is present in more substantive quantity outside the project area boundaries. In the RCAs, Canada thistle is a noxious weed of concern, spreading rhizomatously in small patches that may go undetected. This species may occur in the Becker project area, but has not yet been detected or mapped.

Interior Columbia Basin Ecosystem Assessment Focus Species

The analysis area has also been assessed for the susceptibility of the area to the five focus invasive noxious weed species as identified in the Interior Columbia Basin Ecosystem Assessment (Table 3-147). The assignment of susceptibility ratings was based on vegetation cover types and precipitation zones that have a high frequency of invasion and presence. Susceptibility areas for several species overlap each other within the analysis area.

Table 3-147. Susceptibility and presence of the five invasive focus species within the project area and 5-mile buffer

Invasive Noxious Weed – Focal Species	Area Characterized as Susceptible to Focus Species in Becker Project Area (Acres)	Focus Weed Species Occupying the Becker Project Area (Acres)	Project Area Occupied by Focus Weed Species (%)	Focus Weed Species Occupying the 5 Mile Buffer Surrounding Becker (Acres)
Common Name/ Scientific Name				
Diffuse Knapweed *Centaurea diffusa* (CEDI3)	0	60	<1	635
Yellow Star-thistle *Centaurea solstitialis* (CESO3)	0	0	0	0
Spotted Knapweed *Centaurea stoebe ssp. Micranthos* (CESTM)	0	3,455	18	15,981
Rush *Skeletonweed Chondrilla juncea* (CHJU)	13,173	3,082	16	9,403
Leafy Spurge *Euphorbia esula* (EUES)	10,664	0	0	0

In the case of the project area, the Interior Columbia Basin Ecosystem Assessment model does not represent what is occurring on the ground for all 5 species (Table 3-147). Spotted knapweed represents the heaviest infestation in the project area, yet the model characterizes it as unsusceptible. In the project area, spotted knapweed appears to occupy similar habitat to rush skeletonweed, and in most instances, these populations co-exist. Diffuse and spotted knapweeds both have similar potential spread rates to rush skeletonweed as well, up to 40% and 50% respectfully (Table 3-145). Modelling for rush skeletonweed may be more representative of suitable conditions for spotted knapweed. The models for leafy spurge and yellow star-thistle still appear accurate; neither species is documented in the project area nor in the surrounding 5-mile buffer.

Spotted knapweed, rush skeletonweed, and Dalmatian toadflax (not a focus species) are the primary weeds of concern in the project area. The highest risks of exposure are associated with those species and the greatest investments in detection, monitoring, and treatment are needed to bring them under control. Mapped populations of diffuse knapweed and gypsyflower within the project area are still of manageable size (Table 3-145).

Vegetative Cover Types and Fire Regimes as Indicators of Weed Susceptibility

Upland vegetative cover type can be used as a general indicator of weed susceptibility. Potential vegetation groups (PVGs) (comprised of forested Habitat Types that share similar environmental characteristics, site productivity, and disturbance regimes) typically found at lower elevations that support a drier suite of climax, seral, and understory species (i.e., dry Douglas-fir and ponderosa pine vegetation types, particularly PVG 1 [Dry Ponderosa Pine/Xeric Douglas-fir] and PVG 2 [Warm Dry Douglas-fir/Moist Ponderosa Pine]) are at greater risk of weed invasion because of these relatively harsh conditions, particularly following disturbance. Weeds are able to subsist, even thrive, under conditions that have often become unfavorable for the native plant community. The southeastern two thirds of the project area is largely comprised of these dry types, transitioning to moister and/or higher

elevation types across the north and west sides up to the Crooked River/Lowman watershed divide.

Fire regimes can also act as a relative indicator of weed susceptibility. Lands described as having a non-lethal fire regime include PVG 1 and PVG 2. Under these conditions, the fire return interval may be frequent (5–25 years), and while not lethal to the larger, more fire-resilient species such as ponderosa pine, fire may expose additional mineral soils vulnerable to weed colonization. Where fire occurs with high frequency, native plant communities may be suppressed through a reduction in successful reproduction, allowing disturbance-tolerant species (such as noxious weeds) to become established. The fire regime patterns across the project area mimic those described by vegetation groups, with more non-lethal regimes on the eastern side, grading to regimes of less frequency but higher intensity moving west and upwards in elevation. Risk of weed establishment may also be greater in areas where the vegetation is out of desired range, leading to combinations of species or conditions that result in higher fire intensity or severity and expose larger areas of mineral soil and greater disturbances.

3.12.3.2 Ability to Detect and Monitor Weed Populations

Weed infestations are monitored and treated through the Forest Noxious Weed Program. The Boise Forest is included in the Boise Basin Cooperative Weed Management Area (CWMA), where landowners and agencies work together to improve weed control using integrated pest management. Integrated pest management uses all available control techniques, including mechanical, cultural, biological, and chemical, and applies the most appropriate, effective, and light-on-the-land techniques available (Idaho Weed Mgmt Task Force 2004). Early Detection Rapid Response (EDRR) methods have been employed for several years to eradicate new outbreaks before they become established or to contain infestations that are not eradicated across and around the analysis area. Specific direction for weed treatment options and methods within the project area are documented in the nonnative/noxious weed technical report (project record). Figure 3-113 provides a spatial display of mapped populations of the Idaho-listed and focus noxious weeds documented within the project and cumulative effects analysis areas.

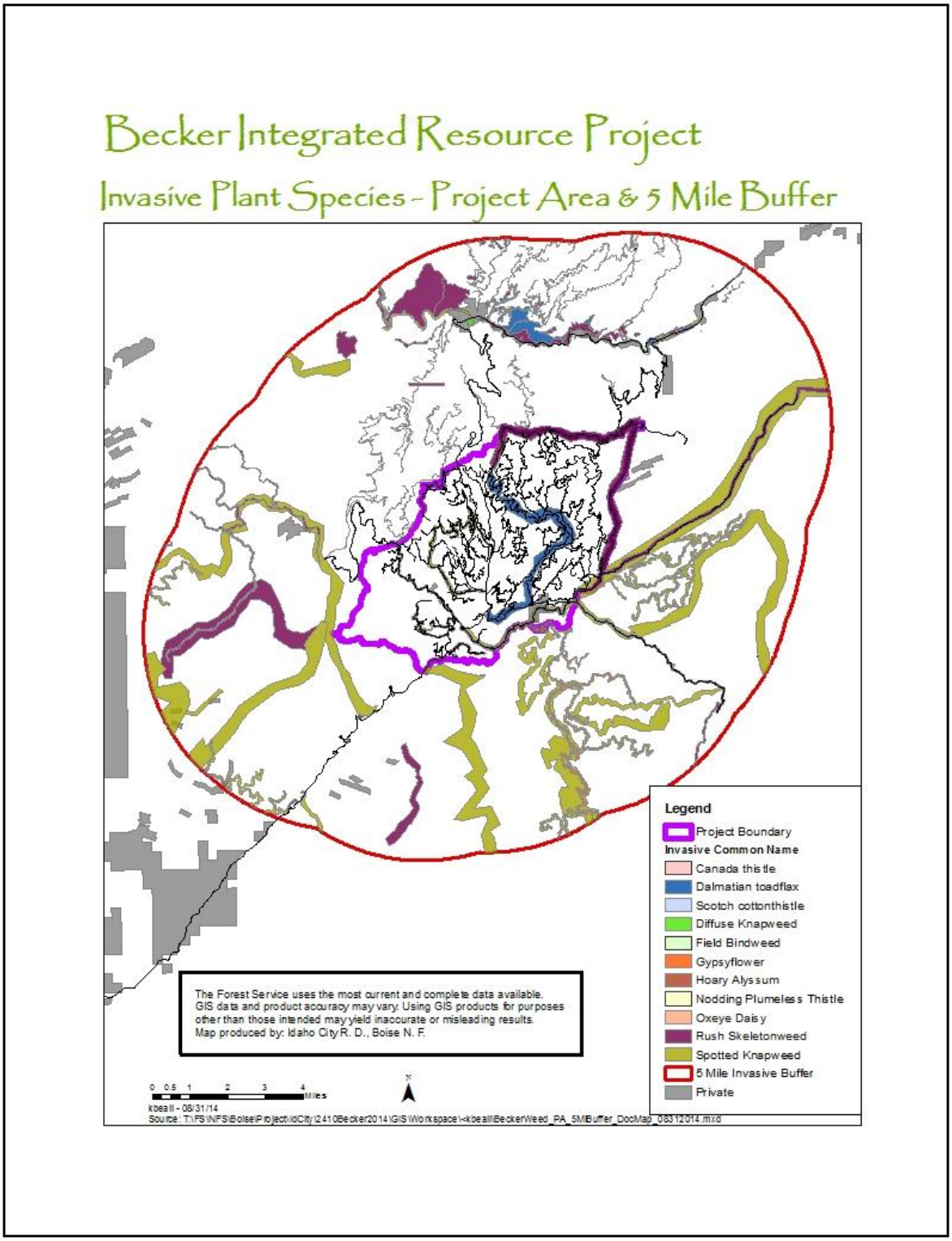


Figure 3-113. Weed infestation in the project area and surrounding 5 miles (species may not be visible due to overlap)

3.12.3.3 Ability to Treat Established Infestations

Invasive Species Treatments in the Becker Project Area

Current treatment of invasive plant species in the Project area consists primarily of chemical herbicide applications, although all methods are considered part of an integrated approach to invasive species treatment. As a partner with the Boise Basin CWMA, the Idaho City Ranger District has a cooperative agreement with Boise County (USDA Forest Service 2014d) to inventory, treat, and monitor weeds on the District, including the project area. Treatment direction specifically addresses concentrating treatment within the project area, including inventory, monitoring, and treatment on motorized roads and dispersed recreation sites. The target for 2014 was 176 chemically treated acres, for a coverage of 1,408 acres at a treatment cost of $14,000 (M. Feiger, Weed Partnership Coordinator with Boise Basin CWMA. Chemical treatments have occurring in the project area during CY2012 and 2013 (Table 3-148). Multiple successive years of treatment are typically necessary to ensure that target plants have been killed and the seed bank exhausted.

Table 3-148. Chemical treatments of invasive plant species treatments within the project area during CY2012 and 2013

Year	Product Applied	Active Ingredient	Total Product Applied (gal)	Amount AI Applied (lb.)	Species Treated	Acres of Application	[a]Cost @ $80.00/acre
2013	Milestone	Aminopyralid	0.353	0.702	Rush skeletonweed, Spotted knapweed	231.5	18,520.00
2012	Milestone	Aminopyralid	0.183	0.367	Rush skeletonweed, Spotted knapweed, Gypsyflower, Dalmatian toadflax, Diffuse knapweed	290	23,200.00
2012	Platoon UAP-Timberland	2,4-D Amine	0.125	0.475	Rush skeletonweed, Spotted knapweed	37	2,960.00
2012	Telar XP	Chlorsulfuron	0.038	0.028	Hoary alyssum	25	2,000.00
2012	Tordon 22K	Picloram	0.325	0.65	Rush skeletonweed, Spotted knapweed, Hoary alyssum	87	6,960.00
Total					Acres Chemical Application	670.5	$53,640.00
Total Acres Becker PA Treated as part of Inventory/Monitoring Area during 2012-2013						5,364	

[a]Cost per acre/inventory-treatment-monitoring of weeds on lands accessible via motorized vehicle charged by Boise County under agreement.

3.12.4 Environmental Effects

3.12.4.1 Direct and Indirect Effects

Alternative A (No Action Alternative)

Under Alternative A, no additional effect to the distribution and status of noxious weeds in the project area would occur, given additional ground-disturbing management activities or changes to the transportation system are not proposed. Depending on changes in risk of exposure, the continued ability to detect, access, and monitor new or expanding weed

populations and the success of ongoing treatments, current weed populations may expand or contract. New species of weeds may appear in the project area; most likely, one of the species from the 5-mile buffer surrounding the boundary would invade the project area.

All documented weed populations occurring on or near motorized roads and trails in the project area are being treated with herbicides by Boise County through a cooperative agreement. Weed treatment would continue as appropriate and as funding allows across the Idaho City Ranger District, including within the project area.

Effects Common to All Action Alternatives

Under the action alternatives (Alternatives B, C, D, E, and F), a variety of actions or activities are prescribed, ranging from those generating no ground-disturbance (administrative status change that would result in no physical change on the ground) to those with extensive ground-disturbance (road and trail permanent or temporary construction/reconstruction/realignment, road decommissioning with total recontour, trailhead construction, creation and use of skid trails and landings, culvert removals or replacements and certain fuels activities such as pile burning). In areas of extensive ground disturbance, the "risk of exposure" to invasive species introduction and spread would increase at least on a temporary basis. Changes in road/trail status may increase or decrease the risk of transportation corridors acting as weed vectors. Additional factors in calculating the risk of exposure to weed introduction or spread include the proximity of weed seed/propagules and the inherent environmental susceptibility of an area (i.e. low elevations, dry vegetation types, and high fire frequency or severity). Generally, the most vulnerable areas to weed introduction or spread would occur with the most proposed ground disturbance and environmental susceptibility.

Along with the risk of exposure, information on the "ability to detect and monitor weed populations" and the "ability to treat established populations" is needed to assess the potential effects of any proposed activity or action on weeds. To successfully manage invasive species, their location must be identified and documented, and the most effective treatment strategy determined, implemented, and monitored. Treatment actions must be performed in a way that is timely and financially manageable.

Alternative B (Proposed Action)

Vegetation management activities are proposed across the same acreage for Alternatives B, C, E, and F. All three of the predominant weed species (rush skeletonweed, spotted knapweed and Dalmation toadflax) are known from the project area in uplands and RCAs, primarily in proximity to established transportation corridors. An increase in risk of exposure is expected with Alternative B through the tractor skid trails construction, ground-based logging systems (no helicopter logging is proposed under Alternative B), landing use, and temporary road construction. Risk of weed introduction and spread is high for these activities, but access to detect, treat and monitor would also rise – at least through the implementation period. Overall costs of weed treatment in the area would increase. Activity fuels work generates a moderate risk, with the potential exception of burn piles (when in proximity to weed seed source). Natural fuels treatment represents a low risk as broadcast burns are expected to be light to moderate in intensity and severity. However, access would be more difficult and expensive if treatment were needed.

Transportation corridors serve as the primary vectors for weeds in the Becker project area, and a variety of road and trail proposed actions in Alternative B are in close proximity to weed sources. However, Alternative B would decrease risk of exposure and maintain/decrease ability to detect, monitor and treat weeds on ML 2 roads being converted to ML 2 Admin or ML 1 roads because of changes in public access (ML 2 Admin) or closure to motorized vehicles (ML 1). Alternative B would convert the most mileage of the alternatives from ML 2 to ML 2 Admin. All three primary weed species are present at conversion sites; making it important to successfully treat existing weeds at a lower cost where access would decrease (ML 1). Road reconstruction, new construction (realignment), and in some cases road decommissioning involve a major amount of ground disturbance and carry a high risk of weed introduction and spread. These activities would increase weed management expenses, although where motorized access is available, inventory, treatment and monitoring would occur at the lower cost per acre. The amount of reconstruction, realignment, and decommissioning of unauthorized routes is essentially the same across alternatives. Alternatives B and C propose the least mileage of NFS roads to be decommissioned. Other types of road activities (conversion of roads to motorized or non-motorized trails) should pose a lower threat of weed introduction and spread because they involve less ground disturbance. However, all three primary weeds of concern are present where these conversions would occur. In the case of conversion to non-motorized trails, access to detect and monitor would decrease and treatment costs would increase.

Proposed culvert treatments are the same for all alternatives. Culverts are located within transportation corridors and often support weeds on the dry, gravelly fill slopes. All but one culvert is mapped as supporting rush skeletonweed and spotted knapweed; diffuse knapweed is also mapped at the Banner Creek/Pikes Fork culvert. The risk of exposure at these locations is high, although access to detect, monitor and treat is also high unless a road is closed after culvert removal.

New motorized trail construction is proposed on previously undisturbed ground and in old road beds under Alternative B, and all three primary noxious weeds overlap proposed construction. While the risk of exposure would subsequently increase by the creation of new seedbeds and weed vectors, motorized access for weed management activities keeps treatment costs lower. Alternative B proposes the most mileage for new motorized trail of the action alternatives. Alternative B also proposes the most use of ML 2 roads as mixed use motorized trails, and designation/conversion of ML 1 roads as motorized trail (for vehicles 50” or less), and all three primary noxious weeds overlap proposed changes for motorized trails. The risk of exposure here is partially dependent on the amount of ground disturbance proposed. While motorized trails act as vectors for weeds, they also create or retain the ability for detection, monitoring and treatment at the lower cost. A new motorized trailhead is proposed at Pikes Fork under Alternative B (and all other action alternatives except Alternative E). Construction would involve ground disturbance and weeds occur on site. However, the location of the trailhead at a major road junction allows easy access for continued weed management to occur at the lower cost of treatment. Accessibility and treatment costs would be equal under all alternatives for the proposed Beaver Creek trailhead along Highway 21.

Under Alternative B, non-motorized trails would be created as a result of authorization or conversion of unauthorized routes and ML 1 and ML 2 Admin roads, and all three major

weeds found in the project area are present at most proposed non-motorized trail locations. Where minimal or no ground disturbance is involved, risk of exposure depends on the proximity of the sites to existing weed populations and visitation. Non-motorized trails have a lower risk of exposure, but also carry a lower ability to detect and monitor weeds. Weed treatments on these trail segments require use of non-motorized equipment and are therefore more costly and time consuming. The exception is where the newly designated non-motorized trails overlays an ML 2 Admin road, retaining access for motorized weed management. In comparison to the other action alternatives, Alternative B falls in the middle of the range for proposed non-motorized trail mileage.

Alternative C

Effects of implementing Alternative C are expected to be very similar to that described for Alternative B. Alternative B and C are similar with respect to vegetation management, skid trails or logging systems, landing use, temporary road construction, fuels treatment activity or natural fuels treatments. Risk of exposure, ability to detect, monitor and treat weed infestations, and cost of weed management would be essentially the same for this group of activities.

The same is true for most of the transportation system changes and culvert work. The exception is that Alternative C has about 25% fewer ML 2 road miles to be converted to ML 2 Admin than does Alternative B. Open roads carry a higher risk of exposure and are more likely to act as weed vectors than roads with restricted traffic. While the overall ability to detect, monitor and treat weeds and the cost of weed management would be the same for ML 2 and ML 2 Admin roads and for all the other transportation actions under Alternative C compared to Alternative B, Alternative C carries a higher risk of exposure for roads than does Alternative B. After project implementation Alternative C would have about three more miles of roads and trails open to motorized use by the public than Alternative B. Proposed culvert treatments are the same for all alternatives.

Alternative C would have less new motorized trail construction and designation of ML 1 road to motorized trail (for vehicles 50” or less) than Alternative B. Slightly more ML 1 road miles would be authorized as non-motorized trail, and fewer non-motorized trail miles would be authorized on ML 2 Admin roads than in Alternative B. The overall result is a decrease of one mile of motorized trail, and almost four miles of non-motorized trails under Alternative C compared to Alternative B. Trailhead accessibility and weed management costs at those locations would be the same as that for Alternative B, D, and F.

Alternative D

Alternative D has the most proposed vegetation management treatment and subsequently more skid trails, temporary road construction, use of tractor jammer logging system and landings, and activity fuels only treatment than any other action alternative, and all three major weed species are present in these treatment areas. This means the greatest risk of exposure would occur under Alternative D. However, access to detect, monitor and treat weeds would be relatively high at least through the implementation period. Costs for treating skid trails would potentially be the greatest of any action alternative. Skid trails would be treated on an as needed basis during and after implementation. No helicopter logging is

proposed under Alternative D, and natural fuels treatments are the same as the other alternatives.

Alternative D transportation system changes and culvert work are similar to Alternatives B and C. One exception is that Alternatives C and D have about 25% fewer ML 2 road miles to be converted to ML 2 Admin than Alternative B. Alternative D also has fewer ML 2 road miles to be converted to ML 1. Open roads carry a higher risk of exposure and are more likely to act as weed vectors than roads with restricted traffic or that are closed to motorized vehicles. While the overall ability to detect, monitor and treat and the cost of weed management would be the same for ML 2 and ML 2 Admin roads and for all the other transportation actions proposed under Alternative D, Alternative D carries a higher risk of exposure for roads than does Alternative B. After project implementation, Alternative D would have about three more miles of roads and trails open to motorized use by the public than Alternative B. Proposed culvert treatments are the same for all alternatives.

Under Alternative D, new motorized trail or ML 1 roads converted to motorized trail would be designed for vehicles of 60 inches or less (including all UTVs), whereas new or converted trails under Alternatives B or C would be designed for vehicles of 50 inches or less (excluding most UTVs). Alternative D would have fewer miles of new motorized trail and ML 1 conversion to trail than Alternative B, but with greater ground disturbance occurring on a per mile relative to allowed vehicle width. Slightly more ML 1 road would be authorized as non-motorized trail and fewer non-motorized trail miles would be authorized on ML 2—Admin Only roads under Alternative D than under Alternatives B or C. The overall result would be about one fewer mile of motorized trail, and almost four fewer miles of non-motorized trails under Alternative D than Alternative B. Trailhead accessibility and weed management costs at those locations would be the same as Alternatives B, C, and F.

Alternative E

The total acres of vegetation management treatments under Alternative E are the same as Alternative B. The greatest difference between Alternative E and the other action alternatives is the amount of helicopter logging. Alternative E incorporates 1166 acres of helicopter logging, Alternative F incorporates 377 acres, and Alternatives B, C, or D incorporates no helicopter logging. Helicopter logging would substantially reduce the miles of temporary road and skid trails, and decrease the numbers of landings, although helicopter landings are typically larger than tractor landings. This reduction in amount of disturbance would create a lower risk of exposure than other action alternatives, and a lower projected inventory and treatment costs for roads, trails, and skid trails than for any of the other action alternatives. If lands outside roads and trails were to need weed treatment, the cost would be higher per acre for Alternative E than the other action alternatives because more acreage would be inaccessible by motorized means. For natural fuel treatments under Alternative E, the exposure risk would be the same as the other action alternatives.

Under Alternative E the same mileage of ML 2 road would be converted to ML 2 Admin as in Alternative B, but fewer miles would be converted from ML 2 to ML 1. Conversion to an ‘Administrative Use Only’ designation would decrease the risk of exposure and retain the ability to detect, monitor and treat weeds. All three primary weeds are present in the locations where Alternative E road and trail changes would occur. Following implementation, Alternative E would have fewer road miles than Alternatives B, C, and D,

and therefore a lower risk of exposure and reduced road and motorized trail weed management costs. Proposed culvert treatments are the same for all alternatives.

No new motorized trail construction is proposed for Alternative E. While motorized trails serve as vectors for weed spread and carry a higher risk of exposure, they also maintain accessibility to conduct inventories, monitor and treat weed populations. Alternative E proposes more miles of non-motorized trail than the other action alternatives. While non-motorized trails have a reduced risk of exposure, access for detection, monitoring and treatment is decreased and weed management actions would cost more to implement than where motorized access is available. Though the motorized trailhead would not be constructed at Pikes Fork under Alternative E, the proposed actions at the Beaver Creek trailhead would have the same effects as those occurring under the other action alternatives.

Alternative F

The proposed acres of vegetation management treatments under Alternative F are the same as Alternative B. However, as with Alternative E, this alternative incorporates 377 acres of helicopter logging. The result is fewer miles of temporary road and skid trails, and fewer landings, although helicopter landings are typically larger than tractor landings, than proposed in Alternative B. Therefore, this alternative would create a lower risk of exposure than other action alternatives, except Alternative E, resulting in a slightly lower expected cost for weed management on roads, trails, and skid trails than Alternatives B, C, and D. For natural fuel treatments, the exposure risk for Alternative F would be the same as the other action alternatives.

Under Alternative F, about 25% fewer ML 2 road miles would be converted to ML 2 Admin than under Alternative B, and fewer ML 2 road miles would be converted to ML 1. Open roads or trails carry a higher risk of exposure and are more likely to act as weed vectors than roads or trails with restricted traffic. While the overall ability to detect, monitor and treat and the cost of weed management would be the same for ML 2 and ML 2 Admin roads, Alternative F carries a higher risk of exposure compared to Alternative B. Alternative F proposes the greatest number of NFS road to be converted to trails (both motorized and non-motorized). After implementation, this alternative would have the same miles of roads and trails open to motorized use as Alternative B, and, therefore, similar overall risk of exposure and expense for detection, monitoring and treatment. Proposed culvert treatments are the same for all alternatives.

Under Alternative F, new motorized trail, ML 2—Admin mixed use motorized trails or ML 1 roads converted to motorized trail would be designed for vehicles of 60 inches or less (including all UTVs), whereas new or converted trails under Alternative B or C would be designed for vehicles of 50 inches or less (excluding most UTVs). Alternative F would have fewer miles of new motorized trail construction, ML 2—Admin mixed use and designation/conversion of ML 1 road to motorized trail miles than under Alternative B, but with greater ground disturbance occurring on a per mile basis relative to allowed vehicle width. The overall result would be about 3 fewer miles of motorized trail and about a half mile fewer non-motorized trails under Alternative F compared to Alternative B. However, Alternative F would have more miles of motorized and non-motorized trails compared to Alternatives C and D. Trailhead accessibility and weed management costs would be the same as Alternatives B, C, and D.

Summary and Comparison of Effects

Table 3-149 represents the collective summary of differences between the action alternatives, assigns a ranking for the three primary indicators used in assessing a weed management situation, and compares relative costs.

"*Risk of Exposure*" focuses on the vectors most likely to facilitate weed movement (roads/trails, skid trails), degree of ground disturbance, the proximity of mapped weed populations and environmental vulnerability. Activities generating the highest risk of exposure and posing the greatest threat of exacerbating the invasive species situation become the highest priority for weed management. "*Ability to Detect and Monitor Weed Populations*" and "*Ability to Treat Established Populations*" refers to the ability and access to detect, monitor and treat weed infestations.

The projected cost of treatment for the high and moderate priority activity groups are included as a fourth item. These costs combine treatment cost by access type and acres to be treated.

Comparisons between indicators are relative, and not numerically scaled. The letter "M" represents the alternative with the middle value. Pluses indicate a positive or beneficial outcome and negatives represent a more challenging situation from a management perspective or a greater expense.

Table 3-149. Final summary of the alternative comparisons for invasive plants by indicator

Indicators	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Risk of Exposure	M	-	--	++	+
Ability to Detect and Monitor Weed Populations	++	M	+	--	-
Ability to Treat Established Populations	++	M	+	--	-
Estimated Cost of Treatment	-	M	-	++	+
Overall Ranking for Invasive Species Management	1	3	4	2	

Note: Comparisons between indicators and alternatives are relative, not numerical.

All action alternatives would generate a higher risk of exposure to invasive species (including focus species of concern) than Alternative A (No Action) in the short and the long-term for the road/trail construction/realignment/reconstruction, vegetation/fuels management, conversion of closed roads for use by motorized vehicles, and construction of new recreation facilities activities. However, risk would also be reduced through some actions, such as road decommissioning, and road conversions to ML 1 or ML 2 Admin and from motorized to non-motorized use.

Additionally, the exposure risk of each action alternative is reduced through inclusion of design features based on Forest Plan standards to minimize or avoid the introduction and spread of noxious weeds. Design Features IS-1 through IS-10 require weed pretreatment and treatment effectiveness monitoring be conducted in areas of high risk for introduction and spread, that off-road equipment (e.g., skidders) is cleaned, and that seed mixes, organic

matter, and other materials brought into the project area are weed-free. Effectiveness monitoring would be required annually for 3 years following completion of project-associated activities. These features would minimize the potential for noxious weed introduction, dispersal, or establishment. Design Features FH-5, FH-10, FH-24, and TH-5g would also be expected to decrease the potential for noxious weed introduction or spread because they require applying approved seed and/or mulch to disturbed areas following road activities and landing reclamation activities. Descriptions of weed treatment options, features of the various methodologies and chemicals, standard operating procedures for herbicide application, and laws and regulations governing chemical use are detailed in the nonnative/noxious weed technical report (project record).

Any of the weeds surrounding the Becker project area may be transported into the project area through the vectors described in the *Analysis Process and Indicators* section above. This includes roads and trails, motorized and non-motorized use, equipment used for vegetation management activities and even Forest Service personnel and vehicles. Generally, the more acres to be disturbed, the more vulnerable lands are to invasion of new weed species or additional introductions of those already present.

No vectors (e.g., roads or trails) entering the project area from beyond the boundaries would be created or closed. Therefore, the opportunity for weed movement into or out of the project are from the 5-mile buffer would be the same for each action alternative.

Susceptibility models were produced by the Interior Columbia Basin Ecosystem Project for five weed species of potential concern in the interior northwest. Suseptibility mmodeling provided mixed results for the project area (described in technical non-native/noxious weed technical report, available in the project record). The project area is characterized as being susceptible to rush skeletonweed and leafy spurge; of these two, only rush skeletonweed is known to be present here or in the 5-mile surrounding buffer. The project area is not considered susceptible to spotted knapweed, which along with rush skeletonweed, has the greatest presence and poses the greatest threat to the lands within the project area boundary. The project area is not characterized as susceptible to diffuse knapweed, which is present inside the project area and the buffer. The area is not categorized as being susceptible to yellow star-thistle, and this species has not been identified there. (Dalmation toadflax occupies about 1,000 acres within the project area, but was not a modeled focus species). Due to the lack of consistency in modelling results, projected susceptibility did not play a role in final ranking of alternatives.

Number of acres, road miles or points of development overlapping areas of susceptibility for the identified focus species. Focus species (The Interior Columbia Basin Ecosystem Assessment identified lands that were highly susceptible to noxious weed invasion (USDA Forest Service and USDI BLM 2000). The susceptibility ratings were based on vegetation cover types and precipitation zones that have a high frequency of invasion and presence. Focus species include spotted knapweed, rush skeletonweed, leafy spurge, diffuse knapweed and yellow star thistle.

Table 34 provides a summary comparison for risk of exposure between alternatives using three measures. The first measure ranks alternatives by the total number of acres, miles or points of development that would be encompassed by a particular activity or group of activities and therefore have a greater risk of exposure, from most to least. The second

measure ranks the overlap between activities and existing invasive species populations (this is a relative, not numerical comparison), which relates to the potential risk of exposure through spread. The third measure highlights the focus weed species, those identified in the Interior Columbia Basin Ecosystem Management Project as being particularly quick to spread and difficult to control.

Alternative B receives the most favorable ranking for overall weed management when combining the indicators and cost for action alternatives. While cost is relatively high in comparison to the other alternatives based on the construction and maintenance of the most road and trail miles, Alternative B retains access for detection, treatment and monitoring. With the most ML 2 Admin roads, this alternative decreases risk by limiting exposure and also maintains the lower cost per acre treatment options.

Alternatives C and D carry the most risk for exposure, relative to skid trails, temporary roads and full public access. Although Alternative D represents the most new ground disturbance in terms of vegetation management (thinning, activity fuels only, temporary roads, ground based logging and landings), opening areas for weed colonization, this alternative has slightly better access while the project is being implemented. The additional skid trails would be more costly to access and treat should that be needed. However, the overall costs of Alternatives C and D would be lower than Alternative B because these alternatives have fewer motorized and non-motorized trail miles to manage.

Alternative E carries the least risk for exposure to weeds due to road decommissioning, road conversions to non-motorized trails, the lack of a new motorized trailhead, and the fewest miles of skid trails. However, detection, monitoring and treatment access would be more time-consuming and costly per acre for the decommissioned and ML 1 roads, and non-motorized trails. Overall, projected weed management costs are lowest because fewer activity acres are proposed.

Alternative F receives the same overall ranking as Alternative E. Though it has a higher risk of exposure than Alternative E, it maintains a higher degree of motorized access and, therefore, lower projected weed treatment cost per acre. Costs would also be lower compared to Alternatives B, C, and D because management for invasive species would need to occur on fewer acres.

3.12.4.2 Cumulative Effects

Alternative A

Since this alternative would have no additional or new direct or indirect effects for noxious weeds in the Becker project area, no cumulative effects would occur.

Action Alternatives

A 5-mile buffer around the Becker Project area was used to analyze cumulative effects for invasive species. The distance of 5 miles was chosen because it encompasses populations that are most likely to generate affects in the project area in the future. All or at a least a portion of all types of past, present and foreseeable activities described below fall within the five mile buffer considered for invasive species.

Appendix B of the EIS outlines the past, ongoing, and foreseeable actions evaluated for inclusion in this analysis. Past management actions have been considered in describing the existing conditions of noxious weeds in the analysis area. Vegetation management activities, road and trail use and related activities (including culvert work and maintenance), authorized and unauthorized recreation activities, recreation facilities construction and use, fire (prescribed and wildfire) and fire suppression, activities authorized under special use permits, livestock grazing, mining and use of private land have all contributed to the current conditions. How the proposed actions function as vectors for weeds is discussed in the assumptions used for each of the indicators.

Many of these activities are ongoing or occurring at new locations within the buffer zone. Any and all of these actions may involve ground disturbing activities in areas occupied by invasive plant species, and would have the potential to cumulatively contribute to the existing weed populations inside the Becker project area boundary through spread of existing populations or introduction from the outside. While policy dictates that weed prevention is incorporated into all ongoing Forest Service actions, it is not possible to prevent all movement of weed seed or propagules across boundaries, especially when moved by natural means (e.g., wind, water, wildlife).

Reasonably foreseeable vegetation/fuels projects outside the Becker project area boundary include the Rocky Road Reoffer and the Lowman WUI Corridor. These projects would involve ground disturbing activities, and would have the potential to cumulatively impact noxious weed conditions in the Becker project area through weed introduction or spread from the buffer zone, especially along travel corridors. However, as with activities proposed under the Becker action alternatives, noxious weed project design features would also be required during implementation of future Forest Service projects. The application of design features as part of new project proposals would be expected to minimize exposure risk for the introduction and spread of noxious weeds, as is expected to be the case on the project.

Differences exist between the risk of exposure and the ability to detect, monitor, and treat infestations between the action alternatives for the project. Although Alternative E carries the lowest long-term risk for cumulative effects of weeds in terms of introduction or spread along transportation corridors, it also carries a reduced ability to detect, monitor and treat potential weed infestations from the surrounding buffer area. Alternative D carries the highest risk collectively for vectors and most ground disturbance, but retains the opportunity for access and treatment. Alternative C would be similar to Alternative D in terms of potential cumulative effects. Alternative F is similar but not as favorable as Alternative E in terms of reduced vulnerability to weed infestation in the buffer zone, but it retains greater ability to detect, treat and monitor weeds. Alternative B lies in the middle for vulnerability to invasion from the buffer zone. Though it has more road and trail mileage than the other alternatives, the retention of the ability to detect, treat and monitor weeds and the decrease in full public accessibility may make it the alternative most capable of maintaining or achieving weed free status in the long term.

Both ongoing and future activities in and around the Becker project areas have the potential for invasive species' introduction or spread inside the boundaries. Under any alternative, maintaining a strong weed management program across the Forest is the best defense against additional invasive species' introduction or spread. Thus, while current Forest weed management programs would likely not totally avoid the introduction of new populations

and/or spread of existing noxious weeds in the project area, the weed management program in conjunction with design features would be anticipated to reduce the risk of exposure to invasive species and contain and/or eradicate any newly occurring weed populations.

3.13 CLIMATE CHANGE

3.13.1 Affected Environment

Resiliency is the ability of a system to absorb disturbances while retaining its basic structure and function. It is also the capacity of that system to adapt to stress and change. Landscape patches in a condition where disturbance and its effects operate similarly to historical conditions are considered more resilient than those that depart from historical conditions (Millar et al. 2007, Peterson et al. 2011). The underlying philosophy in the 2010 Forest Plan is that vegetative conditions within desired levels allow natural disturbance processes to operate characteristically, which contributes to ecosystem resilience.

Historically, vegetation in the nonlethal fire regime was made up primarily of the large tree size class, dominated by ponderosa pine in the overstory and by openings in the understory with generally small (<1 acre) groups of smaller tree size classes (USDA Forest Service 2010a, Appendix A, Table A-1, p. A-3). Stands would be multistoried but primarily in groups that were discontinuous. Small amounts of Douglas-fir would be present.

The primary bark beetle would have been western, generally attacking the older ponderosa pine either singly or in small groups. Douglas-fir dwarf-mistletoe would have been present, but fire would have helped prune dense brooms, reducing the overall level of dwarf-mistletoe plants in stands.

Frequent low-intensity fire and endemic levels of bark beetles and dwarf-mistletoe kept these forests relatively open, minimized Douglas-fir composition, and limited fuel buildup. Moderate- to high-intensity fires and occasional outbreaks of bark beetles occurred in some areas of heavier fuels or denser tree groups, as well as in moister areas where lodgepole pine, Douglas-fir, and subalpine fir were more prevalent. These types of disturbances were generally limited to small areas, such as steep northerly slopes within the project area.

The mixed1 fire regime, like the nonlethal fire regime, historically comprised extensive areas of large tree size classes, primarily of ponderosa pine and Douglas-fir. A variety of size and species mixes of overstory and understory groups would have been present within or surrounding large tree patches. Due to the variety of nonlethal to mixed fire that would have occurred historically, groups would have been distinct from each other in some cases; in other cases, they would have been more continuous. Stand structure would have been diverse, with various sized overstory groups containing large ponderosa pine and Douglas-fir occurring along with different sized understory groups and openings. Western bark beetle mortality groups would have been larger due to more extensive multistoried groups. Dwarf-mistletoe would have been more common due to both the greater amount of Douglas-fir and less frequent fire.

Current vegetative conditions within the project area reflect past management activities, such as mining, timber harvest, and fire suppression. Timber harvest from the 1960s through the 1990s resulted in a variety of plantations dominated by ponderosa pine. Due to past commercial removal, large and legacy ponderosa pines are uncommon. Although large

Douglas-fir trees were also removed, those that were infested with dwarf-mistletoe, making them undesirable as a commercial product, were left in many areas.

Because of fire suppression, the vertical and horizontal continuity of fuel loadings has increased, primarily as a result of high stand densities. In the absence of fire, species composition of more climax species such as Douglas-fir in the nonlethal fire regime and subalpine fir in the mixed1 fire regime increased.

Higher stand densities have also increased levels of bark beetle activity across the project area. Western bark beetle-endemic populations have become sporadic epidemic populations in stands dominated or codominated by ponderosa pine. Small cyclic populations of bark beetles endemic to Douglas-fir have increased to become fairly long-term epidemic outbreaks. Larger and older Douglas-fir trees are often killed due to stress from dwarf-mistletoe infections. As a result, dead fuel loadings and continuity have increased because of higher levels of insect and disease mortality. This level of mortality, in combination with ladder fuels and increased stand densities, makes many of these stands more susceptible to lethal fire.

3.13.2 Environmental Effects

3.13.2.1 Direct and Indirect Effects

Alternative A—No Action

Alternative A would have no direct effects on the vegetative conditions that make forested vegetation more resilient to disturbances, including climate change. Over time, conditions, including species composition, would trend away from desired levels, and stand density would increase. Higher stand densities would lead to increased levels of bark beetle and dwarf-mistletoe and potentially higher than endemic levels of mortality from these factors.

The extent of snags, coarse woody debris, and subsequent surface fuel loadings would increase. Ladder fuels would be relatively continuous across the project area, increasing the risk of large-scale lethal fire similar to that which has occurred in recent years within and outside the project area. Resilience to insects, disease, wildfire, and climate change would decline. Early seral species, including ponderosa pine and Douglas-fir, would decline both from lack of regeneration and high levels of bark beetle and dwarf-mistletoe mortality. Stand patterns within plantations would reflect past practices of homogenous spacing of the planted species. High densities that have developed both from growth of the planted trees and natural regeneration would continue.

Eventually bark beetles and dwarf-mistletoe increase levels of mortality, which may create large openings. However, overall heterogeneity would be relatively low. As a result, Alternative A would continue to develop vegetative conditions that could respond uncharacteristically and undesirably to disturbances, including climate change.

All Action Alternatives

Silvicultural prescriptions applied under all action alternatives would be designed to move vegetative and fuel conditions toward desired levels. These treatments would, in turn,

increase tree vigor and reduce epidemic insect outbreaks and uncharacteristically high levels of dwarf-mistletoe.

The intent of the prescriptions would not be to eradicate disease and eliminate all potential for endemic insect levels, since these types of disturbance agents contribute to critical functional components such as snags and coarse woody debris. Instead, the treatments would create conditions within desired levels to provide for and sustain functions such as wildlife habitat and ecological processes such as fire. Fuels treatments, both natural and activity (i.e., fuels created by mechanical treatments), would be administered at levels that meet desired conditions for live and dead vegetative components.

Except for the harvest system in Alternative F, proposed vegetation treatments for Alternatives B, C, and F are the same. The total number of acres proposed for treatment under these alternatives is 13,428. Alternative D is identical to Alternative B, except that it includes 182 additional acres of treatment (13,610 total). The treatment units and acres in Alternative E are the same as those in Alternatives B, C, and F. However, Alternative E differs from the other alternatives due to an 18-inch diameter at breast height (DBH) upper limit on harvested trees and use of yarding methods (feller-buncher and helicopter) on some acres.

Stands and landscapes are most resilient to disturbances, including climate, the closer they are to desired conditions. Departures from desired species composition indicate lower levels of earlier seral species and higher levels of late seral to climax species. Seral species, in particular ponderosa pine, are generally more tolerant of warmer temperatures and lower amounts of precipitation, all of which are changes predicted to occur with climate change in the Intermountain Region.

High stand densities increase the water stress of individual plants. The majority of annual precipitation occurs as snowfall across the Boise National Forest. Summer rainfall is sporadic and often associated with wet monsoonal thunderstorms. However, the amount and duration of precipitation vary widely from year to year, and seasonal droughts are not uncommon (Hanson and Weltzin 2000). The stress on plants caused by drought is expected to increase with lower precipitation and higher temperatures. In addition to mortality caused directly by drought, drought-stressed plants are more vulnerable to mortality from insects and disease.

Alternative B, C, and F

In comparison to Alternative A, Alternative B would move vegetative conditions closer to desired levels. Alternative B would increase the species composition of desirable early seral species, including ponderosa pine in the nonlethal fire regime and Douglas-fir in the mixed1 fire regime. Stand densities would decrease, which would in turn develop larger canopied, more vigorous individual trees that are better able to withstand drought. Structural conditions and fuel loadings more consistent with the historical fire regimes would develop, improving resilience to disturbances. Treatments would promote structural conditions of groups and clumps that would allow some mortality to produce snags and coarse woody debris. However, in contrast to Alternative A, snags and coarse woody debris would be lower and more widely distributed spatially and temporally.

Alternative B would develop more spatial heterogeneity in the plantations than exists now. Over time, stand patterns more indicative of historical conditions would develop. As a result,

Alternative B would produce vegetative conditions within plantations that could respond more characteristically to disturbance regimes, including climate change, than Alternative A would.

Effects of Alternative F to vegetative conditions would be the same as those described for Alternative B, even though some acres would be subjected to different yarding methods (feller-buncher and helicopter).

Alternative D

Under Alternative D, an additional 182 acres would be treated. Effects would be the same as those described for Alternatives B, C, and F on the acres in common as well as the additional acres proposed for treatment.

Alternative E

Alternative E would treat the same number of acres with the same methods as Alternatives B, C, and F would. However, under this alternative, no trees greater than or equal to 18-inches DBH would be removed. The species composition of trees over this size limit would be the same as that for Alternative A post treatment. Treatments to smaller trees would increase the ponderosa pine and Douglas-fir species composition: over time, the species composition of trees 18-inches DBH and greater would have a higher component of ponderosa pine and Douglas-fir as smaller trees moved into this larger class.

Large Douglas-fir with high levels of dwarf-mistletoe would remain, increasing the levels of dwarf-mistletoe within stands over those for Alternatives B, C, D, and F, although the level of dwarf-mistletoe would be less than that for Alternative A. Stand densities would be lower than those for Alternative A, and although resilience of the overstory in the short term would be lower than for the other action alternatives, it would improve over time. Effects within the plantations would be similar to those for the other action alternatives, although no changes would occur to trees 18-inch and greater DBH. However, only a small proportion of the plantations contain these larger trees.

3.13.2.2 Cumulative Effects

Since the 1960s, approximately 108,880 acres of vegetation management activities have occurred outside the project area and within the analysis area for cumulative effects. These activities include reforestation (17,610 acres), timber stand improvement (7,330 acres), and other types of vegetation management (83,944). An ongoing project within the cumulative effects area is the Rock Creek Timber Sale, which lies northwest of the project area on the Lowman Ranger District. Fire suppression similar to what has occurred in the past would continue into the future.

Effects from older vegetation management activities (1960–1990) outside the project area would be similar to those that contributed to existing conditions within the project area. Effects from more recent and future treatments (2000 and forward) would be similar to the types of restorative actions described for this project.

Alternative A

Older untreated and undisturbed vegetation within and adjacent to the project area within the analysis area for cumulative effects would continue to advance successionally, trending away from desired conditions. Areas of ongoing treatment (i.e., Rock Creek Timber Sale) would have reduced density, altered species composition, and increased heterogeneity.

However, these two treatment areas are small within the cumulative effects area and would do little to contribute overall to resilience of the larger area. So the risk of epidemic insect outbreaks spreading across large contiguous areas would increase. Disturbances such as insect epidemics, stand-replacing wildfire, and climate change could produce uncharacteristic effects across large portions of the area, which would further reduce the ability of the landscape to move toward desired conditions in the event of a disturbance.

Alternative B, C, D, and F

Within the cumulative effects analysis area, Alternative B would produce a greater diversity of heterogeneous conditions more consistent with the historical fire regimes than Alternative A would. The treated areas, in combination with the Rock Creek Timber Sale would develop stand species composition, structural conditions, and insect and disease patterns that would break up the current continuity. Alternative B would produce a greater variety of groups and openings made up of diverse species, including early seral species. Therefore, if the cumulative effects area experienced disturbance, including wildfire and climate change, the treated areas would be more resilient and contribute to biodiversity within the landscape.

Cumulative effects of Alternative D would be the same as those for Alternative B on all acres, including the additional 182.

Alternative E

Over time, cumulative effects of Alternative E would be similar to those for Alternative B. Initially, because of the 18-inch DBH retention limit, the overstory would be more similar to acres within the cumulative effects area that have not been recently treated. But over time, species composition of early seral species would increase due to proposed treatments below the 18-inch dbh retention limit. Overall stand density would be less than for untreated areas. In combination, resilience would increase compared with untreated areas.

3.14 MINERAL RESOURCES

3.14.1 Analysis Scale, Data Sources, and Methodology

3.14.1.1 Analysis Scale

The following spatial and temporal scales were used to analyze minerals effects for the Becker Integrated Resource Project. Spatially, direct, indirect, and cumulative effects are tracked at the project area, as well as known mining activities and claims adjacent to the project area. This scale was chosen because this area is likely to be affected by proposed management activities for the project. Temporally, temporary (0–3years), short-term (3–15 years), and long-term (15+ years) time frames are used to depict effects to indicators.

Forty-nine sections within or adjacent to the Becker project boundary were assessed for the presence of mining claims/projects.[43] Sections outside the project area were included if access routes would go through the area. The following sections, identified by township and range, were analyzed:

- T.8N. R.8E—7 sections
- T.8N. R.7E—25 sections
- T.8N. R.6E—1 section
- T.7N. R.8E—2 sections
- T.7N. R.7E—12 sections
- T.7N. R.6E—2 sections

3.14.1.2 Data Sources

Data sources included field survey data, results of previous analysis in and near the Becker project area, and the Bureau of Land Management LR-2000 mining claim database.

3.14.1.3 Analysis Methodology

To complete the analysis, researchers evaluated current mining claims through the Bureau of Land Management's LR-2000 database, followed by a detailed search of project files in Idaho City. A field evaluation was then conducted when it was identified that certain claims or projects could be impacted.

3.14.2 Analysis Indicators

Mining claims or mining projects in the project area are indicators of concern for minerals resources. Assessment of the following factors was important for understanding how these resources would be affected by proposed activities under the various alternatives:

- Motorized access to mining claims and projects. Decommissioning of roads or seasonal closures that could impact motorized access to known mining claims and projects. Culvert replacement that would impact short-term access to mining claims.
- Disruption or displacement of mining proponents. Project activities such as timber harvest, prescribed fire, or culvert replacements that could temporarily disrupt or displace mining proponents from their project sites.
- Overlap of mine claims and proposed facilities in the project area.

3.14.3 Affected Environment

The majority of mining activity, both past and present, exists along the Crooked River in the southern portion of the project area and just outside that area to the east on Banner Creek, Pikes Fork, and the Banner Mine Complex.

Current activities consist primarily of placer mining for gold along these river corridors. Placer mining is accomplished without the aid of earth-moving equipment (e.g., pick, shovel, and gold pan). Most mining is secondary activity for weekend campers. Suction dredging is

[43] The affected environment was assessed using legal descriptions to be compatible with the LR-2000 mining claim database.

not allowed in this area. Intermittent surface and underground exploration has occurred in the recent past and is ongoing within the Banner Mine Complex both on Forest and private lands. The Forest Service has received no plans for further development.

Historically, the Banner Mine Complex was a high-producing silver mine for the upper Boise Basin.

- Prospectors radiating out from Boise Basin discovered placers on Crooked River in the summer of 1863. These were traced to a quartz lode, July 6, 1864, and the Banner mine was located August 8. A rush from Idaho City followed two weeks later. After a decade of arastra production, G. W. Craft installed a mill in 1874, and capital from Elmira, New York, helped further to develop the district in 1878. Stamp mill reproduction at Banner continued for more than ten years, with a considerable spurt in activity there from 1882 to 1884, ending in a $400,000 mine sale in 1884. Production totaled close to $3,000,000 worth of silver before the district shut down in 1921. (Idaho Historical Society 1985)

Evidence of past activities can be seen today throughout the Banner Mine Complex. Structures and waste dumps are present, and timber has been removed in the past to support construction. Below are discussions of the current status of the three indicators.

- Motorized Access—Currently, motorized access is being maintained to known mining claims within the project area and adjacent areas that were assessed. During project design and external scoping, researchers identified the specific roads and locations where ongoing minerals activities are occurring and/or multiple mining claims exist. These included National Forest system roads (NFSR) 393, X384C, and 025MX1. Culvert replacements on NFSR 312 that could also affect short-term access to mining claims were identified.
- Disruption or Displacement—Activities such as road use and maintenance, trail use and maintenance, recreation activities, and fire suppression are ongoing within the analysis area. These activities could temporarily disrupt or displace mining proponents.
- Overlap—Mining claims and Forest Service facilities do not overlap in or adjacent to the project area.

In general, mining claim density is low throughout much of the project area. Few mining claims exist in the northern portion of the area, and the majority of claims exist along the Crooked River in the southern portion of the project area and just outside that area to the east on Banner Creek, Pikes Fork, and the Banner Mine Complex.

3.14.4 Environmental Effects

3.14.4.1 Direct and Indirect Effects

Alternative A—No Action

Implementing Alternative A (No Action) would have no direct or indirect effects on current minerals resources given that this alternative would maintain the existing access and opportunities within the analysis area. No change to the amount, duration, and/or frequency of minor disruptions and/or displacement of mining proponents by other uses in the analysis area would be expected with implementation of the No Action Alternative.

Mineral development in the analysis area would be maintained at the current level. Existing dispersed recreation uses, including camping, hunting, scenic driving, and fuelwood gathering, would likely continue in the project area. National Forest System (NFS) roads and NFS trails open to motorized use in the analysis area, as illustrated on the Idaho City Ranger District's motor vehicle use maps (MVUM), would remain open for designated use by season and be maintained accordingly to accommodate this use. No overlap of mining claims and Forest Service facilities would occur.

All Action Alternatives

Effects to minerals resources will be the same for all action alternatives for two indicators. Since mining claims and Forest Service facilities do not overlap in or adjacent to the project area, no direct or indirect effects would occur under the action alternatives for this indicator.

Motorized Access

Up to 23 culvert treatments could occur throughout the project area. But no culvert removals would result in long-term loss of access to existing claims, only short-term loss of access. Each culvert replacement would affect vehicle traffic from roughly 2 hours to 2–3 weeks, depending on the size and complexity of the replacement. Except for one replacement, all complex (2–3 weeks for implementation) culvert replacements have alternate routes for access.

The one exception is the Banner Creek culvert on National Forest System (NFS) road 312 (T.8N. R.8E. S32), which would affect access to Graham, Jackson Peak Lookout, and the Trapper Flats area. Numerous claims are located past this culvert, but no alternate routes exist around the work site. No current or proposed plans of operations would be impacted by this action. In addition, no notices of intent have been submitted in the past 2 years within the area that would be impacted by the action alternatives.

Three locations were identified where Design Feature MG-2 maintains access to areas with either road decommissioning or road status that differs from the preliminary project design:

- NFS road 393—A portion of this road is scheduled for road realignment/decommissioning. The road plan was designed to maintain motorized access to two claims identified in this area.
- NFS road X384C—This is an unauthorized road that has been the primary access to the Hell or High Water mining project. Under all alternatives, this unauthorized road would be converted to Management Level (ML) 2 (Administrative Use Only), gated at the beginning and decommissioned 0.4 miles from the gate (distance to the main project area).
- NFS raod 025MX1—Under all alternatives, 0.36 miles of unauthorized road would be converted to ML2A and gated. This unauthorized road has been primarily used by the Idaho Department of Transportation as a disposal site, but it also leads to claims adjacent to Lamar Creek.

In addition to physical changes to roads that could affect access to mining claims, seasonal designation changes to roads was analyzed. No access issues were identified as a result of roads changed from open year round to open seasonally (mid-June to mid-September).

Disruption or Displacement

The majority of mining activity within or adjacent to the project area consists of small-scale activity such as gold panning or using a nonmotorized sluice. Most of this activity occurs on weekends or holidays, a conclusion that is supported by the lack of notices of intent submitted to the Idaho City District Ranger and by routine field inspections completed by the Forest Minerals Administrator.

All alternatives would likely result in short-term disruption or temporary displacement of mining proponents during project implementation due to noise, dust, and smoke from timber harvest (including helicopter logging) and prescribed fire in the analysis area. Although effects from noise, dust, and smoke would not stop claimants from their mining activities, temporary area closures would affect such opportunities. However, given the limited mining activity and lack of major mining projects, disturbance to mining proponents would likely be consistent with impacts to other NFS users and could range from several hours to several weeks.

Disturbance to mining proponents could also occur with log haul activities on NFS roads. However, Design Feature TH-3, which prohibits log hauls on weekends, major holidays, and the opening days of deer, elk, and turkey hunting seasons, would mitigate most conflicts between log haul operations and mining proponents in the area when mining activity would be highest. If timber harvest or prescribed fire activities were anticipated to impact specific mining locations more than 1 week, specific provisions could be addressed through Design Feature MG-1, submission of a notice of intent or plan of operations from the mining. Additionally, prescribed fire operations occur in the spring and fall, which is outside the peak season for mining activities in this area.

Alternatives B, C, D, and F

Alternatives B, C, D, and F would likely result in additional short-term disruption and displacement from what was discussed above for all action alternatives to several mining claimants along Pikes Fork and Banner Creek due to the proposed motor vehicle trail and trailhead at the junction of NFS roads 312 and 385.

The new trail would likely increase motor vehicle traffic, including all-terrain vehicle (ATV) and utility vehicle (UTV) use, contributing to increased noise and dust. More use would also likely occur at dispersed campsites around the area. Some of these campsites would be located within mining claims. Mine claimants could be temporarily displaced from access to campsites near their claims. While this displacement would inconvenience mine claimants, it is unlikely that they would be barred from accessing their claims.

The proposed motor vehicle trailhead is located within the boundary of federal unpatented mining claim IMC #212527. Based on field evaluations, some casual use (gold panning and nonmotorized sluice) prospecting has occurred in Pikes Fork near the proposed location. The claimant has yet to submit a notice of intent or plan of operations for mining activity on this claim. A search of project files at the Idaho City Ranger District found no past plans of operation or notices of intent on record for this area.

The proposed trailhead would have minimal effect on the mining claimant’s ability to develop this claim. Additional measures would be required for the claimant to work within the trailhead footprint. But given the footprint of the trailhead (roughly 0.5 acres) and the size

of the mining claim (20 acres), the majority of the claim is available for immediate prospecting and development. Gold-bearing material would be evenly distributed throughout the claim, given the known composition and depositional history of the area. Neither past activities on this claim nor other supporting evidence suggests that this area of the proposed trailhead has higher mineral potential than the rest of the claim.

The Forest Service's right to manage surface resources on unpatented mining claims is authorized under section 4(b) of the Surface Resources Act, 30 U.S.C. § 612(b) (1994). The Surface Resources Act authorizes the Forest Service to manage and dispose of resources found on the surface of unpatented mining claims, provided that uses of the surface by the United States, its licensees, or its permittees do not endanger or materially interfere with prospecting, mining, or processing operations or uses reasonably incident thereto. Barring any evidence that this proposed trailhead endangers or materially interferes with established prospecting, mining, or processing operations or reasonably related uses, approval of this surface management action would be appropriate.

A certified mineral examiner (CME) should review all proposed plans of operation within the footprint of the proposed trailhead to determine whether unnecessary or unreasonable resource damage would occur. If the CME determines that the proposed plans are the next logical level of development, the CME should prepare a formal Surface Use Determination Report to be used in processing and approving the specific Plan of Operation. By locating these facilities, the responsible official would accept the risk that mineral development is possible and could impact these facilities. However, given the lack of any substantial placer-mining operations in this area recently, it is unlikely that profitable concentrations of gold-bearing material exist. Risk of mineral development would be minimal.

3.14.4.2 Cumulative Effects

Alternative A

No cumulative effects would be associated with this alternative since no direct or indirect effects would occur to minerals resources with implementation of Alternative A.

All Action Alternatives

Past Activities

Table B.1 in Appendix B identifies past activities that were considered in this analysis of cumulative effects. The impacts of past activities have contributed to the existing conditions for minerals resources in the analysis area; therefore, they are included in the affected environment discussion (section 3.14.3).

Present and Ongoing Activities

Table B.1 in Appendix B identifies present and ongoing activities that were considered for this cumulative effects analysis. Ongoing activities are those such as road use and maintenance, trail use and maintenance, recreation, and fire suppression that would likely continue within the analysis area.

Minor disruptions and/or displacement to mining proponents in the analysis area could occur with ongoing activities related to recreation use, road and trail maintenance, and fire

suppression, if they occur. Minor access disruptions could also occur during scheduled maintenance of NFS roads and trails in the analysis area, as has happened historically. In addition, to mitigate public health risks, safety risks, and hazards, areas could be temporarily closed to Forest users during fire suppression activities.

Reasonably Foreseeable Activities

Table B.1 in Appendix B identifies reasonably foreseeable activities that were considered for this cumulative effects analysis. No reasonably foreseeable activities are anticipated that would differ from present and ongoing activities, and no plans of operation are under review in the analysis area. Access disruptions could occur during scheduled maintenance of NFS roads and trails, as has happened historically. In addition, to mitigate public health risks, safety risks, and hazards, areas could be temporarily closed to National Forest users during fire suppression activities.

The cumulative effects of these activities would not "endanger or materially interfere with prospecting, mining or processing operations, or uses reasonably incident thereto" (FSH 2809.15; 36 CFR 228.8; 30 U.S.C. § 601, et seq.).

Alternatives B, C, D, and F

Reasonably Foreseeable Activities

However, as with present and ongoing activities, road use and maintenance, trail use and maintenance, recreation, and fire suppression would likely continue within the analysis area.

Minor access disruptions could occur during scheduled maintenance of NFS roads and trails in the analysis area, as has happened historically. In addition, to mitigate public health risks, safety risks, and hazards, areas could be temporarily closed to National Forest users during fire suppression activities.

3.15 SCENIC ENVIRONMENT

3.15.1 Analysis Scale, Data Sources, and Methodology

3.15.1.1 Analysis Scale

The scenery analysis includes the area within the Project boundary. While some proposed actions may be visible from points or areas outside of the Project boundary, a visual resource analysis only considers the proposed action(s) that must meet the inventoried or mapped Visual Quality Objective (VQO). Exceptions can occur, but if a project meets an inventoried VQO from the foreground distance zone (within the project area), it will usually, by extension, meet that VQO from further distance zones, which may include areas outside of the Project boundary.

The temporal limits or duration of visual impacts, defined as the permitted amount of time for a management activity to create a reduction in form, line, color, or texture contrast to meet a specific VQO, are as follows:

- **Retention (R)—**Immediately post-project[44]
- Partial Retention (PM)—Within 1 year[45]
- **Modification (M)**—Within 1 year or meet other Regional/Forest or project/area guidelines[2]
- Maximum Modification (MM)—Within 5 years

3.15.1.2 Data Sources

The project-level scenery analysis was produced using combined management direction provided by the Forest Plan (USDA Forest Service 2010a) and the Forest Service Visual Management System Handbook (USDA Forest Service 1995; USDA Forest Service 1974). In addition, project information was derived from site visits on June 16–18, 2014, various IDT planning meetings during the planning period, and GIS analysis.

3.15.2 Analysis Process/Indicators

3.15.2.1 Scenery Resource Indicators

- Indicator 1—Skid trail and temporary road development/location
- Indicator 2—Landing development/location
- Indicator 3—Slash treatments and locations
- Indicator 4—Vegetative removal patterns/density
- Indicator 5—Prescribed fire and fire line development
- Indicator 6—Trail development density

3.15.2.2 Visual/Scenery Resource Analysis Process

The National Forest Visual Management System (VMS) has been used by the Forest Service since the early 1970s and provides the basis for describing acceptable degrees of landscape alteration on the Forest. This system describes a range of desired conditions; but, more importantly, it provides ways to asses the potential visual effect of various proposals, relative to prescribed management objectives found within the current Forest Plan. Natural landscape features and viewer sensitivity (both physical numbers and concern for the environment) help establish visual management objectives for any given area. All public lands within the Forest were first inventoried in the early 1980s. Since that time, the VMS has been routinely used to evaluate proposed activities and determine visual compatibility.

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[44] Relevant Boise Forest Plan Guideline (SCGU02): The duration of visual impacts from ground disturbing and vegetation removal activities, to allow for herbaceous vegetation recovery of ground cover, may extend to three years in fgR (Foreground/Retention). Consider the timely initiation of reseeding in areas where natural recovery is questionable.

[45] Because this Forest Plan guideline is permitted/identified in a highly restrictive VQO (R), it is therefore hereby assumed that this guideline will also apply to the less restrictive VQOs of PR and M.

The visual analysis for a proposal on public lands starts with a description of the physical attributes that comprise affected and surrounding landscape characteristics. This overall impression is created by a unique combination of visual features, which include the land, existing vegetation, water, rock outcrops, and topography. In addition to physical landscape features, perceptual factors also help to determine how visitors or highway travelers might perceive a proposed site alteration.

A proposed activity's attributes can then be assessed by the same method, and a comparison can be drawn between the existing environment and proposed management activity. The degree of landscape alteration can be evaluated and a comparison made as to whether or not a proposal is consistent with inventoried VQOs and direction provided in the Forest Plan. Inclusive in this analysis is a project-level review of the adopted VQOs in order to ensure that VQO mapping, completed at a Forest scale, is accurate for the site. These planning guidelines and management direction are provided to ensure Forest scenic values are protected and not compromised. All new proposals must remain consistent with the VQOs of the proposed area of impact.

VQOs are identified using a combination of overlay data, including distance zones, sensitivity levels, and landscape variety class (each defined below). VQOs used on the Forest can be defined as follows (Figure 3-114):

- **Preservation (P)—**Reserved for Wilderness or Wilderness study areas; this VQO is not present in the project area.
- **Retention (R)—**Provides for ***management activities that are not visually evident to the casual Forest visitor***. Activities may only repeat form, line, color, and texture, which are frequently found within the characteristic landscape. Changes in size, intensity, or patterns, should not be evident.
- **Partial Retention (PR)—**Provides for ***management activities that remain visually subordinate*** to the characteristic landscape. Activities may repeat form, line, color, or texture common to the characteristic landscape, but changes in their qualities (e.g., size, amount, intensity, direction, pattern) remain visually subordinate.
- **Modification (M)—Management activities may visually dominate the original characteristic landscape**. Activities that typically introduce facilities such as buildings, signs, or roads, should borrow naturally established form, line, color, and texture so completely and at such scale that the visual characteristics are compatible with the natural surroundings.
- **Maximum Modification (MM)—**Represents the lowest level visual quality objective within the VMS.

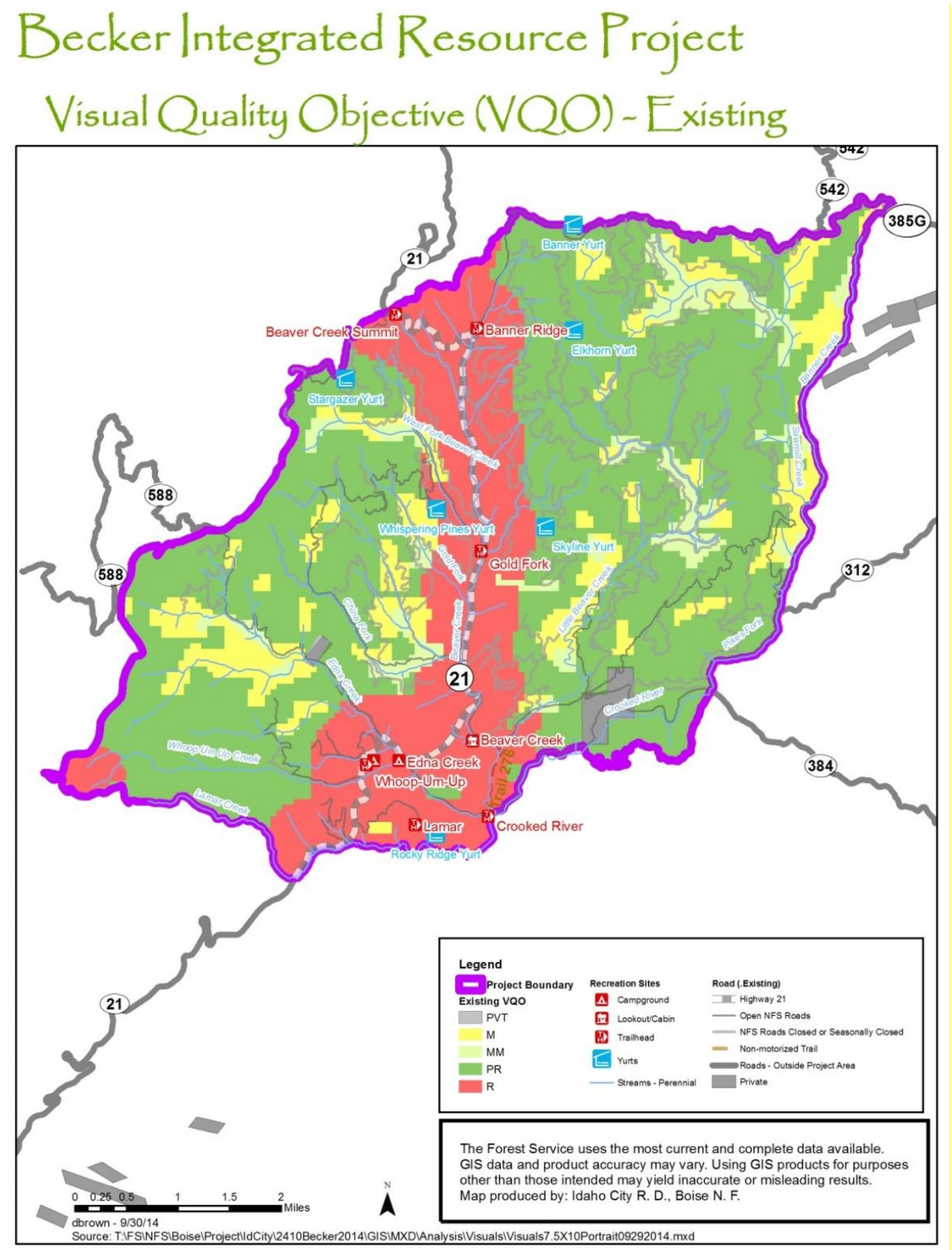

Figure 3-114. Mapped/adopted project area Visual Quality Objectives (VQOs)

3.15.2.3 Other Scenery Resource Considerations

Viewing Distance and Travel Routes/Use Areas

Distance zones are divisions of a particular landscape being viewed and are used to describe the part of a characteristic landscape that is being inventoried or evaluated. The three distance zones are foreground (up to 0.5 miles from the observer), middleground (between 0.5 and 3 miles from the observer), and background (further than 3 miles from the observer). Management activities that would potentially be visible within the project area are all located within the foreground or middleground distance zones. While background views may occur, visual mitigations will be developed/reviewed from the applicable foreground or middleground distance zones where they potentially have a greater impact.

Primary travel routes include tate Highway 21 (Ponderosa Pine Scenic Byway) and all NFS roads and trails (summer and winter, motorized and non-motorized) within the project area.

The project area includes five yurts (Stargazer, Banner, Elkhorn, Skyline, and Whispering Pines), two campgrounds (Edna Creek and Whoop-Um-Up), four existing trailheads (Banner Ridge, Gold Fork, Whoop-Um-Up, Lamar) and two proposed trailheads (385/312 and Beaver Creek Summit), and the Beaver Creek Cabin (Figure 3-115).

Figure 3-115. Typical project area recreation sites (Skyline Yurt, Beaver Creek Cabin, Gold Fork Trailhead)

Viewer Sensitivity

People recreate within this area and use this area to access other recreational opportunities; therefore, users would likely display a mid or high level of sensitivity to the landscape character, equating to a Sensitivity Level of 1 (highest) or 2 (mid level), out of 3 as inventoried, mapped, and adopted in the Forest Plan (USDA Forest Service 2010a).

3.15.3 Affected Environment

A scenic quality inventory is contingent upon establishing a physical, “on the ground” frame of reference. A frame of reference is developed by defining and mapping landscape character types, which are broad areas having distinguishing general physical characteristics unique or common to each particular physiographic unit. Each character type’s physical characteristics are compared in terms of visual variety and attractiveness, both of which are evaluated

through the following classifications called variety classes: A (Distinctive), B (Common), and C (Minimal).

The Forest lies entirely within the Southern Batholith character type. This character type covers southcentral Idaho and is characterized by mountains of moderate-to-high relief and cascading streams with mature drainage systems. Common elevations range from 2,000 to 8,000 feet, with rare exceptions to 10,000 feet.

The Idaho City Ranger District is located in the eastern portion of this character type and visual appearance is variable on NFS lands within the Ranger District. The rivers and streams are generally characterized by fast-moving, high-gradient water. Small waterfalls, pools, and islands are usually part of the visual character of water features. Streambed features are often visible due to clear water, except during runoff periods.

Landforms here appear rolling to mountainous with strong stream-cut drainages. The vegetative patterns are reflected as a mosaic of brush/grass south slopes and timbered north slopes and well-defined riparian areas and meadows. Vegetation is primarily composed of conifers with shrub/grass types and aspen patches in wet, south facing areas and mixed types in the riparian areas.

Natural features can be defined within any landscape, in terms of four dominance elements: form, line, color, and texture. All four dominance elements are usually present, but exert differing degrees of visual influence within the landscape scene. Within the proposed project area, the landscape character can be described as follows:

- **Form**—The project area is primarily situated within the valley of the Beaver Creek drainage, which drains to the Crooked River. Slopes within the project area range from narrow segments of flat, lowland riparian areas to moderate-to-steep mountainsides. Travelers will see large conifer stands and some limited aspen stands interspersed by open meadows. Landforms are generally dictated by the narrow viewsheds afforded by the steep drainages present. Strong valley bottom and ridgeline features are dominant.
- **Line**—The project area lies within a dominant river valley formed by Beaver Creek and its tributaries. The valley bottom is framed by adjacent mountains on each side of the drainage. Views toward the mountains and ridgelines show continuous conifer stands interspersed with occasional meadows. Travelers along NFS roads within the project area have either very confined corridor views of the forest along the road, or, where limited breaks in vegetation are present, views of the adjacent dominant ridgeline along either side of the road.
- **Color**—The predominant vegetation is mostly coniferous, with varying shades of dark green throughout the year. Aspen and riparian vegetation occur in the lower elevations of the project area and provide lighter shades of green while leafed-out in the spring and summer and brown, red, and white bark colors during the fall and winter. Surrounding meadows are typically sage green to earth-tone colors of tan or brown with periods of more intense green during the spring. In the winter, these features would most likely display snow.

- **Texture**—Texture is directly related to viewing distance from identified affected priority travel routes and use areas (see Viewing Distance and Travel Routes/Use Areas above). A foreground viewing situation is usually considered to be from 0 to 0.25 or 0.5 miles to the observer. At these viewing distances a high degree of individual detail is obvious, such as individual trees, branches, leaves or needles, flowers, and grasses. A middleground view is usually defined as a viewing distance from the foreground out 3 to 5 miles from the observer. Individual tree forms can still be discernible in very sparse or open landscapes. More often, vegetation becomes obscured, and texture is characterized by masses of trees in stands of uniform tree cover.

3.15.4 Environmental Effects

3.15.4.1 Direct and Indirect Effects

Alternative A

Alternative A has no direct effects on the landscape character associated with the project areas. No foreseeable change to the future landscape character would occur; therefore, the future scenic integrity of the project areas would not change from the current conditions.

Potential indirect effects to the landscape character of the project area, if Alternative A is selected and no vegetative treatment occurs, would be the potential for loss of vegetation and land scarring associated with an increased risk of collapsed stands from insect and disease attacks or catastrophic wildfire, which would be beyond expected disturbance levels for this ecological system. This alternative could have a long-term major adverse effect and be more damaging to the scenic integrity of the project area because of the risk associated within the natural ecosystem fire regime. Because of the unnatural fuel buildup, an unmanaged wildfire could burn hotter and destroy native plants, permanently changing the vegetation composition of the forest and resulting in scenery with a negative appearance for up to 10 years and a different type of scenic expression thereafter. This change could potential decrease the ability of the forest lands to meet the established VQOs.

All Action Alternatives

Indicator 1—Skid Trail and Temporary Road Development

Skid trails and temporary roads (in tandem) are typically developed to haul timber and slash from the point-of-creation to a landing or haul road. Design Feature SE-8 for skid trail and temporary road development would ensure that their development meets mapped VQOs where applicable.

Alternatives B, C, and D propose more skid trails than Alternatives E and F, which include helicopter logging. Alternatives E and F propose so few skid trails that their potential visual resource impacts would be minor, thus meeting or exceeding mapped VQOs.

Temporary road construction for all alternatives is confined to the south side of the project area near the Lamar Trailhead (not visible from Highway 21), the west side of the project area outside of the sensitive foreground viewing distance of Highway 21, and a few limited entry roads directly off Highway 21 near Banner Ridge Trailhead. Alternatives B, C, and D

propose constructing 3 temporary roads that connect to Highway 21; Alternatives E and F propose one.

Potential scenery impacts from temporary roads and skid trails include the creation of an uncharacteristic linear feature visible on the landscape from travel routes and use areas that could potentially visually dominate a particular viewshed. Design Features SE-8, TH-5, Th-6, TH-7, and IS-3 were developed to mitigate the potential linear visual effects of these features. Wherever practicable, temporary roads and skid trails should be located so as not to be visible from primary travel routes and use areas. While this restriction may extend the overall length of these features in order to ensure their routes remain outside of a particular viewshed, the net result, from a visual resource perspective, would be limited evidence of management activities.

Temporary roads and skid trails would be reclaimed after the project to ensure their impacts meet VQO restoration timelines, typically within 3 years post-project as identified in the VQO guidance above (SCGU02; USDA Forest Service 2010a).

Indicator 2—Landing Development

Landings and staging or stockpile areas are typically developed for various logging systems staging/mobilization and as a transfer site to which materials are hauled from their point-of-origin and from which the same materials are hauled off-site.

Proposed design features for landings would ensure they meet mapped or adopted VQOs where applicable. Alternatives B, C, and D propose more landings than Alternatives E and F, which include helicopter logging. Alternatives E and F propose so few landings that their potential visual resource impacts would be minor, thus meeting or exceeding mapped VQOs.

The size, quantity, and location of landings can adversely affect scenic resources. Design Features SE-8, FH-6, FH-10, and FH-18 were developed to mitigate these impacts.

Indicator 3—Slash Treatments

This indicator is qualitative (versus quantitative) because the overall quantity of the area treated matters less than the location in which the treatment is to occur and its relative visibility from travel routes and use areas (evaluated on a site- or area-specific basis). Various proposed slash treatments may affect scenic resources due to the potential visibility of this management action from project travel routes and use areas. Potential slash treatment options for this project include piling and burning or lopping and scattering the slash. Each treatment option includes design features developed to mitigate their individual and collective effect on the scenery resource. Lopping and scattering slash is inherently more difficult to manage from a scenery resource perspective than piling and burning due to its potential to cover and affect a larger area, thereby potentially being more visible and requiring more intensive management. Design Feature SE-2 was incorporated to ensure that this treatment option meets project VQOs where applicable. Therefore, slash treatments under all of the action alternatives will not affect the scenic resources and would meet established VQO’s.

Indicator 4—Vegetation Removal Pattern/Density

This indicator is qualitative (versus quantitative) because the overall quantity of the area treated matters less than the location in which the treatment occurs and the relative visibility of vegetation removal from travel routes and use areas (evaluated on a site- or area-specific basis). In addition, design features and careful placement can reduce the effects so that they appear natural in the characteristic landscape over time. Proposed vegetation treatments do not differ significantly enough between alternatives to require analyzing them individually. The additional treatment units on the south side of the project area for Alternatives C, D, E, and F (relative to B) include a couple of units off of Highway 21 and a couple of units off of the Lamar Trailhead road.

Alternative C, however, proposes an 18-inch dbh limit in PVG) 4 and 7 with an exception for the removal of large Douglas-fir. However, effects to scenic resources should not differ enough to require a separate analysis. Rather, the remaining larger trees will further bolster visual screening potential. Conversely, the proposed removal of trees greater than 18 inches dbh is mitigated scenically through Design Feature SE-5, which requires retaining smaller screening vegetation in areas of the longest view duration (use areas) in order to ensure VQOs are met.

Other potential impacts include removing vegetation density, including openings and developed clearings, and stump visibility. The following design features were added to ensure that project VQOs would be met: IS-3, SE-3, SE-4, SE-6, SE-7, SE-9, and VM-7. With the addition of these design features, vegetation removal under the action alternatives will not affect scenic resources.

Indicator 5—Prescribed Fire/Fire Lines

This indicator is qualitative (versus quantitative) because the overall quantity of the area treated matters less than the location in which the treatment is to occur and the relative visibility of fire lines from travel routes and use areas (evaluated on a site- or area-specific basis). Fire on the landscape and its effects, natural or prescribed, does not necessarily negatively affect scenic resources since fire is a natural component of the characteristic landscape ecosystem. Its effects on the landscape, while dramatic, are a natural part of the successional/regenerative system of the forest landscape in this area (SCGU17 [USDA Forest Service 2010a]). The additional acreage of broadcast burning proposed under Alternatives C, D, and E is consistent with the effects described above and does not require further analysis.

Fire line development/construction has the greatest potential to affect scenic resources. However, fire line development sensitive to the scenery resource is built-in to this project for all alternatives (except for the No Action Alternative, for which a fire line would not be developed). Additionally, the following design features were developed to ensure minimal scenery resource impact (VQOs would be met, where applicable) with respect to prescribed fire for all alternatives: SE-11 and RM-9.

Indicator 6—Trail Density

Proposed motorized and non-motorized trails and summer/winter trails can affect viewsheds and visitor experience/scenic quality. They can also be the very travel corridors from which

visitor experience and scenic impacts are measured. As a result, their relative density and type (e.g., motorized vs. non-motorized) can negatively impact scenic resource.

Alternatives B, C, D, and F propose similar trail actions. The differences (relative to the scenery resource) are relatively minor route alignment changes that do not affect the overall project area route density. Proposed versus existing trail route densities are similar, when considered from an overall viewshed/scenery impact perspective. Trail density would continue to meet VQO thresholds under all action alterantives.

Existing designated motorized routes would remain for vehicle use under Alternatives B, C, D, E, and F. The ATV trails proposed in Alternatives B, C, D, and F would be developed at a smaller scale to accommodate ATVs (UTVs for Alternative D only) instead of general vehicle traffic, which would reduced site impacts slightly; however, there would be no differences between the effects of the ATV trail proposed under Alternatives B, C, and F and the UTV trail proposed under Alternative D. Alternative E does not propose an new ATV trail. However, the effects from trails to scenic resources are expected to be similar for all alternatives.

Feature placement and development can affect scenic resources because roads linking to and crossing the trail system can create multiple opportunities for sightlines and road development visual impacts, such as the development of linear features, presence of erosion, and reduced screening. However, feature placement and development remain consistent with VQOs under all action alternatives.

Alternatives C, D, and F include a proposed motorized trailhead. The low development level and location (directly off/adjacent to NFS roads 385/312) would meet the mapped VQO of **Partial Retention**. Establishing a formal developed trailhead parking area should help mitigate some of the dispersed roadside parking impacts that currently occur in this area.

Winter trail development is the same under all alternatives. However, Alternatives C, D, E, and F propose a seasonal motorized closure area. Because the physical effect of winter use (other than trail development) is ephemeral in the sense of compacted vs. uncompacted snow in-season, the scenic measure is outside the temporal guidelines used to measure scenery impacts, which typically changes over a 1- to 3-year window. Therefore, the relative winter trail development impacts between action alternatives \is considered negligible from a scenery resource perspective. Otherwise, winter trail development would also be used for spring, summer, and fall trails as described above.

Design Features RM-4 and RM-8 were developed to ensure trail development standards would remain consistent with project VQOs.

3.15.4.2 Cumulative Effects

Existing developments within the project area have contributed to a landscape where some of the mapped or adopted VQOs require updating (see associated Non-Significant Forest Plan Amendment below). Reasonably foreseeable future actions that could affect scenic quality include ongoing highway and recreation site maintenance activities and continued recreational mining in the area. However, impacts from these activities are expected to remain reasonably similar to past and present impacts that have been analyzed for this project and are not, therefore, expected to critically affect the visual resource beyond the existing condition.

No other proposals or decisions have been identified that would affect the visual resource in the project area.

Considering the existing development level within the project area, mitigation measures and best management practices for potential and foreseeable developments and likely ongoing maintenance activities, and the minimal effect on the visual resource associated with the proposed project, cumulative effects on the visual resource associated with this project are not expected to exceed the existing or proposed VQOs as described by these alternatives.

3.16 SOCIECONOMICS

3.16.1 Analysis Scale, Data Sources and Methodology

3.16.1.1 Analysis Scale

The analysis area for direct, indirect, and cumulative effects is identified by four counties in Idaho (Adams, Boise, Gem, Valley) and two in Oregon (Union and Baker) (Figure 3-116). Boise County is the main economic focus, with a ripple effect throughout southwestern Idaho and northeastern Oregon. Because Boise County lacks lumber mills, the analysis area was expanded to include the counties that would benefit from timber products, through the direct and indirect effects on employment and spending that are more representative of rural areas. Ada and Canyon counties were not used in the timber analysis because their large populations result in a minor effect on the project activities. To determine the appraised commercial value of each alternative, Emmett, Idaho, was used as the appraisal point. Handbook direction (FSH 2409.18) requires forest products to be appraised to the most advantageous location. The appraisal point is most advantageous when total transportation costs, including road construction and road maintenance, are less than other possible appraisal points. Commercial volume was based on stand exam data modeled in FSVeg. During field evaluation, actual acres and volume were reduced by 35% due to harvest system limits, species composition, and terrain. Appraised value of commercial material may change depending on actual cruised volume, potential purchaser, and location of milling facilities.

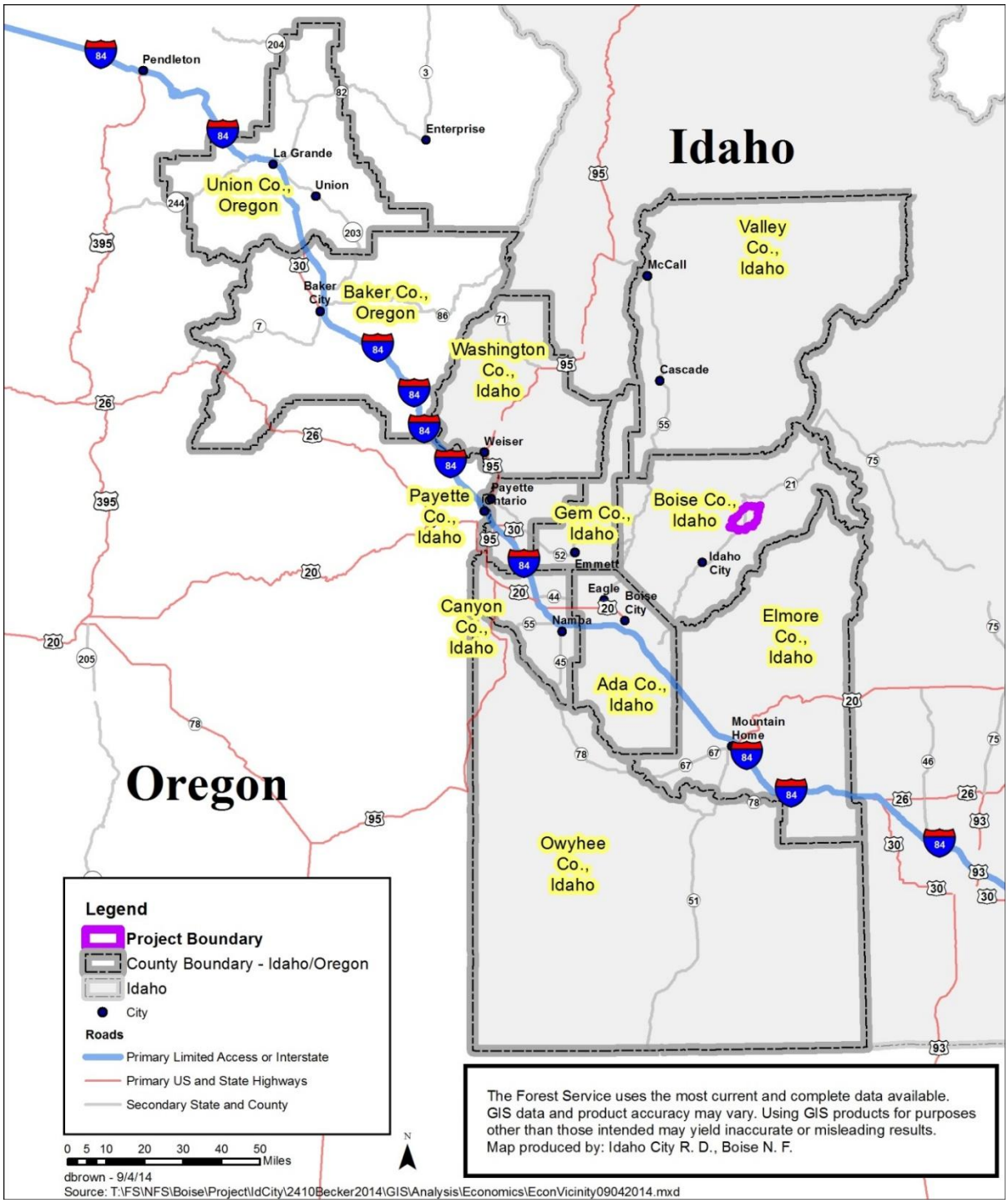

Figure 3-116. Project vicinity and analysis area

3.16.1.2 Data Sources

Data sources in include specific GIS data (roads, harvest methods, vegetation and landings); Forest Service Manual (FSM) and FSH direction; stand data modeled using Forest Vegetation Simulator (FVS); Forest Service appraisal spreadsheets, worksheets, LogCost and HaulCost programs, the Transaction Evidence Appraisal (TEA) system, and field surveys. All spatial information and data were evaluated using the ESRI software ArcGIS version 10.1.

IMPLAN assess the economic significance of various programs and activities at national, regional and forest levels. IMPLAN was developed to estimate the economic consequences of Agency decisions and proposed actions and to describe the current economic contribution of natural resource management on National Forests and Grasslands

The National Visitor Use Monitoring (NVUM) program provides science-based estimates of the volume and characteristics of recreational visitation to the National Forest System, as well as the benefits of recreation.

3.16.1.3 Analysis Process/Indicators

Indicator: Trend/Value—This indicator was used to evaluate the trend of recreational activities between alternatives. The increase/decrease of these activities will determine the effect of the revenue generated in the surrounding communities.

Indicator: Volume harvested—This indicator was used to evaluate the potential volume harvested for each alternative. The estimate of volume harvested effects the projected revenue generated from individual alternatives. Volume in millions of board feet (MMBF) was used as the unit of measure for comparing alternatives.

Indicator: Jobs supported—This indicator was used to estimate the potential for direct and indirect job creation and support. Potential job creation and support is displayed as jobs per year between commercial treatments (MMBF harvested) by alternative.

Indicator: Restoration costs—This indicator was used to evaluate the estimated costs associated with specific restoration. This value can be compared to the appraised value indicator to determine what restoration to fund through wood product receipts and identify what additional funding might be required to address all identified needs within the project area.

3.16.2 Affected Environment

The project area is relatively small compared to the effects analysis area and accounts for only 2.2% of NFS land within the Forest available for recreation or harvest. However, the project area is popular, based on the recreational activities it provides and its location near to Boise, Idaho, and easy access from Highway 21.

Boise County has a population of 6,800 people with the following landownerships:

- Private—20%
- Federal—73% (of which 70% is NFS land)
- State—7%

The main commodities are forestry, construction, retail trade, recreation, education, and public administration. Horseshoe Bend is the largest community, followed by Idaho City, Garden Valley, and Lowman (EPS-HDT 2014)

Timber sales and associated actions and outdoor recreation activities have a major impact to Boise County and the communities within southwestern Idaho and northeastern Oregon. These activities are directly linked to revenue and employment upon which these communities rely. According to the U.S. Bureau of Labor Statistics, the unemployment rate for Boise County in 2013 was 6.4% compared to the national rate of 7.3%.

The 2003 *Southwest Idaho Ecogroup Land and Resource Management Plan's* FEIS (USDA Forest Service 2003a, Chapters 2 and 3) includes a comprehensive socioeconomic analysis of the effects of timber harvest on the communities in southwestern Idaho, including effects on non-commodity resources. The socioeconomic analysis of the Forest Plan amendments associated with the Wildlife Conservation Strategy is discussed in the 2010 FEIS (USDA Forest Service 2010b).

No legal or policy mandate requires revenues generated by an individual National Forest timber sale to exceed the cost to implement the project. However, a timber sale is considered to be below cost when the Forest Service's expense to prepare and administer the sale exceeds the revenue returned to the Federal Treasury.

Several non-commodity values and amenities occur within and adjacent to the project area, including recreation and visual quality. Although assigning these amenities a monetary value is difficult, they are included in this economic assessment as a trend over time and the role they play to the local economy.

The project area offers several quality recreational activities. Due to model limitations, displaying the effects of the proposed activities on Boise County is difficult. Data are splayed at the national, state, and Forest level, which generate a ripple effect back to Boise County. The analysis illustrates the importance of recreation to Boise County in two ways: displaying the number of visitors (Table 3-150) and the revenue generated from participation in recreational activities (Table 3-151).

Table 3-150 displays the number of visits where individuals participated in various activities (activities in bold are available within the project boundary). According to NVUM survey conducted in 2009 for the Forest, 51% of the users who passed through the Forest stated recreation was their main purpose. The average length of stay is between 1 and 5 days with 82% of the visitors staying at a Forest Service campground or an undeveloped site or renting a cabin managed by the Forest Service. Two developed campgrounds managed by the Forest Service are available for summer use and one rental cabin also managed by the Forest Service is available year-round within the project area.

Approximately 75% of visitors travel 75 miles to visit a National Forest (National Visitor Use Monitoring report available in the project record). The project boundary is approximately 60 miles from Boise, 65 miles from Meridian, 75 miles from Nampa, and 83 miles from Caldwell. Table 3-151 represents total spending for local visitors and nonlocal visitors who traveled to or through the Forest in 2009. Over half of the money spent on recreation was provided by local residents who had travelled less than 50 miles.

Table 3-150. Visits by type

Activity	Percent of Visits Participating[a]	Average Days of Activity per Visit†	Visits with Participation in Activity (1,000s)†	Activity Days (1000s)†
Developed Camping	12.6	2.6	95	251
Primitive Camping	3.3	3.2	32	102
Backpacking	4.0	5.1	40	207
Resort Use	2.3	4.5	18	82
Picnicking	5.5	2.2	40	90
Viewing Natural Features	12.2	2.6	108	279
Visiting Historic Sites	.2	4.1	1	6
Nature Center Activities	2.1	2.6	12	33
Nature Study	1.1	1.6	10	16
Relaxing	21.9	2.9	117	509
Fishing	14.0	2.7	125	343
Hunting	11.9	2.6	112	287
OHV Use	2.8	1.6	28	44
Driving for Pleasure	16.5	1.9	150	285
Snowmobiling	3.1	1.0	23	23
Motorized Water Activities	.02	2.4	2	4
Other Motorized Activity	0.1	2.0	0	1
Hiking / Walking	23.9	2.4	202	487
Horseback Riding	1.4	1.0	14	14
Bicycling	3.0	3.5	19	65
Non-motorized Water	4.0	2.1	27	56
Downhill Skiing	32.4	1.3	284	365
Cross-country Skiing	22.8	1.2	221	274
Other Non-motorized	4.3	2.5	28	71
Gathering Forest Products	8.8	3.6	74	269
Viewing Wildlife	12.5	2.6	110	290
Motorized Trail Activity	6.6	2.0	63	124
Some Other Activity	0.2	1.9	1	2

[a]Only visitors within the 75% Market Area were included. The 75% Market Area is the approximate distance zone for which about 75% of the visits originated.

Table 3-151. Forest visitor spending

Spending Category	Total spending – non local visits ($1,000s)	Total spending – local visits ($1,000s)	Total	% Local
Lodging	$7,996	$10,460	$18,456.00	57
Restaurant	$5,149	$8,637	$13,786.00	63
Groceries	$7,253	$12,122	$19,375.00	63
Gas and Oil	$9,940	$17,788	$27,728.00	64
Other Transportation	$148	$172	$320.00	54
Activities	$3,027	$5,709	$8,736.00	65
Admissions/Fees	$3,656	$6,692	$10,348.00	65
Souvenirs	$2,627	$5,128	$7,755.00	66

The project area includes yurts managed by the State of Idaho and cross country ski trails also provided by the State of Idaho. Yurt usage between 2009 and 2013 displays an upward trend in usage (Table 3-152). Current data trends show an increase over the last 2 years in visitor usage with the non-winter seasons having the greatest growth. Table 3-153 displays the Park N Ski pass sales for Banner Ridge, Gold Fork, Whoop-Um-Up, and Beaver Creek trailheads. Pass sales appear to remain level over the 5-year period with snow levels being the greatest limiting factor for pass sales.

Table 3-152. Idaho Department of Parks and Recreation yurt rental program

Month	Days Occupied					Days Available					% Occupied				
	09	10	11	12	13	09	10	11	12	13	09	10	11	12	13
January	130	124	131	141	112	155	155	168	164	170	84	80	78	86	66
February	92	117	139	143	139	140	140	157	159	151	64	84	88	90	92
March	53	93	120	141	122	155	154	175	166	166	34	60	68	85	73
April	26	18	42	45	34	150	150	172	180	175	17	12	24	25	19
May	20	22	14	34	47	155	155	171	170	172	13	14	8	20	27
June	22	31	43	103	82	150	143	154	150	164	15	22	28	69	50
July	40	38	83	126	103	155	138	135	161	163	26	28	61	78	63
August	60	23	62	73	97	155	140	148	90	163	39	16	42	81	60
September	22	25	61	8	71	150	116	157	112	170	15	22	39	7	42
October	22	29	99	0	89	155	139	172	183	171	14	21	58	0	52
November	26	39	68	0	83	150	140	166	166	171	17	28	41	0	48
December	93	100	125	30	128	155	146	177	172	176	60	68	71	17	73

Note: Data for 2012 was affected by fire closures.

Table 3-153. Park N Ski Pass sales

	2009	2010	2011	2012	2013
Temporary	501	659	756	596	593
Annual	408	502	558	388	432
Total	909	1,161	1,314	984	1,025

According to the 2011 National Survey of Fishing, Hunting, and Wildlife Associated Recreation (fishing, hunting, and wildlife watching activities), participation in hunting and fishing has increased by over 50% both in participation and dollars spent since 2006 (USFWS 2011; Table 3-154). While wildlife watching has dropped by 13%, expenditures for wildlife watching have increased by over 90%. Table 3-155 displays hunting and fishing licenses sold within Idaho and dollars generated from their sale. Even though tag numbers and revenue have fluctuated, these activities are an important part of the Idaho culture and should continue to provide income to the business of Boise County (USFWS 2011).

Table 3-154. Hunting, fishing and wildlife viewing in Idaho

Activity	Number of Participants		Change (%)	Expenditures		Change (%)
	2006	2011		2006	2011	
Hunting	310,000	408,000	+32	$449,014	$634,625	+41
Fishing	573,000	736,000	+28	$577,226	$644,396	+12
Wildlife Watching	1,084,000	940,000	–13	$449,921	$857,119	+90

Table 3-155. Idaho hunting/fishing licenses sold and revenue

	Licenses Sold			Revenue		
Type	2011	2012	2013	2011	2012	2013
Hunting	946,859	978,693	958,761	$23,898,310	$22,468,600	$20,808,219
Fishing	567,308	590,421	589,249	$10,230,220	$11,071,385	$11,145,028

Source: USFWS 2013

Table 3-156 displays OHV registrations within the four counties surrounding the Forest and the project area. Registration varies by county and appears to remain level between 2009 and 2011. However, overall usage on the Forest seems to be trending upward. OHV use is allowed on open roads within the project area and is a popular activity by users. According to a study conducted by the University of Idaho, Boise County ranks number three in the most frequented county by OHV users with the majority of the users being Treasure Valley residents (Anderson and Taylor 2014). Ada County ranks first in the number of out-of-county trips and Ada and Canyon counties rank in the top four in OHV and associated purchases. In 2012, users spent $434 million on purchases and trips with 75% of the trip expenditures made in the home county compared to 25% spent in the destination county. Due to this disparity, the destination county failed to capture the bulk of the trip expenditures for the majority of trips. For example, the majority of visitors to Boise County originated in the Treasure Valley where Ada County residents spent $28 million compared to $5.5 million in the destination counties. Visitors to Boise County spend approximately $400,000 per year compared to $900,000 by in-county residents (Table 3-157; Anderson and Taylor 2014).

Table 3-156. Idaho off-highway vehicle (OHV) registrations by county

		2007	2008	2009	2010	2011
Boise	ATV	770	772	854	744	728
	UTV	28	41	62	71	84
	Motorcycle	230	262	235	212	225
	Total	3035	3083	3160	3037	3048
Ada						
	ATV	13,014	12,921	12,802	12,568	12,338
	UTV	243	405	569	746	889
	Motorcycle	10,079	10,053	8,888	8,556	8,397
	total	23,336	23,379	22,259	21,870	21,624
Canyon						
	ATV	9,545	9,898	9,646	9,562	9,392
	UTV	183	271	372	444	580
	Motorcycle	3,869	4007	3358	3248	3215
	total	13,597	14,176	13,376	13,254	13,187
Elmore						
	ATV	1488	1618	1650	1624	1619
	UTV	22	38	61	73	92
	Motorcycle	618	698	617	582	515
	total	2128	2354	2328	2279	2226

Table 3-157. 2012 Boise County off-highway vehicle (OHV) trips and trip expenditures

OHV Trips (thousands)			Trip expenditures by county households ($ millions)			
			Home County Trips	Out of County Trips		
Home County Households	Out of County Households	Total		Home	Destination	Total
10	44	54	.5	.5	.4	1.4

One snowmobile trailhead provides access to approximately 8 miles of groomed trails within the project area that access additional miles in the surrounding area. Several other trailheads are located outside the project boundary and to surrounding communities, providing additional opportunities. Specific data pertaining to snowmobile use is not available for Boise County, so a comparison study from Valley County is presented here. According to this study, snowmobile recreation is a high expenditure sport where people spend an average of $316 per person per trip or $106 per person per day, with lodging accounting for 80% of the expense (Larsen et al. 2006). The majority of snowmobile recreationists who travel to Valley County are Idaho residents from the Treasure Valley while 20% come from Washington state and another 20% from various locations. Single-day visitors account for 35% of the users while 65% spend multiple days. Due to the difference in accommodations in Boise County compared to Valley County, more money could be spent on food and supplies compared to lodging. Single-day visits would more than likely be above the 65% level as the majority of visitors would be from the Treasure Valley. Snowmobile designations for Boise County between 2009 to 2011have stayed constant at around 1,200 per year. Due to poor snow conditions in 2012 and 2013, designations dropped below 1,000. These

designations are important as a portion of the registration fees are used to pay for trail grooming (Larsen et al 2006).

In 2009, the Forest completed an economic profile for select communities affected by recreation and forest products. Table 3-158, Table 3-159, Table 3-160, and

Table 3-161 represent the communities located in Boise County and the overall importance of recreation and timber products to these communities. The largest contributors that affect jobs are Arts, Entertainment, and Recreation; Accommodation and Food Services; and Retail Trade; followed by Forestry, Sawmills, Logging, Hunting and Fishing. The jobs dependent on these areas range from 15%–36.7% and contribute between 12.3% and 34.7% of the earnings. Tables 3-13 and 3-14 represent the communities identified in Oregon and the importance of timber and timber by products to these communities. The forest products industry provides between 9.8%–42.8% of the jobs available and contribute between 8.6% and 45.5% of the earnings (Economic Modeling Specialist, Inc. 2009).

Table 3-158. Economic profile of Lowman, Idaho—jobs and labor income by industry

Industry	Jobs	Percent of Total Jobs	Earnings	Percent of Total Earnings
Agriculture, Forestry, Fishing and Hunting	*	0.2%	$4,000	0.2
Retail Trade	1	0.8%	$10,000	0.4
Arts, Entertainment, and Recreation	5	4.3%	$74,000	2.8
Accommodation and Food Services	11	9.7%	$235,000	8.9
Total	**17**	**15%**	**$323,000**	**12.3**

Table 3-159. Economic profile of Crouch–Garden Valley, Idaho—jobs and labor income by industry

Industry	Jobs	Percent of Total Jobs	Earnings	Percent of Total Earnings
Agriculture, Forestry, Fishing and Hunting	18	2.5%	$546,000	3.3
Logging	8	1.1%	$305,000	1.8
Sawmills	21	3.0%	$648,000	3.9
Retail Trade	48	6.8%	$745,000	4.5
Arts, Entertainment, and Recreation	82	11.5%	$1,437,000	8.6
Accommodation and Food Services	40	5.6%	$499,000	3.0
Total	**217**	**30.5%**	**$4,180,000**	**25.1**

Table 3-160. Economic profile of Horseshoe Bend, Idaho

Jobs and Labor Income by Industry ($'000)				
Industry	**Jobs**	**% of Total Jobs**	**Earnings**	**Percentage of Total Earnings**
Agriculture, Forestry, Fishing and Hunting	66	8.6%	$2,200	13.6
Logging	27	3.5%	$1,037	6.4
Retail Trade	72	9.4%	$950	5.9
Arts, Entertainment, and Recreation	53	6.9%	$748	4.6
Accommodation and Food Services	64	8.3%	$684	4.2
Total	**282**	**36.7%**	**$5,619**	**34.7**

Table 3-161. Economic profile of Idaho City, Idaho

Jobs and Labor Income by Industry ($'000)				
Industry	**Jobs**	**% of Total Jobs**	**Earnings**	**Percentage of Total Earnings**
Agriculture, Forestry, Fishing and Hunting	40	4.1%	$1,302	6.6
Sawmills	2	0.2%	$52	0.3
Retail Trade	71	7.3%	$568	2.9
Arts, Entertainment, and Recreation	160	16.4%	$2,494	12.6
Accommodation and Food Services	58	6.0%	$620	3.1
Total	**331**	**34%**	**$5,036**	**25.5**

Table 3-162. Economic profile of Elgin, Oregon

Jobs and Labor Income by Industry ($'000)				
Industry	**Jobs**	**% of Total Jobs**	**Earnings**	**Percentage of Total Earnings**
Agriculture, Forestry, Fishing and Hunting	59	6.0%	$1,045	3.6
Sawmills	134	13.6%	$4,593	15.9
Logging	7	.7	304	1.1
Softwood Veneer & Plywood	221	22.5	7168	24.9
Total	**421**	**42.8**	**$13,110**	**45.5**

Table 3-163. Economic profile of La Grande, Oregon

Jobs and Labor Income by Industry ($'000)				
Industry	**Jobs**	**% of Total Jobs**	**Earnings**	**Percentage of Total Earnings**
Agriculture, Forestry, Fishing and Hunting	1018	8.2%	$19,226	5.9
Sawmills	30	.2%	$1,896	.6
Logging	73	.6	$3,192	1.0
Softwood Veneer & Plywood	103	.8	$3,690	1.1
Total	**1224**	**9.8%**	**$28,004**	**8.6**

3.16.3 Environmental Effects

3.16.3.1 Direct and Indirect Effects

Alternative A

Under Alternative A, no new vegetation, transportation, recreation, or aquatic habitat restoration management activities would be implemented. No wood products would be removed or submerchantable trees thinned. Existing ongoing activities, such as road maintenance,[46] public fuelwood gathering, mining and motorized travel consistent with the Motor Vehicle Use Map (MVUM) would continue. Wildfire suppression would also continue consistent with Forest Plan direction (USDA Forest Service 2010a).

Existing recreational activities would continue. Yurt access would remain at current levels because no changes would occur to the current transportation system. Lastly, to help provide a non-motorized winter experience, the 7,491-acre non-motorized winter area closure would be incorporated under this alternative.

This alternative would not increase employment opportunities or revenue generated in Boise County or surrounding areas. No expenses would be incurred for sale preparation, contract administration, thinning operations, prescribed burning activities, culvert replacement AOP, or road decommissioning. The trend with summer and winter recreation use and visual quality would remain on the current trajectory as shown in Table 3-150, Table 3-151, Table 3-152, Table 3-153, Table 3-154, Table 3-155, Table 3-156, and Table 3-157.

Table 3-164 represents the restoration items that are anticipated being completed within the project area. These items were used to determine the number of jobs supported by the project by alternative in IMPLAN Given the incurred cost for this NEPA analysis, this alternative would be considered “below cost” by approximately $576,000 (Table 3-165).

[46] Refer to Footnote 5 for road maintenance activities that are identified under Alternatives B and C that may also occur under Alternative A if funding becomes available. Those maintenance actions that fall under Categorical Exclusion 36 CFR 220.6(d)(4), and that do not require authorization through the Decision Notice/FONSI to be issued for this project, may be implemented at any time.

Table 3-164. Restoration activities

Restoration Item	Alternative A[a]	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Noxious Weed Control	X	X	X	X	X	X
Road Maintenance	X	X	X	X	X	X
Realignment of National Forest System (NFS) road 393 and 362D		X	X	X	X	X
Road Decommissioning—NSF roads		X	X	X	X	X
Road Decommissioning—Unauthorized roads		X	X	X	X	X
Road conversion to non-motorized trail		X	X	X	X	X
Road conversion to motorized trail 50 inches or less		X	X			
Road conversion to motorized trail 60 inches or less				X		X
New Motorized Trail Construction		X	X	X		X
New Motorized Trailhead Construction		X	X	X		X
Noncommercial thinning of Plantations		X	X	X	X	X
Thinning of noncommercial trees following commercial harvest		X	X	X	X	X
Thinning of noncommercial trees outside commercial harvest units		X	X	X	X	X
Activity Fuels Treatment—Underburn plantations		X	X	X	X	X
Activity Fuels Treatment—Underburn natural areas		X	X	X	X	X
AOP Culvert—NFS roads		X	X	X	X	X
Total	**$194,773**	**$5,508,053**	**$5,509,965**	**$5,611,214**	**$5,432,543**	**$5,538,194**

[a]Alternative A figure represents current spending5,538,194

Table 3-165. Summary of financial assessment by alternative

Action	Alternative A ($)	Alternative B ($)	Alternative C ($)	Alternative D ($)	Alternative E ($)	Alternative F ($)
Commercial Cost						
Net Volume (MMBF) Large Sale	0	5.5	5.5	5.5	3.3	5.5
Net Volume (MMBF) Small Sales	0	2.9	2.9	3.2	2.9	2.9
Potential Net Value						
Large Sales	$0	+$770,634	+$770,634	+$806,144	+$20,832	+$357,529
Small Sales	$0	+305,370	+305,370	+$328,910	+$359,668	+305,370
Sub-Total	**$0**	**+$1,076,004**	**+$1,076,004**	**+$1,125,054**	**+$380,500**	**+$662,899**
Projected NEPA Cost	–$576,000	–$576,000	–$576,000	–$576,000	–$576,000	–$576,000
Projected Sale Preparation Cost	$0	–$182,900	–$182,900	–$182,900	–$182,900	–$182,900
Projected Contract Administration	$0	–$81,300	–$81,300	–$81,300	–$81,300	–$81,300
Sub-Total	–$576,000	+$840,200	+$840,200	+$840,200	+$840,200	+$840,200
Net Revenue (PNV—Costs)	**–$576,000**	**+$235,804**	**+$235,804**	**+$284,854**	**–$459,700**	**–$177,300**

*Alternative E, Sale 1, appraised at -$312,147. This value was increased to +$20,832 (Base Rates) which is the minimum the Forest Service can advertise commercial wood products.

Effects Common to All Action Alternatives

AOP culvert replacement would typically close roads for 2–3 weeks per culvert for completing construction work; this expense is tied to restoration costs associated with implementation activities. The estimated cost for replacing all culverts is $2,300,000 and would require several seasons to complete. Road closures would require forest users to use alternate routes to access NFS lands, including yurts, hiking trails, and the Beaver Creek cabin. Coordination would be needed to reduce user conflicts resulting from the road closures and reduce impacts to recreation and commercial harvest. Design Feature RE-10 would require notifying various users through timely press releases, on-the-ground signage showing travel restrictions and alternative travel routes, and updating rental information on the reservation systems for rental cabins and yurts.

Information concerning yurt or area closures would be posted in periodicals, on the Forest and State of Idaho websites, and/or on onsite kiosks (Design Features FF-2 and RE-10). Cautionary signage would be placed on primary access routes along Highway 21 prior to implementing any prescribed burn or timber sale activity. These notifications would inform the public of planned activities. Burning could impact the yurt rental program for 1–2 weeks and timber removal could impact the yurt program for up to 4 weeks (Table 3-152). Implementing prescribed burning would have the greatest impact to multiple yurts while timber sale activities would only affect the Stargaze yurt and the majority of the roads and trails north of Beaver Creek to the project boundary. These closures would not affect the entire area at one time and would be removed when the area is deemed safe for public entry. Estimated revenue loss to the IDPR yurt rental program during burning could range from $485 to $970 per yurt, assuming 100% rental capacity, and $485 to $1,940 during timber harvest (IDFG 2015)

Alternative B

Given the potential net value (PNV) and estimated Forest Service costs, this alternative would be considered “above cost” by approximately $235,804 (Table 3-165). Alternative B directly affects the indicator associated with volume harvested and jobs supported by removing an estimated 5.5 MMBF of wood products for the large sale and generating a PNV of approximately $770,634 (Table 3-165). Additional small sales would remove an estimated 2.9 MMBF of wood products and generate a PNV of approximately $305,370 (Table 3-165). The value of the wood products and work associated with implementing restoration items under this alternative would help sustain economies in Boise County and adjacent areas (Table 3-158, Table 3-159, Table 3-160,

Table 3-161, Table 3-13, and Table 3-14). Monetary value does not include volume in RCAs or landslide prone (LSP) areas as harvested acres do not count towards the forest ASQ (FSH 2409.13). Commercial harvest includes using 5.8 miles of temporary roads, which would reduce skidding costs and allow more acres to be treated through conventional ground-based logging, resulting in lower operating costs compared to helicopter logging.

Economic impacts are expressed in terms of annual full- or part-time jobs supported by the project (jobs are not necessarily ‘new’ jobs created in the region), as well as annual labor income associated with those jobs. Total restoration costs would be $5,508,053 (Table 3-164) and would be broken out between 1–6 years and 7–15 years. Commercial harvesting and

processing would account for a relatively greater percentage of the economic impacts, compared to Forest Service–funded activities associated with roads, trails, and restoration (Table 3-8). The majority of activities associated with commercial harvest and recreation would occur within the first 6 years, thus reducing economic impacts the remaining 9 years. The average annual full- and part-time jobs and labor income supported by the project is approximately 25 and $709,412 for the first 6 years and 5 and $142,275 for the remaining 9 years (Table 3-18). Forest Service–funded projects (Table 3-166) would continue throughout the life of the project and beyond. However, no new jobs or positions would be created with this funding, so it will not be address further. Cost for burning should not extend beyond the 15-year timeline.

Restoration costs (Table 3-17) exceed the PNV (revenue generated from timber sale receipts and available for funding restoration items) by about $4,432,049. Therefore, supplemental funding would be necessary to fund some restoration items. Stewardship contracts referenced (FSH 2409.19, Chapter 60) could be used to help offset the cost of some restoration activities by trading goods for services. Additional funding could be supplemented by retained receipts from other stewardship projects, appropriated funding, or grants. Since the project area has no wildland-urban interface (WUI), competing for appropriated funding could be limited.

Access to the Elkhorn yurt is by foot traffic only while all remaining yurts have vehicle access with the last 300 feet being foot traffic only. Access to the Stargaze yurt is open year-round to motorized vehicles within 300 feet when road conditions allow. Access to the Skyline yurt is restricted by a seasonal road closure from September 15 through June 15. Under this alternative, summer access to the Stargaze and Skyline yurts would be restricted by converting the access roads to ML 2—Administrative Use Only and removing the seasonal closure and open road status. According to the use data provided by IDPR, fall, spring, and summer use of the yurts is continuing to increase (Table 3-152). This alternative could reduce use to these two yurts by limiting vehicle access and subsequently reduce revenue associated with the rental program. During project implementation for prescribed fire and commercial harvest, area closures could also be implemented to provide for public safety (Design Feature RE-10). Estimated revenue loss to the IDPR yurt rental program during burning could range from $485 to $970 per yurt, assuming 100% rental capacity, and $485 to $1,940 during timber harvest. Alternative B would change access to the Stargazer and Skyline Yurts to non-motorized trails in the summer season, which may impact the number of nights these yurts are rented and the income generated during this season. Changing vehicle access may reduce nightly rental income by $65–$120 per night.

With the increasing trend of ATV/UTV use, a seasonal 23.3 mile motorized trail designated for vehicles <50 inches wide and a new trailhead is proposed under this alternative. ATV/UTV use is occurring on undesignated routes and trails within the project area. Developing this trail could help alleviate unauthorized use, reduce conflicts between different classes of motorized vehicles, and minimize effects to resources such as soil, water, and wildlife. This new trail could also attract new visitors to Boise County, resulting in increased revenue (Table 3-156 and Table 3-157).

This alternative recommends closing 20.3 miles of ML 1 roads, closing 28.7 miles of ML 2 roads, and converting 24.8 miles of ML 2 roads to ML 2—Administrative Use Only roads. This alternative also recommends decommissioning 30.9 miles of ML 1, ML 2, and unauthorized roads that are causing resource damage, which would permanently reduce road

access within the project area. Associated actions would spend federal dollars to create or maintain 3–5 jobs to complete the restoration activities (Table 3-18). Future restoration activities would have a minimal impact as the roads proposed for decommissioning are causing resource damage or are located in areas not suited for forest product removal or general use. Changing the maintenance level and closing roads would maintain a transportation system for future land management activities. The impact on recreation could be greater since some of the roads that were once open for OHV use, fuelwood gathering, camping, and other recreational activities, would be closed to public motorized use. Approximately 21 miles of the roads proposed for closing or decommissioning would be converted to non-motorized trails and would be available for foot traffic, bicycles, horses, and skiing, which would reduce some of the impact to recreation.

An existing winter motorized closure totaling 7,491 acres is in effect north of Beaver Creek and east of Highway 21 up to the dividing boundary between the Lowman and the Idaho City Ranger Districts. Since this is a winter closure and commercial activity is prohibited between December 15 and April 15 and other non-winter activities are limited to the summer months, there should be no effect with the proposed project or current winter recreation activities.

Alternative C

Given the PNV and estimated Forest Service, this alternative would be considered “above cost” by approximately $235,804 costs (Table 3-165). Alternative C directly affects the indicator associated with volume harvested and jobs supported by removing an estimated 5.5 MMBF of wood products for sale for the large sale and generating a PNV of approximately $770,634 (Table 3-165). Additional small sales would remove an estimated 2.9 MMBF of wood products and generate a PNV of approximately $305,370 (Table 3-165). The value of the wood products and work associated with implementing restoration items under this alternative would help sustain economies in Boise County and adjacent areas (Table 3-158, Table 3-159, Table 3-160,

Table 3-161, Table 3-13, and Table 3-14). Monetary value does not include volume in RCAs or LSP areas as harvested acres do not count towards the forest ASQ (FSH 2409.13). Commercial harvest includes using 5.8 miles of temporary roads. These roads would decrease skidding costs and allow more acres to be treated by conventional ground-based logging, resulting in lower operating costs compared to helicopter logging.

Economic impacts are expressed in terms of annual full- or part-time jobs supported by the project, as well as annual labor income associated with those jobs. Total cost for restoration is $5,509,965 (Table 3-164) and is broken out between 1–6 years and 7–15 years. Commercial harvesting and processing accounts for a relatively greater percentage of the economic impacts, compared to Forest Service–funded activities associated with roads, trails, and restoration (Table 3-18). The majority of activities associated with commercial harvest and recreation would occur within the first 6 years, thus reducing the economic impact on the remaining 9 years. The average annual full- and part-time jobs and labor income supported by the project is approximately 25 and $709,412 for the first 6 years and 5 and $142,275 for the remaining 9 years (Table 3-18). Forest Service–funded projects (Table 3-166) would be ongoing throughout the life of the project and beyond. However, no new jobs or positions would be created with this funding so it will not be address further. Cost for burning should not extend beyond the 15-year timeline.

The cost for all restoration items exceeds the PNV by about $4,433,961 (Table 3-17). Therefore, supplemental funding would be necessary to fund some restoration items. Stewardship contracts (FSH 2409.19, Chapter 60) could be used to help offset the cost of some restoration activities by trading goods for services. Additional funding could be supplemented by retained receipts from other stewardship projects, appropriated funding, or grants. Since the project area has no WUI, competing for appropriated funding could be limited.

Access to the Elkhorn yurt is by foot traffic only while all remaining yurts have vehicle access, with the last 300 feet being foot traffic only. Access to the Stargaze yurt is currently open year-round to motorized vehicles within 300 feet when road conditions allow. Access to the Skyline yurt is restricted by a seasonal road closure from September 15 through June 15. Under this alternative, summer access to the Stargaze and Skyline yurts would be closed to motorized vehicles, requiring renters to hike in from Highway 21. According to the use data provided by IDPR, fall, spring, and summer use of the yurts is continuing to increase (Table 3-152). This alternative could reduce use by limiting vehicle access and subsequently reduce rental program revenue. During project implementation, area closures could also be implemented during prescribed fire and commercial harvest to provide for public safety (Design Feature RE-10). Estimated revenue loss to the IDPR yurt rental program during burning could range from $485 to $970 per yurt, assuming 100% rental capacity, and $485 to $1,940 during timber harvest. Alternative C would maintain motorized access but only seasonally between June 16 and September 14 to the Stargazer Yurt, which may impact the number of nights this yurt is rented and the income generated during the summer season. Changing when the yurt can be accessed by vehicle may reduce nightly rental income by $65–$120 per night.

A seasonal 22-mile motorized trail designated for vehicles <50 inches wide and a new trailhead are proposed under this alternative. ATV/UTV use is occurring on undesignated routes and trails within the project area. Developing this trail could help alleviate unauthorized use, reduce conflicts between different classes of motorized vehicles, and minimize effects to resources such as soil, water, and wildlife. Adding this trail could attract new visitors to Boise County, resulting in increased revenue (Table 3-156 and Table 3-157).

This alternative recommends closing 20.3 miles of ML 1 roads, closing 24.2 miles of ML 2 roads, and converting 20.3 miles of currently open ML 2 roads to ML 2—Administration Use Only roads. This alternative also recommends decommissioning 30.9 miles of ML 1, ML 2, and unauthorized roads that are causing resource damage, thus permanently reducing road access within the project area. Associated actions would spend federal dollars to create or maintain 3-5 jobs to complete the restoration activities (Table 3-18). The impact on future restoration activities would be minimal impact as the roads proposed for decommissioning are causing resource damage or are located in areas not suited for forest product removal. Changing the maintenance level and closing roads would maintain a transportation system for future land management activities. The impact on recreation could be greater as some of the roads that were once open for OHV use, fuelwood gathering, camping, and other recreational activities would be closed to public motorized use. Approximately 21 miles of the roads proposed for closing or decommissioning would be converted to non-motorized trails and would be available for foot traffic, bicycles, and horses, and skiing, which would reduce some of the impact.

A winter motorized closure totaling 10,800 acres is proposed under this alternative. The closure area includes the 7,491 acres north of Beaver Creek and east of Highway 21 up to the dividing boundary between the Lowman and Idaho City Ranger Districts. The additional 3,300 acres proposed under this alternative uses natural features, such as ridges and drainages, to create a non-motorized buffer to maintain the value for non-motorized users along maintained ski trails throughout the project area. This closure would be implemented around the ski trails to reduce the possibility of mixed use on these trails and create a buffer from motorized use. Since this is a winter closure and commercial activity is prohibited between December 15 and April 15 and other non-winter activities are limited to the summer months, winter recreation should not be affected by this closure.

Alternative D

This alternative was developed to maximize the timber economic benefit. Given the PNV and estimated Forest Service costs, this alternative would be considered "above cost" by approximately $284,854 (Table 3-165). Alternative D directly affects the indicator associated with volume harvested and jobs supported by removing an estimated 5.5 MMBF of wood products for the large sale and generating a PNV of approximately $806,144 (Table 3-165). Additional small sales would remove an estimated 3.2 MMBF of wood products and generate a PNV of approximately $328,910 (Table 3-165). The value of the wood products and work associated with implementing restoration items under this alternative would help sustain economies in Boise County and adjacent areas (Table 3-158, Table 3-159, Table 3-160,

Table 3-161, Table 3-13, and Table 3-14). Monetary value does not include volume in RCAs or LSP areas as harvested acres do not count towards the forest ASQ (FSH 2409.13). Commercial harvest includes using of 6.5 miles of temporary roads, which would decrease skidding costs and allow more acres to be treated by conventional ground-based logging, resulting in lower operating costs compared to helicopter logging.

Economic impacts are expressed in terms of annual full- or part-time jobs supported by the project, as well as annual labor income associated with those jobs. Total cost for restoration items is $5,611,214 (Table 3-164) and is broken out between 1–6 years and 7–15 years. Commercial harvesting and processing accounts for a relatively greater percentage of the economic impacts, compared to Forest Service–funded activities associated with roads, trails, and restoration (Table 3-18). The majority of activities associated with commercial harvest and recreation would occur within the first 6 years, thus reducing the economic impact the remaining 9 years. The average annual full- and part-time jobs and labor income supported by the project is approximately 26 and $744,327 for the first 6 years and 5 and $145,040 for the remaining 9 years (Table 3-18). Forest Service–funded projects (Table 3-166) would be ongoing throughout the life of the project and beyond. However, no new jobs or positions would be created with this funding, so it will not be address further. Costs for burning should not extend beyond the 15-year timeline.

The cost of all restoration items exceeds the PNV by about $4,486,160 (Table 3-17). Therefore, supplemental funding would be necessary to fund some restoration items. Stewardship contracts (FSH 2409.19, Chapter 60) could be used to help offset the cost of some restoration activities by trading goods for services. Additional funding could be supplemented by retained receipts from other stewardship projects, appropriated funding, or

grants. Since the project area has no WUI, competing for appropriated funding could be limited.

Access to the Elkhorn yurt is by foot traffic only while all remaining yurts have vehicle access, with the last 300 feet being foot traffic only. Access to the Stargaze yurt is currently open year-round to motorized vehicles within 300 feet when road conditions allow. Access to the Skyline yurt is restricted by a seasonal road closure from September 15 through June 15. Under this alternative, summer access to the Stargaze would remain open to motorized vehicles during the snow-free season and the seasonal closure to the Skyline yurt would be removed, allowing vehicle traffic during the snow-free season. According to the use data provided by IDPR, fall, spring, and summer use of the yurts is continuing to increase (Table 3-152). This alternative could increase use by removing vehicle restrictions and subsequently increase revenue associated with the rental program. During project implementation, area closures could also be implemented during prescribed fire and commercial harvest to provide for public safety (Design Feature RE-10). Estimated revenue loss to the IDPR yurt rental program during burning could range from $485 to $970 per yurt, assuming 100% rental capacity, and $485 to $1,940 during timber harvest. Since existing accessto the yurts would be maintained, no lost revenue from rental fees is anticipated.

A seasonal 22-mile motorized trail designated for vehicles <60 inches wide and constructing a new trailhead are proposed under this alternative. ATV/UTV use is occurring on undesignated routes and trails within the project area. Developing this trail could help alleviate unauthorized use, reduce conflicts between different classes of motorized vehicles, and minimize effects to resources such as soil, water, and wildlife. Adding this trail could attract new visitors to Boise County, resulting in increased revenue (Table 3-156 and Table 3-157).

This alternative recommends closing 20.3 miles of ML 1 roads, closing 24.2 miles of ML 2 roads, and converting 20.3 miles of currently open ML 2 roads to ML 2—Administration Use Only roads. This alternative also recommends decommissioning 30.9 miles of ML 1, ML 2, and unauthorized roads that are resource damage, thus permanently reducing road access within the project area. Associated actions would spend federal dollars to create or maintain 3-5 jobs to complete the restoration activities (Table 3-18). The impact on future restoration activities would be minimal as the roads proposed for decommissioning are causing resource damage or are located in areas not suited for forest product removal. Changing the maintenance level and closing roads would maintain a transportation system for future land management activities. The impact on recreation could be greater as some of the roads that were once open for OHV use, fuelwood gathering, camping, and other recreational activities would be closed to public motorized use. Approximately 18 miles of the roads proposed for closing or decommissioning would be converted to non-motorized trails and would be available for foot traffic, bicycles, horses, and skiing, which would reduce some of the impact.

A winter motorized closure totaling 10,800 acres is proposed under this alternative. The closure area includes the 7,491 acres north of Beaver Creek and east of Highway 21 up to the dividing boundary between the Lowman and Idaho City Ranger Districts. The additional 3,300 acres uses natural features, such as ridges and drainages, to create a non-motorized buffer to maintain the value for non-motorized users along maintained ski trails throughout the project boundary. Since this is a winter closure and commercial activity is prohibited

between December 15 and April 15and other non-winter activities are limited to the summer months, winter recreation should not be affected by this closure.

Alternative E

Given the PNV and estimated Forest Service costs, this alternative would be considered "below cost" by approximately $459,700 (Table 3-165). Alternative E imposes an 18 inch DBH limit for all species, thus reducing the overall volume available for harvest. Although the overall volume is reduced, the alternative directly affects the indicator associated with volume harvested and jobs supported by removing an estimated 3.3 MMBF of wood products for the large sale and generating a PNV of approximately $20,832 (Table 3-165). Additional small sales would remove an estimated 2.9 MMBF of wood products and generate a PNV of approximately $359,668 (Table 3-165). The value of the wood products and work associated with implementing restoration items under this alternative would help sustain economies in Boise County and adjacent areas (Table 3-158, Table 3-159, Table 3-160,

Table 3-161, Table 3-13, and Table 3-14). Monetary value does not include volume in RCAs or LSP areas as harvested acres do not count towards the forest ASQ (FSH 2409.13). Commercial harvest includes using 1.5 miles of temporary roads, which is 4.3 fewer miles than under Alternatives B and C and 5 few miles than Alternative D. Reducing miles of temporary road shifts the logging system on 940 acres to helicopter logging, resulting in higher operating costs. To reduce the impact to NFS roads being used as non-motorized trails, commercial treatments surrounding non-motorized trails would also be treated using helicopter logging. Using helicopter logging would allow the road to remain in a trail-like setting and not change the quality of user experience. However, overall value of commercial products drops substantially under this alternative.

Economic impacts are expressed in terms of annual full or part-time jobs supported by the project as well as annual labor income associated with those jobs. Total cost for restoration is $5,432,543 (Table 3-164) and is broken out between 1–6 years and 7–15 years. Commercial harvesting and processing accounts for a relatively greater percentage of the economic impacts, compared to Forest Service–funded activities associated with roads, trails, and restoration (Table 3-18). The majority of activities associated with commercial harvest and recreation would occur within the first 6 years, thus reducing the economic impact the remaining 9 years. The average annual full- and part-time jobs and labor income supported by the project is approximately 20 and $546,962 for the first 6 years and 5 and $142,102 for the remaining 9 years (Table 3-18). Forest Service–funded projects (Table 3-166) would be ongoing throughout the life of the project and beyond. However, no new jobs or positions would be created with this funding, so it will not be address further. Costs for burning should not extend beyond the 15-year timeline.

The cost of all restoration items exceeds the PNV by about $5,052,043 (Table 3-17). Therefore, supplemental funding would be necessary to fund some restoration items. Stewardship contracts (FSH 2409.19, Chapter 60) could be used to help offset the cost of some restoration activities by trading goods for services. Additional funding could be supplemented by retained receipts from other stewardship projects, appropriated funding, or grants. Since the project area has no WUI, competing for appropriated funding could be limited.

Access to the Elkhorn yurt is by foot traffic only while all remaining yurts have vehicle access, with the last 300 feet being foot traffic only. Access to the Stargaze yurt is currently open year-round to motorized vehicles within 300 feet when road conditions allow. Access to the Skyline yurt is restricted by a seasonal road closure from September 15 through June 15. Under this alternative, summer access to the Stargaze and Skyline yurts would be restricted by making the access roads administrative use only, requiring users to hike in from Highway 21. According to the use data provided by IDPR, fall, spring, and summer use of the yurts is continuing to increase (Table 3-152). This alternative could reduce use to these two yurts by limiting vehicle access and subsequently reduce revenue associated with the rental program. During project implementation, area closures could also be implemented during prescribed fire and commercial harvest to provide for public safety (Design Feature RE-10). Estimated revenue loss to the IDPR yurt rental program during burning could range from $485 to $970 per yurt, assuming 100% rental capacity, and $485 to $1,940 during timber harvest. Alternative E would change access to the Stargazer and Skyline Yurts to non-motorized trails in the summer season, which may impact the number of nights these yurts are rented and the income generated during this season. In addition, this alternative would apply a seasonal closure for mechanized equipment (i.e. wagon, carts, bicycles, etc.) on all routes north of Beaver Creek Cabin and east of State Highway 21 from May 1 to June15. The mechanized equipment seasonal closure may reduce the number of nights the Elk Horn and Skyline Yurts are rented and the income generated. Changing vehicle access may reduce nightly rental income by $65–$120 per night.

This alternative does not include a designating a seasonal motorized trail or constructing a corresponding proposed trailhead.

This alternative recommends closing 23.2 miles of ML 1 roads, closing 28.7 miles of ML 2 roads, and converting 24.8 miles of currently open ML 2 roads to ML 2—Administration Use Only roads. This alternative also recommends decommissioning 32.9 miles of ML 1, ML 2, and unauthorized roads that are causing resource damage, thus permanently reducing road access with the project area. Associated actions would spend federal dollars to create or maintain 3-5 jobs to complete the restoration activities (Table 3-18). The impact on future restoration activities would be minimal as the roads proposed for decommissioning are causing resource damage or are located in areas not suited for forest product removal. Changing the maintenance level and closing roads would maintain a transportation system for future land management activities. The impact on recreation could be greater as some of the roads that were once open for OHV use, fuelwood gathering, camping, and other recreational activities would be closed to public motorized use. Approximately 26 miles of the roads proposed for closing or decommissioning would be converted to non-motorized trails and would be available for foot traffic, bicycles, horses, and skiing, which would reduce some of the impact.

A winter motorized closure totaling 10,800 acres is proposed under this alternative. The closure area includes the 7,491 acres north of Beaver Creek and east of Highway 21 up to the dividing boundary between the Lowman and Idaho City Ranger Districts. The additional 3,300 acres uses natural features, such as ridges and drainages, to create a non-motorized buffer to maintain the value for non-motorized users along maintained ski trails throughout the project boundary. Since this is a winter closure and commercial activity is prohibited

between December 15 and April 15 and other non-winter activities are limited to the summer months, winter recreation should not be affected by this closure.

This alternative also proposes an 8,576-acre seasonal closure for all motorized equipment east of Highway 21 and north of Beaver Creek to the dividing boundary between the Idaho City and Lowman Ranger Districts. The closure would be implemented between May 1 and June 15 to address big game calving concerns. The Skyline and Elkhorn yurt could still be rented and associated trails could still be used by non-mechanized equipment only. This closure would have the same effect to the Skyline yurt as changing the access road to ML 2—Administration Use Only. Due to a potential loss of users in a timeframe when IDPR data shows an increase in use (Table 3-152), the yurts could lose an estimated revenue of $65–$120 per day during the restricted timeframe.

Alternative F

Given the PNV and estimated Forest Service costs, this alternative would be considered "below cost" by approximately $177,300 (Table 3-165). This alternative is a modified version of Alternative E and incorporates 307 acres of helicopter logging along NFS roads currently being used as non-motorized trails. This helicopter logging would allow the road to remain in a trail-like setting and would not change the quality of user experience. Alternative F directly affects the indicator associated with volume harvested and jobs supported by removing an estimated 5.5 MMBF of wood products for the large sale and generate a PNV of approximately $357,529 (Table 3-165). Additional small sales would remove an estimated 2.9 MMBF of wood products and generate a PNV of approximately $305,370 (Table 3-165). The value of the wood products and work associated with implementing restoration items under this alternative would help sustain economies in Boise County and adjacent areas (Table 3-158, Table 3-159, Table 3-160, Table 3-161). Monetary value does not include volume in RCAs or LSP areas as harvested acres do not count towards the forest ASQ (FSH 2409.13). Commercial harvest includes using 4.3 miles of temporary roads. Reducing miles of temporary roads shifts the logging system on 307 acres to helicopter logging, resulting in higher operating costs. The overall value of commercial products drops substantially under this alternative.

Economic impacts are expressed in terms of annual full- or part-time jobs supported by the project, as well as annual labor income associated with those jobs. Total cost for restoration is $5,538,194 (Table 3-164) and is broken out between 1–6 years and 7–15 years. Commercial harvesting and processing accounts for a relatively greater percentage of the economic impacts, compared to Forest Service–funded activities associated with roads, trails, and restoration (Table 3-18). The majority of activities associated with commercial harvest and recreation would occur within the first 6 years, thus reducing the economic impact the remaining 9 years. The average annual full- and part-time jobs and labor income supported by the project is approximately 25 and $709,507 for the first 6 years and 5 and $142,206 for the remaining 9 years (Table 3-18). Forest Service–funded projects (Table 3-166) would be ongoing throughout the life of the project and beyond. However, no new jobs or positions would be created with this funding, so it will not be address further. Costs for burning should not extend beyond the 15-year timeline.

The cost of all restoration items exceeds the PNV by about $5,052,043 (Table 3-17). Therefore, supplemental funding would be necessary to fund some restoration items.

Stewardship contracts (FSH 2409.19, Chapter 60) could be used to help offset the cost of some restoration activities by trading goods for services. Additional funding could be supplemented by retained receipts from other stewardship projects, appropriated funding, or grants. Since the project area has no WUI, competing for appropriated funding could be limited.

Access to the Elkhorn yurt is by foot traffic only while all remaining yurts have vehicle access, with the last 300 feet being foot traffic only. Access to the Stargaze yurt is currently open year-round to motorized vehicles within 300 feet when road conditions allow. Access to the Skyline yurt is restricted by a seasonal road closure from September 15 through June 15. Under this alternative, summer access to the Stargaze and Skyline yurts would be accessible by vehicles between June 16 and September 14. According to use data provided by IDPR, fall, spring, and summer use of the yurts is continuing to increase (Table 3-152). This alternative could reduce use to these two yurts by limiting vehicle access and subsequently reduce revenue associated with the rental program. During project implementation, area closures could also be implemented during prescribed fire and commercial harvest to provide for public safety (Design Feature RE-10). Estimated revenue loss to the IDPR yurt rental program during burning could range from $485 to $970 per yurt, assuming 100% rental capacity, and $485 to $1,940 during timber harvest. Changing vehicle access could also reduce nightly rental income by $6-$120 per night. Alternative F would change motorized access to the Stargazer and Skyline Yurts to seasonal between June 16 and September 15, which may impact the number of nights these yurts are rented and the income generated during this season. Changing vehicle access may reduce nightly rental income by $65–$120 per night.

A 18.8-mile motorized trail designated for vehicles <60 inches wide and construction of a new trailhead are proposed under this alternative. ATV/UTV use is occurring on undesignated routes and trails within the project area. Developing this trail could help alleviate unauthorized use, reduce conflicts between different classes of motorized vehicles, and minimize effects to resources such as soil, water, and wildlife. This new trail could also attract new visitors to Boise County, resulting in increased revenue (Table 3-156 and Table 3-157).

This alternative recommends closing 23.2 miles of ML 1 roads, closing 24.2 miles of ML 2 roads, and converting 20.3 miles of currently open ML 2 roads to ML 2—Administration Use Only roads. This alternative also recommends decommissioning 31.7 miles of ML 1, ML 2, and unauthorized roads that are resource damage, thus permanently reducing road access within the project area. Associated actions would spend federal dollars to create or maintain 3–5 jobs to complete the restoration activities (Table 3-18). The impact on future restoration activities would be minimal as the roads proposed for decommissioning are causing resource damage or are located in areas not suited for forest product removal. Changing the maintenance level and closing roads would maintain a transportation system for future land management activities. The impact on recreation could be greater effect as some of the roads that were once open for OHV use, fuelwood gathering, camping, and other recreational activities would be closed to public motorized use. Approximately 21 miles of the roads proposed for closing or decommissioning would be converted to non-motorized trails and be available for foot traffic, bicycles, horses, and skiing, which would reduce some of the impact.

A winter motorized closure totaling 10,800 acres is proposed under this alternative. The closure area includes the 7,491 acres north of Beaver Creek and east of Highway 21 up to the dividing boundary between the Lowman and Idaho City Ranger Districts. The additional 3,300 acres proposed under this alternative uses natural features, such as ridges and drainages, to create a non-motorized buffer to maintain the value for non-motorized users along maintained ski trails throughout the project area. Since this is a winter closure and commercial activity is prohibited between December 15 and April 15 and other non-winter activities are limited to the summer months, winter recreation should not be affected by this closure.

Table 3-17—Summary of supplement al funding needs by alternative

Action	Alternative A ($)	Alternative B ($)	Alternative C ($)	Alternative D ($)	Alternative E ($)	Alternative F ($)
Potential Net Value (PNV)	$0	+$1,076,004	+$1,076,004	+$1,125,054	+$380,500	+$662,900
Restoration Expenditures	$0	–$5,508,053	–$5,509,965	–$5,611,214	–$5,432,543	–$5,538,194
Supplemental Funding Needs (PNV—Restoration Costs)	**$0**	**–$4,432,049**	**–$4,433,961**	**–$4,486,160**	**–$5,052,043**	**–$4,875,294**

Table 3-18—Average annual full and part-time jobs and labor income supported by restoration activities

	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F	
	Employment	Income	Employment	Income	Employment	Income	Employment	Income	Employment	Income	Employment	Income
1–6 years												
Commercial Forest Products	0	$0	22	$644,830	22	$644,830	23	$677,334	17	$496,317	22	$644,830
Other Project Activities			3	$60,098	3	$60,098	3	$62,419	3	$45,987	3	$60,077
FS Implement and Monitoring	0	$0	.1	$4,483	.1	$4,483	.1	$4,574	.1	$4,658	.1	$4,600
Total			**25.1**	**$709,412**	**25.1**	**$709,412**	**26.1**	**$744,327**	**20.1**	**$546,962**	**25.1**	**$709,507**
7–15 years												
Commercial Forest Products	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Other Project Activities			5	$136,235	5	$136,235	5	$138,908	5	$135,787	5	$136,051
FS Implement and Monitoring	0	$0	.2	$6,040	.2	$6,040	.2	$6,132	.2	$6,314	.2	$6,155
Total	**0**	**$0**	**5.2**	**$142,275**	**5.2**	**$142,275**	**5.2**	**$145,040**	**5.2**	**$142,102**	**5.2**	**$142,206**

Note: Table represents Idaho and Oregon as shown in Figure 3-116

Table 3-166. Re-occurring cost estimates and associated jobs

	Trail Maintenance	Burning	Road Maintenance	Noxious Weeds	Ski Trail Grooming	Snowmobile Trail Grooming	Yurt Rental
Cost	$15,700	$808,000 – $873,000	$110,750	$46,500	$44,100	$7,900	$105,000
Jobs	4+	12+	4+	2+	1+	1+	2+

3.16.3.2 Cumulative Effects

Alternative A

No cumulative effects would be associated with this alternative since there would be no direct or indirect effects to the economic resources with implementation of Alternative A.

Action Alternatives

Appendix B identifies the past, present and ongoing, and reasonably foreseeable activities considered for this cumulative effects analysis. No past activities in the analysis area, when combined with any alternative, would cumulatively impact the financial assessment or revenue generated by these alternatives. No past activities have been identified that would cumulatively impact the level of jobs or economic activity in Boise County or surrounding communities.

Ongoing activities, such as road use and maintenance, trail use and maintenance, livestock grazing, fire suppression, and recreation, would be expected to continue within the analysis area. These activities would have no cumulative impact on the financial assessment or revenue generated by these alternatives. No present/ongoing activities have been identified that would cumulatively impact the level of jobs or economic activity in Boise County or surrounding communities.

No reasonably foreseeable projects or activities within the analysis area would cumulatively impact future activities. This project is anticipated to cumulatively impact the financial assessment or revenue generated by these alternatives and impact the level of jobs or economic activity in Boise county or surrounding communities.

3.16.3.3 Conclusions about Alternative Effects

Given that levels of treatment and commercial harvest and processing activity do not differ substantially across Alternatives B, C, D, and F, the estimated impacts for those alternatives are approximately the same: an average of 15–16 full and part-time jobs and $400,000–$420,000 in labor income supported per year, over the 15-year period of the project (Table 3-). Commercial harvesting and processing accounts for a relatively greater percentage of the economic impacts, compared to Forest Service–funded activities associated with roads, trails, culverts and restoration. Estimated job and labor income impacts are greater for the first 6 years of the project (approximately 20 to 26 jobs per year; $547,000–$744,000 labor income per year); during which time commercial harvest occurs. Impacts are lower during the last 9 years of the project, after commercial harvesting has been completed, but treatment continues (5 to 6 jobs per year; $142,000–$145,000 in labor income supported per year) (Table 3-). Estimated impacts are slightly lower for Alternative E as a result of reduced harvest volumes, averaging approximately 12 jobs and $340,000 in labor income supported annually over 15 years (Table 3-). Approximately 20 jobs per year and $547,000 in labor income per year are supported during the first 6 years, followed by 5 jobs and $142,000 per year during the last 9 years of the project. Impact results for the latter 9 years are similar across all action alternatives.

Table 3-20. Jobs supported and maintained within the Analysis Area

	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Jobs Supported	N/A	30.3	30.3	31.3	25.3	30.3
Revenue	N/A	$851,687	$851,687	$889,367	$689,064	$851,713
Jobs Maintained	26	26	26	26	26	26
Total Jobs	26	56.3	56.3	57.6	51.3	56.3

The anticipated financial assessments in Table 3-165 vary slightly between Alternatives B, C, and D which utilize ground-base harvest systems. Alternatives E and F would require helicopter logging, which would lower the anticipated sale value. No commercial value would be proposed under Alternative A. Net revenue for all alternatives is a combination of the anticipated NEPA cost, sale preparation cost, and contract administration cost. The net revenue for all alternatives is the same except for Alternative A, which is “below cost.” Alternatives B, C, and D are considered “above cost” by approximately $235,804, Alternative D is “above cost” by $284,854. Alternative E and F are “below cost” at $459,700, and Alternative F is “below cost” by $177,300. Sale volumes are the same for Alternatives B, C, and F and are estimated at 8.4 MMBF. Alternative D is slightly higher at 8.7 MMBF, and Alternative E is at 6.2 MMBF due to suggested diameter limits (Table 3-). The sale value for Alternatives B and C are the same bringing in an estimated $1,076,004, Alternative D is slightly higher at $1,125,054, Alternative E is drastically lower at $380,500 because of helicopter logging, and Alternative F is $662,900 also because of helicopter logging (Table 3-). Constructing temporary roads for timber harvest would decrease logging costs by utilizing ground-based harvest systems. Alternative B and C propose constructing 5.8 miles of temporary roads, Alternative D proposes 6.5 miles, Alternative E proposes only 1.5 miles, and Alternative F proposes 4.3 miles to protect recreation experiences (Table 3-). Proposed restoration activities are similar across all alternatives with the estimated sale value being the greatest factor affecting the need for supplemental funding. Alternative B would require an additional $4,432,049 to complete all restoration activities, Alternative C would require $4,433,961, Alternative D $ 4,486,160, Alternative E $5,052,043, and Alternative F 4,875,294 (Table 3-).

Table 3-21—Financial assessment

	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Large Sale Volume	0	5.5	5.5	5.5	3.3	5.5
Small Sale Volume	0	2.9	2.9	3.2	2.9	2.9
Large Sale Value	$0	$770,634	$770,634	$806,114	$20,832	$357,529
Small Sale Value	$0	$305,370	$305,370	$328,910	$359,668	$305,370
Total Value	$0	$1,076,004	$1,076,004	$1,125,054	$380,500	$662,899
Net Revenue	–576,000	235,804	235,804	284,854	–459,700	–177,300
Supplemental Funding Needs	0	$4,432,049	$4,433,961	$4,486,160	$5,052,043	$4,875,294
Temporary Roads	0	5.8	5.8	6.5	1.5	4.3

Impacts to recreation are similar for the alternatives with changes to yurt access, proposed closure areas, new ATV/UTV trail construction, and road decommissioning and closings. Alternative A would allow continued operation of the yurt system and corresponding trail system in partnership with IDPR. No new recreational activities are proposed.

All Alternatives except A and E are proposing an OHV trail and corresponding trail head. Alternatives B and C incorporate a trail width of <50 inches and D and F would allow for vehicles <60 inches (Table 3-167). Alternative B has the longest trail route with 23.3 miles being proposed (Table 3-167). To reduce trail user conflicts, Alternatives C and D reduce the proposed trail route to 22 miles; Alternative F proposes 18.8 miles eliminate new construction in RCAs. (Table 3-167)

Table 3-167. Off-highway vehicle trail

	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Width Restriction (inches)	N/A	<50	<50	<60	N/A	<60
Miles		23.3	22	22		18.8

Proposed road actions may have a negative effect on yurt use by eliminating vehicle access requiring individuals to hike in or increase use by removing vehicle restrictions on closed roads (Table 3-168). Under Alternatives B and E, road access would be converted to ML 2—Administrative Use Only, requiring renters to hike to the yurts (Table 3-168). Alternatives C and F propose seasonal closures with vehicles allowed between June 16 and September 14 (Table 3-168). Alternative D would remove the seasonal closure and would be the only alternative with no access restrictions (Table 3-168).

Table 3-168. Yurt access

Access Restrictions	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Administrative Use Only		X			X	
Seasonal Restrictions June 16–September 14	X		X			X
No Restrictions				X		

Alternatives A through F would incorporate a winter non-motorized closure up to 10,800 acres (Table 3-169). Alternatives A and B propose closing 7,491 acres; the remaining alternatives propose closing an additional 3,309 acres to preserve a non-motorized experience around designated ski trails. Since this would be a winter closure and proposed activities are prohibited between December 15 and April 15, winter recreation activities should not be affected. Alternative E would impose a seasonal closure to mechanized equipment to protect big game calving between May 1 and June 15 on 8,576 acres east of Highway 21 and north of Beaver Creek (Table 3-169). This alternative could have the greatest economic impact on the yurt rental program by limiting vehicle access to the Skyline and Elkhorn yurts.

Table 3-169. Seasonal closures

Closure Type	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Winter		X	X	X	X	X
Spring					X	
Acres	7,491	7,491	10,800	10,800	19,376	10,800

Road activities for Alternatives B through F are similar and would close between 44 and 52 miles of ML 1 and ML 2 roads (Table 3-170). Some of these roads would be closed to the public but open for administrative use only. An additional 30–33 miles of road would be decommissioned and permanently removed from the system (Table 3-170). Depending on alternative, between 18 and 26 miles of these closed or decommissioned roads would be converted to trails (Table 3-170).

Table 3-170. Road actions

Action	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Close ML 1	0	20.3	20.3	20.3	23.2	23.2
Close ML 2	0	28.7	24.2	24.2	28.7	24.2
Administrative Use Only	0	24.8	20.3	20.3	24.8	20.3
Decommission	0	30.9	30.9	30.9	32.9	31.7
Convert to trails	0	21	21	18	26	21

3.17 CULTURAL RESOURCES

3.17.1 Analysis Scale, Data Sources, and Methodology

The area of potential effect (APE) for this project is defined as the project boundary. Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects of their activities and programs on historic properties within the APE.

Existing information from cultural resource records, historic archives, maps, and geographic information system (GIS) spatial data was reviewed to provide specific information about historic properties, or the likelihood that unidentified properties might exist in non-inventoried areas. The specific location of a historic property is the unit of spatial analysis when considering effects of alternatives.

An intuitive-complete survey (using 30-meter transects) was conducted in the project area in 2008 and 2014.

3.17.2 Analysis Indicators

The analysis indicator for cultural resources is whether or not cultural resources are protected.

3.17.3 Affected Environment

Cultural themes for the project area include Mining, Ethnic Heritage, Timber Industry, Forest Service History, and the Civilian Conservation Corps (CCC). Mining and timber have been important industries in this management area. In the 1860s, placer miners on Crooked River discovered enough silver in their gold “diggings” to prompt exploration for a lode source. In 1864, they discovered a silver ledge on Banner Ridge. Miners, many of them Chinese, established two towns in the area named Banner and Eureka. The Banner Mining District was a thriving enterprise until the early 1920s, producing over $3,000,000 in silver. In 1903, Barber Lumber Company established field quarters at Barber Flat in anticipation of driving logs down Crooked River and the North Fork Boise River. In 1923, the Forest developed Barber Flat into an administrative site. In the 1930s, the CCC built new buildings on this site and at Beaver Creek Guard Station (established in 1912).

The historical record and previous cultural resources inventory document the cultural sensitivity of lands included in the project area. Approximately 980 acres have been intensively surveyed for cultural resources. Surveys focused on areas of high probability (i.e., drainages, springs, ridges, saddles, and areas with slopes less than 25%). These surveys documented 35 archeological sites within the project area (Table 3-171), 23 of which are eligible or potentially eligible for listing on the National Register of Historic Places (NRHP). Twelve are not eligible for listing on the NRHP.

Table 3-171. Known cultural resource sites within the project area

Site Number	State Number	National Register Status	Site Type	Description
BS-00081	10-BO-0134	Not eligible	Historic	Mining—Cabin
BS-00082	10-BO-0135	Eligible	Historic	Historic—Chinese cabin
BS-00083	10-BO-0136	Unevaluated	Historic	Mining—Cabin and dump
BS-00084	10-BO-0137	Unevaluated	Historic	Mining—Dump
BS-00101	10-BO-0145	Unevaluated	Historic	Logging—Sawmill
BS-00103	10-BO-0147	Unevaluated	Multicomponent	Mining/LS
BS-00108	10-BO-0152	Not eligible	Historic	Historic/LS—Dump
BS-00695	10-BO-0298	Unevaluated	Historic	Historic—Dugout
BS-00696	10-BO-0299	Unevaluated	Historic	Historic—Dugout and dump
BS-00719	10-BO-0312	Not eligible	Historic	Beaver Creek work station
BS-00828	10-BO-0594	Not eligible	Historic	Pilot Peak fire lookout
BS-00902	10-BO-0442	Not eligible	Historic	Mining—Camp
BS-01001	10-BO-0628	Eligible	Historic	Historic—Banner City
BS-01002	10-BO-0629	Not eligible	Historic	Historic—Banner City
BS-01003	10-BO-0630	Not eligible	Historic	Historic—Cordwood
BS-01009	10-BO-0631	Eligible	Historic	Historic—Banner Graves
BS-01010	10-BO-0632	Eligible	Historic	Historic—Dugout
BS-01082	10-BO-0562	Not eligible	Historic	Historic—Dump
BS-01083	10-BO-0515	Unevaluated	Historic	Historic—Dump
BS-01102	10-BO-0522	Not eligible	Historic	Tree Art—Aspen
BS-01179	10-BO-0707	Eligible	Historic	Historic—Brick dump
BS-01187	10-BO-0598	Not eligible	Historic	Historic—Dump
BS-01188	10-BO-0599	Eligible	Historic	Mining—Camp
BS-01189	10-BO-0600	Unevaluated	Historic	Mining—Chinese flume
BS-01190	10-BO-0601	Unevaluated	Historic	Historic—Camp
BS-01192	10-BO-0603	Unevaluated	Historic	Mining—Edna Lode
BS-01253	10-BO-0633	Unevaluated	Historic	Historic—Dump
BS-01395	10-BO-0771	Eligible	Historic	Historic—Cabin
BS-01396	10-BO-0705	Eligible	Historic	Historic—Cabin
BS-01477	10-BO-0730	Unevaluated	Prehistoric	Lithic Scatter—Biface
BS-01701	—[a]	Unevaluated	Historic	Mining
BS-01702	—[a]	Unevaluated	Historic	Mining
BS-01704	10-BO-	Multicomponent	Historic	Tailing piles and lithic isolate
BS-02059	10-BO-876	Not eligible	Historic	Historic—Bridge, Pikes Fork
BS-02061	10-BO-879	Unevaluated	Historic	Building foundation

[a]These sites have not received State numbers yet

3.17.4 Environmental Effects

Direct and indirect effects to historic properties from project activities are determined by applying NHPA's criteria of effect. NHPA defines an Adverse Effect as one that diminishes the integrity of a historic or prehistoric site's location, design, setting, materials, workmanship, feeling, or association. Adverse effects include physical destruction, damage, or alteration to all or part of a site, and/or the introduction of visual, audible, or atmospheric

elements that are out of character with the site or alter its setting (36 CFR 800.5[a][2][i-vii]). Effects criteria are only applied to those sites determined eligible for the NRHP.

If an undertaking will not alter the characteristics of a historic property that make it eligible for listing on the NRHP, then a No Effect determination may be reached. No Adverse Effect determinations are applied when the Forest Service, in consultation with the State Historic Preservation Office (SHPO), determines that the effects do not meet the criteria of adverse effect or modifies the undertaking or imposes conditions to avoid adverse effects. Should the Forest Service determine that an activity will have an adverse effect on a historic property, and SHPO concurs, the agency and SHPO will stipulate measures to resolve or mitigate the effect(s).

3.17.4.1 Direct and Indirect Effects

Few differences exist between the alternatives in terms of the magnitude, intensity, or duration of effects to historic properties in the project area (Table 3-172). In four alternatives (B, C, D, and F), ongoing potential adverse effects to one historic property from dispersed recreation will be mitigated. Historic properties will be protected through avoidance and monitoring of project activities (see Design Features CR-1 and CR-2). If historic properties are protected and avoided, it is likely that the implementation of any action alternative would result in No Adverse Effect to historic properties and would result in a No Adverse Effect determination.

Table 3-172. Known historic properties within management activity areas

Treatment Description	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Project Area	23	23	23	23	23	23
Vegetation treatments (including temporary road construction and landings)	0	9	9	9	8	9
Fuels treatments	0	10	10	10	10	10
Transportation system and recreation activities (including trailheads)	0	5	5	5	4	5
Aquatic organism passage treatments	0	3	3	3	3	3

Alternative A—No Action

This No Action Alternative is a required alternative that provides a baseline against which impacts of the action alternatives can be measured and compared. Under this alternative, no new management activities would occur, although all other ongoing activities (e.g., recreational activities, public fuelwood gathering, livestock grazing, motorized travel) would continue. Suppression of wildfires within the project area would also continue as needed.

Under Alternative A, no historic properties are within the APE. Implementing Alternative A would likely result in No Effect to historic properties.

Action Alternatives

Under Alternative B, 23 historic properties are located within or adjacent to the project boundary; 11 lie within or are adjacent to proposed management treatments. These historic properties would be protected through avoidance and monitoring of project activities (see Design Features CR-1 and CR-2). If historic properties are protected and avoided, it is likely

that implementing Alternative B would result in No Effect or No Adverse Effect to historic properties and would result in a No Adverse Effect determination.

3.17.4.2 Cumulative Effects

Cultural resources inventories have identified past and ongoing adverse effects to historic properties within and adjacent to the project area from mining, logging, road construction, recreation, and special uses. Prohibited activities, such as artifact collection and vandalism have also damaged and destroyed sites. Since the 1970s, however, when implementing regulations for Section 106, the Forest Service has worked to avoid or minimize impacts to cultural resources from activities on NFS lands.

Alternative A—No Action

Because no action would occur under this alternative, cumulative effects to cultural resources would be unlikely.

Action Alternatives

The Forest Service has evaluated the proposed management activities and anticipates no adverse effects to historic properties from implementing the action alternatives. Historic properties would be avoided and monitored during project implementation. Therefore, no cumulative adverse effects to historic properties would occur.

3.18 RESOURCE COMMITMENTS

This section contains disclosures that are required by federal law, regulation, or policy and generally apply to all of the preceding resource area effects sections in this chapter.

3.18.1 Unavoidable Adverse Effects

The Forest Plan, as amended in 2010, established management emphasis and direction for implementing activities on NFS lands during the planning period, such as those activities proposed under Alternatives B, C, D, E, or F of this DEIS (USDA Forest Service 2010a). By applying the Forest-wide, MPC, and Management Area standards and guidelines found in Chapter 3 of the Forest Plan, adverse effects from these activities would be limited in extent and duration. The design features found in Chapter 2, section 2.4.7, provide additional mitigation to minimize or avoid adverse effects. However, some unavoidable effects would result from implementing activities as proposed under Alternatives B, C, D, E, or F. These potential effects are described by resource area earlier in this chapter.

3.18.2 Relationship of Short-Term Uses and Long-Term Productivity

Long-term productivity refers to the capability of the land to provide resource outputs for a period of time beyond the planning period. One of the purposes of a Forest Plan, as established by federal regulation (36 CFR 219.1(b)), is to provide direction needed to manage NFS lands to sustain the multiple use of its renewable resources in perpetuity while maintaining the long-term health and productivity of the land. Management requirements are contained in Forest-wide and Management Area standards and guidelines and would be met under Alternatives B, C, D, E, or F (refer to Forest Plan consistency determination,

section 1.8.7.1 and 1.8.7.2). Meeting these requirements ensure that the long-term productivity of the land is not impaired by short-term uses.

A key Forest Plan standard that directly pertains to the maintenance of long-term soil productivity pertains to requirements for total soil resource commitment (TSRC). TSRC occurs when a management activity converts a productive site to an essentially nonproductive site for a period of more than 50 years. Examples include authorized or unauthorized roads, inadequately restored haul roads, permanently designated skid roads and log landing areas, parking lots, mining dumps or excavations, dedicated recreation trails, skid trails, developed campgrounds, other dedicated facilities, and some long-term stock driveways. Forest Plan standards require the activity area assessed that encompasses these types of activities to stay below 5% TSRC for the total acreage. Refer to the "Glossary" for definitions of activity area.

Alternative A would have no temporary, short-, or long-term, direct, indirect, or cumulative effects on TSRC. Assuming Travel Management restrictions prohibiting unauthorized motor vehicle use off designated routes would be enforced, no new travel routes, or extensions of existing routes that would increase TSRC are expected. It is likely that livestock would continue to trail along existing, unauthorized routes within the Project area so these features would not fully recover through natural amelioration. Alternative A would maintain the existing TSRC of 4.7%.

Under Alternative B (Proposed Action), there would be an interim increase of 1.6% in TSRC from the construction and use of log landings, skid trails, and 5.8 miles of temporary road to facilitate commercial timber harvest. These temporary, direct effects are addressed through project Design Features FH-6 and TH-5 (section2.4.7), which require these disturbances be reclaimed when they are no longer needed for timber harvest and essentially alleviate the increased TSRC. Constructing 1.2 miles of new road and reconstruction/relocation of 4.8 miles of NFS roads would increase TSRC over the existing conditions by 0.12% within the activity area; however, this increase would be reduced by decommissioning roughly 30.9 miles of existing system (22.8 miles) and non-system routes (8.1 miles). Proposed trailheads would be located in areas already identified as existing TSRC from dispersed recreation. Construction of the trailheads would slightly increase TSRC as the disturbance footprint would be slightly greater than the existing disturbance. As a result, at the conclusion of implementing all activities under Alternative B, TSRC would be estimated to be 4.0% and comply with Forest Plan Standard SWST03 (Forest Service 2010a).

Under Alternative C, there would be an interim increase of 1.6% in TSRC from the construction and use of log landings, skid trails, and an estimated 5.8 miles of temporary road to facilitate commercial timber harvest. These temporary, direct effects are addressed through project Design Features FH-6 and TH-5 (section 2.4.7), which require these disturbances be reclaimed when they are no longer needed for timber harvest and essentially alleviate the increased TSRC. Constructing 1.2 miles of new road and reconstruction/relocation of 4.8 miles of NFS roads would increase TSRC over the existing conditions by 0.12% within the activity area; however, there would be a net decrease in TSRC after decommissioning roughly 30.9 miles of existing system (22.8 miles) and non-system routes (8.1 miles). Proposed trailheads would be located in areas already identified as existing TSRC from dispersed recreation. Construction of the trailheads would slightly increase TSRC as the disturbance footprint would be slightly greater than the existing disturbance. As a result, at

the conclusion of implementing all activities under Alternative C, the TSRC would be estimated to be 4.0% and comply with Forest Plan Standard SWST03.

Under Alternative D, there would be an interim increase of 1.7% in TSRC from the construction and use of log landings, skid trails, and an estimated 6.5 miles of temporary road to facilitate commercial timber harvest. These temporary, direct effects are addressed through project Design Features FH-6 and TH-5 (section 2.4.7), which require these disturbances be reclaimed when they are no longer needed for timber harvest and essentially alleviate the increased TSRC. Constructing 1.2 miles of new road and reconstruction/relocation of 4.8 miles of NFS roads would increase TSRC over the existing conditions by 0.12% within the activity area; however, there would be a net decrease in TSRC after decommissioning roughly 30.9 miles of existing system (22.8 miles) and non-system routes (8.1 miles). Proposed trailheads would be located in areas already identified as existing TSRC from dispersed recreation. Construction of the trailheads would slightly increase TSRC as the disturbance footprint would be slightly greater than the existing disturbance. As a result, at the conclusion of implementing all activities under Alternative D, the TSRC would be estimated to be 4.0% and comply with Forest Plan Standard SWST03.

Under Alternative E, there would be an interim increase of 1.1% in TSRC from the construction and use of log landings, skid trails, and an estimated 1.5 miles of temporary road to facilitate commercial timber harvest. These temporary, direct effects are addressed through project Design Features FH-6 and TH-5 (section 2.4.7), which require these disturbances be reclaimed when they are no longer needed for timber harvest and essentially alleviate the increased TSRC. Constructing 1.2 miles of new road and reconstruction/relocation of 4.8 miles of NFS roads would increase TSRC over the existing conditions by 0.12% within the activity area; however, there would be a net decrease in TSRC after decommissioning roughly 32.9 miles of existing system (24.8 miles) and non-system routes (8.1 miles). Proposed trailhead construction would be located in an area already identified as existing TSRC from dispersed recreation. Construction of the trailhead would slightly increase TSRC as the disturbance footprint would be slightly greater than the existing disturbance. Under alternative E there would be only one trailhead constructed, as opposed to the 2 included in all other action alternatives. As a result, at the conclusion of implementing all activities under Alternative E, the TSRC would be estimated to be 3.8% and comply with Forest Plan Standard SWST03.

Under Alternative F, there would be an interim increase of 1.4% in TSRC from the construction and use of log landings, skid trails, and an estimated 4.3 miles of temporary road to facilitate commercial timber harvest. These temporary, direct effects are addressed through project Design Features FH-6 and TH-5 (section 2.4.7), which require these disturbances be reclaimed when they are no longer needed for timber harvest and essentially alleviate the increased TSRC. Constructing 1.2 miles of new road and reconstruction/relocation of 4.8 miles of NFS roads would increase TSRC over the existing conditions by 0.12% within the activity area; however, there would be a net decrease in TSRC after decommissioning roughly 31.7 miles of existing system (23.6 miles) and non-system routes (8.1 miles). Proposed trailheads would be located in areas already identified as existing TSRC from dispersed recreation. Construction of the trailheads would slightly increase TSRC as the disturbance footprint would be slightly greater than the existing disturbance. As a result, at

the conclusion of implementing all activities under Alternative F, the TSRC would be estimated to be 3.9% and comply with Forest Plan Standard SWST03.

3.18.3 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable commitments of resources are defined in the Environmental Policy and Procedures, Forest Service Handbook 1909.15.

Irreversible commitments of resources mean the consumption or destruction of nonrenewable resources, such as fossil fuels, minerals, or cultural resources, or the degradation of resources, such as soil productivity, that can be renewed only over long periods of time. Irreversible commitments represent the loss of future options.

Irretrievable commitments of resources result in foregone opportunities; they represent tradeoffs in the use and management of Forest resources. Irretrievable commitments of resources include expenditure of funds, loss of production, or restrictions on resource use. For example, some or all wildlife habitat in a specific area may be irretrievably lost while an area serves as a concentrated winter sports site. The habitat function that is lost is irretrievable for that period of time, but the action is not irreversible. If the use changes in the project area, the area may once again provide wildlife habitat.

Alternative A proposes no new activities; therefore, no irreversible or irretrievable commitments would result. Alternatives B, C, D, E, or F result in an irreversible commitment of fossil fuel energy resources that would be used by equipment needed to implement proposed vegetation and road management activities.

All alternatives would also result in irretrievable commitments as a result of expenditure of funds to plan, and in the case of Alternatives B, C, D, E, or F implement these proposed activities (section 3.16, “Socioeconomics”). Commitments would also be made in the short and long term under Alternatives B, C, D, E, or F as a result of effects on soil resources. Management activities can impact soils in a variety of ways, including detrimental soil disturbance (DD) and TSRC. Refer to section 3.10 of this DEIS for detailed effects disclosures for DD and TSRC.

DD occurs when activities detrimentally alter the natural soil characteristics, resulting in the immediate and/or prolonged degradation of onsite resources or vegetation productivity. This impact is associated with unacceptable levels of soil displacement, soil compaction, soil puddling, or severely burned soils. As discussed under the previous section, TSRC occurs when a management activity converts a productive site to an essentially nonproductive site for a period of more than 50 years. Examples include authorized or unauthorized roads, inadequately restored haul roads, permanently designated skid roads and log landing areas, parking lots, mining dumps or excavations, dedicated recreation trails, skid trails, developed campgrounds, other dedicated facilities, and some long-term stock driveways.

Under Alternative A, there would be no increase in DD within any activity area, and this alternative would be consistent with Forest Plan Standard SWST02. DD for activity areas would continue to range from 0% to 5% (Appendix D).

Implementing activities described under Alternatives B and C result in identical effects to DD and would increase DD in each of the activity areas in the temporary and short term (0–15 years) (Appendix D, Table D-1). DD is not predicted to exceed 15% in any of the timber

harvest activity areas. 14 of the 75 units or activity areas are estimated to reach 13% DD immediately following timber harvest activities. (Appendix D). For each timber harvest unit, a time lag exists between sequentially implemented treatments. Using prescribed fire to treat activity fuels occurs 1–3 years after timber harvest, and some of the initial DD increase from timber harvest would recover to disturbed conditions as skid trails were actively reclaimed. Following prescribed fire implementation, the same 14 units would approach 13% to 15% DD. Within 5 years of project implementation, DD in all 75 activity units would range from 0 to 11.5% (Appendix D). Additional recovery of DD in each activity unit is anticipated between 5 and 10 years following project implementation (Appendix D). The estimated increases in DD at the completion of project activities would be less than 15% for all activity areas, and implementing the treatments would comply with Forest Plan Standard SWST02.

Implementing activities described under Alternative D would increase DD in each of the activity areas in the temporary and short term (0–15 years) (Appendix D, Table D-1). DD is not predicted to exceed 15% in any of the timber harvest activity areas. 14 of the 70 units or activity areas are estimated to reach 13% DD immediately following timber harvest activities. (Appendix D). For each timber harvest unit, a time lag exists between sequentially implemented treatments. Using prescribed fire to treat activity fuels occurs 1–3 years after timber harvest, and some of the initial DD increase from timber harvest would recover to disturbed conditions as skid trails were actively reclaimed. Following prescribed fire implementation, the same 14 units would approach 13% to 15% DD. Within 5 years of project implementation, DD in all 75 activity units would range from 0 to 11.5% (Appendix D). Additional recovery of DD in each activity unit is anticipated between 5 and 10 years following project implementation (Appendix D). The estimated increases in DD at the completion of project activities would be less than 15% for all activity areas, and implementing the treatments would comply with Forest Plan Standard SWST02.

Implementing activities described under Alternatives E and F result in identical effects to DD and would increase DD in each of the activity areas in the temporary and short term (0–15 years) (Appendix D, Table D-1). DD is not predicted to exceed 15% in any of the timber harvest activity areas. 14 of the 78 units or activity areas are estimated to reach 13% DD immediately following timber harvest activities. (Appendix D). For each timber harvest unit, a time lag exists between sequentially implemented treatments. Using prescribed fire to treat activity fuels occurs 1–3 years after timber harvest, and some of the initial DD increase from timber harvest would recover to disturbed conditions as skid trails were actively reclaimed. Following prescribed fire implementation, the same 14 units would approach 13% to 15% DD. Within 5 years of project implementation, DD in all 75 activity units would range from 0 to 11.5% (Appendix D). Additional recovery of DD in each activity unit is anticipated between 5 and 10 years following project implementation (Appendix D). The estimated increases in DD at the completion of project activities would be less than 15% for all activity areas, and implementing the treatments would comply with Forest Plan Standard SWST02.

Refer to section 3.10 for discussions concerning TSRC by alternative.

3.18.4 Energy Requirements and Conservation Potential

Energy is consumed in the administration of natural resources from the National Forests. The main activities proposed under Alternatives B, C, D, E and F that would consume energy are restoration activities, including mechanical vegetation treatments and prescribed fire; road

construction and reconstruction; and administrative activities of the Forest Service and other regulatory agencies.

Alternative A does not propose any new activities that would result in increases in energy consumption over that which currently occurs.

Several opportunities exist under all action alternatives to provide for energy conservation or conversion from less plentiful to more plentiful fuels. For example, agency personnel involved with this project are committed to carpooling and combining trips to save fuel and wear and tear on the Forest Service fleet of vehicles. Using teleconferencing and other electronic communication options, rather than scheduling meetings at one location, would save energy spent on travel. The agency would also work with contractors involved with the project to suggest opportunities to use more energy-efficient equipment for activities such as vegetation management, road construction and reconstruction, or road maintenance.

3.18.5 Consultation with Other Federal or State Agency or Local Government

Contact, review, and public involvement with other federal and state agencies indicate no major conflicts between the activities proposed under Alternatives B, C, D, E, or F and the goals and objectives of other federal, State, or local governmental entities. Refer to section 1.7 for a more detailed discussion concerning "Regulatory Requirements and Required Consultation."

Chapter 2, section 2.4.8, also identifies other federal, State, or local approvals/permits potentially applicable to all action alternatives. Finally, as described in section 1.1, the proposed restoration activities under the action alternatives have been designed to further the achievement of goals and objectives in the Forest Plan, as amended in 2010. The Wildlife Conservation Strategy that was integrated into the Forest Plan in 2010 has been designed to complement the Idaho Department of Fish and Game's *Idaho Comprehensive Wildlife Conservation Strategy* (IDFG 2005).

3.18.6 Consultation with Tribal Governments

Executive Order 13175 (65 FR 67249-67252, 2000) requires regular and meaningful consultation between federal and tribal government officials on federal policies that have tribal implications.

As described in Chapter 1 (section 1.10) and Chapter 4 of this DEIS, regular notification and, as requested, consultation with potentially affected tribes has occurred throughout the planning process for this project. The tribal notification and subsequent consultation processes completed have not identified any adverse effects to tribal interests or rights associated with this project.

3.18.7 Best Available Science

The conclusions summarized in this DEIS are based on a review of the Project Record, which considers relevant scientific information and responsible opposing views, where raised by internal or external sources, and the acknowledgement of incomplete or unavailable information, scientific uncertainty, and/or risk, where pertinent to the decision being made.

CHAPTER 4 CONSULTATION AND COORDINATION

4.1 SUMMARY OF SCOPING AND PUBLIC INVOLVEMENT TO DATE

The District encouraged extensive public involvement throughout the planning process leading to this document. This project has been list on the Forest Schedule of Proposed Actions (SOPA) since January 2006. In May 2014, the District initiated public scoping on the Becker Integrated Resource Project. The Proposed Action was posted on the Forest web site[47] on the project web page, on May 1, 2014. The scoping package was mailed to 138 individuals, agencies, and/or groups on May 2, 2014. Additionally, a scoping email bulletin was sent to 57 individuals on May 7, 2014, and a press release was printed in the *Idaho Statesman* on May 7, 2014. Public meetings were held on May 20, 2014 in Idaho City and on May 21, 2014 in Boise. A total of 23 parties responded to the May 2014 scoping effort. The Project Record contains all comments received during the scoping period and the Forest Service responses to the comments.

A Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on August 8, 2014. The NOI described the Proposed Action and invited comments for 30-days following publication. Public notification that the Forest will prepare an EIS for the project, publication of the NOI, and request additional public comment was mailed to 68 individuals and agencies, and/or groups and emailed to 93 individuals on August 11, 2014. A total of 64 parties responded to the NOI comment period. The Project Record contains all comments received during this public involvement period and the Forest Service responses.

4.2 TRIBAL CONSULTATION

The federal government's trust responsibility to federal recognized tribes compels agencies to conduct their activities consistent with rights legally accruing to a tribe or tribes by virtue of inherent rights and sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, of which give rise to legally enforceable remedies. In carrying out their trust responsibilities, the Forest Service must assess proposed actions to determine potential impacts on treaty rights, treaty resources, or other unextinguished tribal righ7ts and interests. Where potential impacts exist, the agencies must consult with affected tribes and explicitly address those impacts in planning documents and final decisions. Consultation with the tribes is essential in carrying out that trust responsibility.

The intergovernmental consultation process serves as the primary means for the federal agencies to carry out their trust obligations. Consultation is not a single event, but instead is a process leading to a decision; for example, the Record of Decision for this EIS. Consultation means different things to different tribes. It can be either a formal process of negotiation, cooperation, and policy-level decision-making between tribal governments and the federal government, or a more informal process. Tribal rights and interests are discussed and considered or incorporated into the decision. Consultation can be viewed as an ongoing

[47] http://www.fs.fed.us/nepa/fs-usda-pop.php/?project=18922

relationship between an agency(ies) and a tribe(s), characterized by consensus-seeking approaches to reach mutual understanding and resolve issues. It may concern issues and actions that could affect the government's trust responsibilities, or other tribal interests.

Consultation minimally serves five purposes:

- to identify and clarify issues,
- to provide for an exchange of existing information and identify where information is needed,
- to identify and serve as a process for conflict resolution,
- to provide an opportunity to discuss and explain the decision, and
- to fulfill the core of the federal trust obligation.

Legal requirements for federal agencies to consult with sovereign Indian tribes have their basis in federal law, court interpretations, and executive orders.

Two federally recognized tribes have received notification about the Becker Integrated Resource Project: Shoshone-Bannock Tribes and Shoshone Paiute Tribes. Shoshone-Paiute tribal representatives were presented with the project proposal at Wings and Roots meetings occurring on April 1, 2012, December 12, 2013, April 13, 2014, September 11, 2014, and November 13, 2014. Tribal council of the Shoshone-Bannock Tribes were mailed and emailed the project proposal on May 2, 2014. A letter was sent to the Shoshone-Bannock Tribes on August 12, 2014 to notify the tribal council that that Forest will prepare an EIS for the project, publication of the NOI in the Federal Register, and request comments. The tribal notification and/or consultation processes described above did not result in the identification of any potential impacts to treaty rights, treaty resources, or other unextinguished tribal rights and interests. Some tribal representatives identified beneficial effects to resources as a result of proposed restoration of vegetation, wildlife habitat, soil, and water resources consistent with those identified during the 2010 Forest Plan amendment process.

4.3 AGENCIES, ORGANIZATIONS, AND INDIVIDUALS CONTACTED AND/OR CONSULTED DURING THE PLANNING PROCESS

Agencies

Advisory Council on Historic Preservation
Boise County Commissioners
Bureau of Land Management
Bureau of Land Management
Chief of Naval Operations, Energy and Environmental Readiness Division
City of Idaho City
City of Placerville
Federal Aviation Administration
Idaho Dept. of Lands
Idaho Dept. of Water Resources
Idaho Dept. of Agriculture
Idaho Dept. of Environmental Quality
Idaho Dept. of Environmental Quality
Idaho Dept. of Fish and Game
Idaho Dept. of Parks and Recreation
Idaho Mining Association
Idaho Outfitter & Guides Association
National Agricultural Library
Natural Resources Conservation Service
NOAA Fisheries Service NW Region
Northwest Power Planning Council
U. S. Environmental Protection Agency
U. S. Fish and Wildlife Service
U.S. Army Corps of Engineers
U.S. Coast Guard

U.S. DOE Office of NEPA Policy & Compliance
USDA Animal and Plant Health Inspection Service
USDI Office of Environmental Policy & Compliance
West Central Highlands RC & D

Organizations

Advocates for the West
Alliance for the Wild Rockies
American Forest Resource Council
Backcountry Horsemen
Blue Ribbon Coalition
Boise Building
Boise Cascade
Boise Ridge Riders
Boise Valley Fly Fishermen
Center for Biological Diversity
Fly Fishers of Idaho
Golden Eagle Audubon
Idaho ATV Association
Idaho Cattle Association
Idaho Conservation League
Idaho Rangeland Resource Commission
Idaho Rivers United
Idaho Sporting Congress
Idaho State Snowmobile Association
Idaho Whitewater Association
Idaho Wildlife Federation
Idaho Woolgrowers Assn.
National Wild Turkey Federation
Northern Utah Prospectors Assn.
Pinnacle Peak Sawtooth Lodge
Rocky Mountain Elk Foundation
Sierra Club
Southwest Idaho Mountain Bike Association
The Lands Council
The Nature Conservancy
The Wilderness Society
Treasure Valley Backcountry Horsemen
Treasure Valley Trail Machine Association
Trout Unlimited
Western Watersheds Projects
Wildlands Denfense
Wild West Institute
Winter Wildlands

Individuals

Senator James E. Risch
Senator Mike Crapo
Congressional Representative Mike Simpson
Congressional Representative Raul Labrador
Idaho City Mayor's Office
Randy Harrison
Bill and Betty Carter
Terry Applegate
Joel Sales
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Scott Cambron
Mike Gillespie
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[48] Email subscribers through the project webpage provide only an email address to subscribe therefore names of the individuals may not be available. Email subscribers already associated with an agency and/or organizations previously listed are not included on this list. The complete list of e-subscribers to the project is available in the project record for each public notification.

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