04-06 #1

United States Department of Agriculture

Forest Service

Salmon/Cobalt Ranger District
Salmon-Challis National Forest

311 McPherson Street
Salmon, ID 83467

File Code: 1950/2670 **Date:** July 17, 2006
Route To:

Subject: Wildlife Analysis Specialist Reports for Proposed Salmon-Moose Timber Sale Project

To: District Ranger, Salmon Cobalt Ranger District

Attached are the final wildlife specialist reports for aspen, old growth, noxious weeds, TES plants and animals and MIS and for the Salmon-Cobalt Ranger District's proposal to harvest timber in the Salmon-Moose project area.

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9 Attachments

Aspen

Existing Condition

Quaking aspen provides very high quality habitat for many species of wildlife (DeByle and Winokur 1985). These include wild ungulates, woodpeckers, secondary cavity nesters, raptors, and even lynx. Quaking aspen's value to wildlife is disproportionate by far to its availability. Species diversity in aspen stands is usually high. Vigorous aspen stands provide abundant nutritious forage and cover. It offers nesting habitat for a wealth of ground-nesting, canopy-nesting, and cavity-nesting birds.

Quaking aspen is a shade-intolerant, seral species largely dependent on periodic natural or planned disturbances (such as wildfire, insect or disease episodes, prescribed fire, or timber harvest) for successful regeneration and retention on the landscape (DeByle and Winokur 1985). However, aspen communities have been declining throughout the interior of the western United States for decades (Schier 1975; Bartos and Campbell 1998). Idaho is included in this downward trend, with the decline particularly noticeable in the Intermountain Middle where the S-CNF is located, and Southern Rockies Ecoregions (USFS 1999). The decline of aspen across the Forest has been detrimental to the plants and animals that benefit from healthy aspen plant communities.

The two primary risk factors contributing to the decline of aspen are fire suppression (that has led to conifer establishment in aspen clones) and aspen browsing by domestic livestock and wild ungulates (USFS 1994; Bartos and Campbell 1998). Trampling by domestic livestock contributes to the decline of aspen as well (DeByle and Winokur 1985). Trampling can affect aspen plant communities even when over-browsing does not occur, especially on moist sites with friable soils (DeByle and Winokur 1985). Trampling crushes vegetation and soil surface litter and compacts mineral soil. These effects contribute to soil erosion and overland runoff of water, yielding further site deterioration. Soil compaction from trampling reduces the ability of air and water to move through the soil profile, which, in turn, affects plant root development (K. Gallogly pers. comm.).

It is not known how many acres of aspen occur on the Forest. The current Forest vegetation database was based on 1991 through 1995 Landsat TM satellite imagery data. This database is unable to represent the actual amount of aspen; due to forest succession, most aspen clones are too small or too hidden beneath the conifer canopy to be detected by satellite imagery or even by aerial photography.

Although the current amount of aspen is uncertain, aspen once occupied a sizeable acreage across the Forest. During a 1999 review of aspen communities on the Forest, the USFS Region 4 Aspen Ecologist found much more aspen than is estimated from aerial photo interpretation or satellite imagery. He stated that the amount of residual aspen across the Forest indicates that there was considerably more aspen prior to European settlement than there is today (D. Bartos, pers. comm.).

A fixed-wing flight to detect aspen in the project area was flown in October 2002 to help delineate proposed aspen treatment units for this project. Fixed-wing flights cannot determine acreage and the cost of helicopter flights to calculate acres is prohibitive.

However, based on ground reconnaissance, the total amount of quaking aspen within the project area probably exceeds 1,000 acres.

All aspen clones in the project area are at risk and in need of regeneration treatments and restoration (Salmon-Cobalt Ranger District 2003 aspen evaluations). Most aspen clones in the project area have been moderately to severely impacted by cattle. Trampling, detrimental soil impacts, loss of field capacity, and changes in the hydrologic regime and plant community occur in all stands heavily used by cattle. Due to forest succession resulting from more than fifty years of successful fire suppression, conifers have established in most clones, overtopping and shading out the aspen trees. Successful aspen regeneration is currently negligible to non-existent.

Aspen clones in the project area tend to be in either the stem exclusion or the old single stratum structural stage. At higher elevations and often in the lodgepole pine cover type, a stem exclusion structural stage occurs. The occurrence of new trees in this stage is limited due to the closed mingled canopy of aspen and conifers resulting from conifer ingrowth. "Park-like" understory conditions characterize the old single stratum structural stage. This stage is common at mid to lower elevations near meadows and riparian areas due to overuse by cattle and the resulting lack of regeneration. Healthy aspen clones are usually not "transparent" (i.e. one can see through the clone from one side to the other), but instead typically have a fringe of aspen sprouts along the outside margins or in patches inside the clones where existing overstory trees have died or fallen.

Direct and Indirect Effects

The area of analysis for aspen is confined to the project area. Effects to aspen stands would be limited to the stands proposed for treatment and would not extend beyond the project area.

Alternative 1 - No Action

Under Alternative 1 there would be no efforts to regenerate aspen in the project area. Aspen clones in the project area would continue to decline without some event to set back forest succession and stimulate sprouting. The acreage occupied by aspen would decrease further as clones eventually die.

Alternative 1 would not implement any fuels reduction treatments; therefore, there would be no change in the risk of wildfires. Aspen is a highly shade intolerant species that historically relied on wildfire for regeneration (DeByle and Winokur 1985). The root system of aspen clones would not likely experience adverse effects from wildfire unless profound physical and chemical changes occurred to the soil profile. Lethal wildfire in aspen clones where lodgepole pine or subalpine fir has established would be beneficial. While the existing aspen stems would be killed by the fire, the root system would react to the hormonal shift caused by the death of the stems with a strong sprouting response. (DeByle and Winokur 1985) The increased soil exposure and soil temperature, the flush of nutrients from the fire and decreased competition from other tree species would favor the emerging aspen regeneration (Hungerford 1988).

Alternative 2

This alternative proposes to regenerate aspen on 569 acres in 14 units over a five-year period by commercially harvesting encroaching conifers that are merchantable and

removing non-merchantable conifers through non-commercial treatment activities. Mature aspen within existing clones could also be treated.

Two of the proposed aspen treatment units, 53-M and 61-S, are located in the lodgepole pine cover type. Unit 53-M (41 acres) is located in the Dump Creek drainage within the Moose Creek sub-watershed. Unit 61-S, containing six acres, is located in the Salmon-Fenster sub-watershed. The following impacts would occur within aspen treatment units with a lodgepole pine cover type. Selectively reducing aspen square feet of basal area per acre by 20 to 40 percent (using felling, girdling or inoculation) would stimulate aspen sprouting while still meeting the current needs of wildlife species that use aspen habitat. Within existing clones, harvesting merchantable lodgepole pine, thinning non-merchantable lodgepole pine, and selectively thinning Douglas-fir and Engelmann spruce trees would promote an open conifer overstory favoring large trees. Thinning lodgepole pine adjacent to the clones would encourage expansion of regenerating aspen clones.

The other 12 proposed aspen treatment units occur in the Douglas-fir cover type. These units are all located in the Salmon-Fenster and Salmon-Wallace sub-watersheds.

The following effects would occur within aspen units with a Douglas-fir cover type. Reducing aspen basal area within clones would help stimulate sprouting and create a healthy stand with multiple age classes, while maintaining aspen habitat and some large snags for wildlife use. Thinning conifers within aspen clones, while retaining larger Douglas-fir, ponderosa pine, and Engelmann spruce, would reduce conifer competition with aspen for sunlight, water, and nutrients. The proposed conifer thinning adjacent to existing clones would promote expansion of regenerating aspen clones while providing sufficient early to advanced Douglas-fir and ponderosa pine regeneration to maintain an open, large diameter overstory over the long term.

Several design elements would reduce adverse effects in aspen units in both conifer cover types. Harvest and stand improvement activities would be permitted only after July 31 annually to protect nesting birds with eggs or dependent young. This mitigation would also meet the forest plan standard requiring protection against disturbance or destruction of active raptor nests. All live ponderosa pine would be retained regardless of size. There are few ponderosa pines in the project area and ponderosa pine seldom encroaches on aspen clones on the forest. Proposed harvest specifications (e.g., dry/frozen conditions) would protect soil, vegetation, and wetland resources in the aspen units. Snag retention specifications would maintain standing and down dead wood habitat for associated wildlife and nutrient recycling. Several proposed livestock management measures, such as monitoring livestock use in aspen clones, should help minimize livestock damage to aspen sprouts as would treating only small amounts of aspen at any one time so riders can more easily keep cattle away from treated areas until the clones have successfully regenerated.

Logging slash exceeding 4-15 tons per acre would be hand piled and burned in all proposed aspen units after harvest operations were complete. Piles would be burned to reduce slash concentrations to 4 to 15 tons per acre. Two piles per acre would be retained, providing habitat for small mammals and a source of prey for raptors. Slash piles would be burned in the late fall, winter or spring and aspen could sprout profusely

on the burned sites by the following year, due to increased soil temperatures on the burned areas (Hungerford 1988).

The proposed aspen treatments would promote aspen sprouting by eliminating competition from conifers, reducing overstory shading, exposing the ground to sunlight, and shifting the hormonal balance of the clone (Peterson and Peterson 1993). Treated aspen clones would probably show a strong positive response to these measures. This assumption is based on studies documenting that aspen responds positively to various regeneration treatments ranging from mild, such as conifer removal or partial thinning, to drastic measures that remove all existing aspen trees (Peral 1991; Bartos 1998).

Sprouting success in treated clones can be influenced by ungulate use until the sprouts have grown beyond the reach of browsing or trampling. This conclusion is well supported by literature addressing grazing impacts to aspen clones (Tirmenstein 1988; Rumble et al. 1996; Bartos and Campbell 1998). If treated aspen clones are not protected from browsing and trampling damage, the suckers cannot grow into trees. The root system will continue sprouting attempts as long as sufficient resources are available to do so. If overstory trees remain in place, fewer sprouts might be produced, but the overstory continues to provide resources to the root system. However, without overstory trees to nourish the root system, root reserves are eventually exhausted and the clone dies (Campbell and Bartos 2000). Hence, there is a need to better manage cattle use in and around the treated clones. Several monitoring and protection measures are included in the project design features to help ensure proposed aspen treatments are effective and will provide for better management of livestock around treated clones. Without these measures, aspen regeneration treatments could fail (Ferguson 2004).

Alternative 3

The effects of proposed vegetation treatments on aspen communities would be the same as Alternative 2, except fewer acres would be treated. Riparian aspen communities are the most productive aspen sites and due to the linked root system of an aspen clone, riparian aspen supports nearby upland aspen by transfer of water to the stems on the drier upland sites. Therefore, the aspen clones along and east of the unnamed tributary to Wallace Creek in Unit 53-S and in Unit 53-M in the Dump Creek drainage would not receive regeneration treatments. Aspen in these clones would continue to decline and these clones will eventually die unless a natural disturbance, such as wildfire, occurs to regenerate them. If adjacent upland aspen is dependent on these riparian aspen for water, the upland aspen will also die. The loss of aspen clones yields a corresponding decrease in habitat diversity and habitat capability since aspen is one of the most valuable habitats for many species of wildlife, particularly for primary and secondary cavity nesters.

Alternative 4

The effects of Alternative 4 to aspen communities would differ from Alternatives 2 and 3 in that fewer acres yet would be treated for regeneration (32 fewer acres than Alternative 3 and 60 fewer acres than Alternative 2). The effects of not implementing regeneration treatments to these aspen clones would be the same as those described for Alternative 3.

Cumulative Effects

Activities that cumulatively affect aspen in the project area include past timber harvest and associated road construction, insect and disease outbreaks, livestock grazing, mining, wildfires, firewood cutting, and the Dump Creek historical mining district and restoration projects. The primary impediments to maintaining vigorous, reproducing aspen clones are forest succession patterns that result from wildfire exclusion and livestock impacts (e.g. browsing and trampling).

Several timber harvests dating from the 1960s and 1970s in the Douglas-fir cover type in the Salmon-Fenster and Salmon-Wallace sub-watersheds benefited aspen, although these sales were not designed to do so. Conifers were removed from a number of clones and cattle were excluded from the harvest units to protect conifer regeneration. Although no measures were taken to specifically regenerate clones in the harvest units, aspen nonetheless responded vigorously (D. Basford pers. comm.). The aspen response to these timber sales suggests that conifer removal can successfully regenerate uneven-aged aspen clones, provided domestic livestock are excluded from the clones until full regeneration has occurred. Recent research is consistent with this conclusion (A. Winward pers. comm.).

Conversely, road construction for timber harvest has impacted aspen clones in the project area by bisecting clones, draining wetlands, and promoting motor vehicle use in aspen clones (B. Rieffenberger pers. comm.). Road construction through or near aspen clones also increases the risk of introducing noxious weeds (e.g. leafy spurge, Canada thistle, yellow toadflax, or non-native hawkweeds) into the aspen clones.

Insect and disease outbreaks in conifer species growing in or near aspen clones benefit aspen by reducing conifer competition for nutrients, sunlight, and water. Reducing or eliminating conifer competition is often enough to stimulate aspen sprouting (Patton and Jones 1977).

Livestock grazing has contributed to the general decline of aspen in several ways. Cattle drift and concentration in preferred areas has reduced or eliminated aspen regeneration and impacted soil, water, and vegetation resources in most aspen clones in the project area. An overall improvement in cattle management would initiate recovery of soil, vegetation and water resources in aspen clones within the project area. However, the proposed treatments would be successful only if cattle could be effectively excluded from the treated clones until new sprouts reach a minimum of six feet in height. Additional fencing or constant herding would be required to have any chance of success, as unregulated drift and overuse of preferred areas are chronic problems with cattle on this allotment. A strong commitment to effectively manage livestock is necessary.

The progression of non-forested plant communities to conifer forest has resulted from a lack of wildfire. The 2000 Fenster Fire burned more than 1,000 acres in the project area,

primarily in sagebrush/grassland plant communities. This included several aspen clones, but too few were burned to contribute to any substantive recovery of the aspen cover type in the project area. In addition, photo-point monitoring indicates that while the burned aspen clones responded to the fire with vigorous sprouting, cattle use has damaged or killed many of the new aspen stems (S-CRD data 2001-2003).

Mining activity in the Dump Creek Subwatershed resulted in a loss of aspen clones, wet meadows, and wetlands at the head of Dump Creek. This habitat can never be fully recovered since the Dump Creek drainage now exists as a deep and unstable chasm. Current and future restoration projects to stabilize vegetation and watershed resources would benefit aspen.

Two emerging threats to aspen stands are weed invasion and use of meadows containing aspen by off-road vehicles. To date, there have been no noxious weed treatments in aspen stands or meadows containing aspen. There have been no cumulative effects to aspen resulting from noxious weed control. However, several weed species thrive in meadows and forested environments, including Canada thistle, leafy spurge and yellow toadflax. Small infestations of each of these species occur in or near the project area. The hawkweeds, a group of highly invasive weed species that also thrive in meadows and conifer forests, now occur in adjacent counties in Idaho. The risk of introducing invasive hawkweed species, whether by timber harvest equipment or other means, is a potential future threat to aspen.

The degree of risk would depend on the district's ability to rapidly detect and eradicate new infestations resulting from implementation. In turn, this ability would depend on the success of prevention measures, such as equipment washing, and weed control actions. Prevention measures to reduce the potential for introducing and spreading noxious weeds are design features of all action alternatives. These include mandatory harvest equipment washing and inspection and minimizing the amount of soil disturbance when re-opening or maintaining roads to be used during timber harvest. While these measures reduce the risk of transmitting noxious weeds, they cannot eliminate it.

The proliferation of recreational off-road vehicle use has resulted in overland vehicle travel. Off-road vehicle use results in rutting, compaction, loss of vegetation, spread of noxious weeds, and additional disturbance to wildlife using the area.

The proposed aspen regeneration treatments have the potential to partially offset the cumulative effects of factors contributing to the decline of aspen in the project area. While only a portion of the aspen cover type in the project area would be targeted, a continuum of aspen habitat would be provided. These treatments could also set the stage for continued active management of aspen in the future. Selection of Alternative 2 aspen treatments would be most beneficial to this highly productive wildlife habitat while selection of Alternative 4 would be the least beneficial.

Old Growth

Existing Condition

Old growth habitat provides for wildlife and plant species that require the specific structural attributes offered by mature to old stands of trees. Old age alone does not ensure that these "old growth" conditions are present, but mature stands are most likely to contain "old growth" attributes. Therefore, the age of a stand is used as an indicator that the appropriate conditions may be offered. Key attributes of old growth typically include large diameter live trees with substantial crowns, large diameter snags, and large dead wood on the forest floor (USDA Forest Service 1991). Douglas-fir, ponderosa pine, and mixed conifer stands provide the greatest benefits to the most species. Mature and old stands of cottonwood and aspen also form very high quality old growth habitat where found in conjunction with conifer forest.

Old growth retention stands for the Salmon National Forest were delineated and approved for the Forest Plan in 1988. The old growth analysis for the Salmon/Moose project is based on the April 2006 Forest GIS coverage.

There are almost 72,000 acres of mapped Forest Plan designated old growth on the Salmon portion of the Forest. Each major commercial conifer cover type is represented, including Douglas-fir, spruce-fir, mixed conifer, ponderosa pine, and lodgepole pine. Aspen, cottonwood, and whitebark pine were not represented in the original delineation of old growth stands since these are not commercial species. Almost 40,000 acres of these 72,000 acres are located within the boundaries of the Salmon-Cobalt Ranger District.

Currently, there are about 5,731 acres of designated old growth in the analysis area, distributed in 49 stands. This means that almost eight percent of the forested area within the old growth analysis area is managed for old growth values.

In 2003 and 2004, twelve old growth retention stands within the project area covering almost 2,000 acres (35 percent of the designated old growth in the analysis area) were examined to assess current stand conditions. The stand examinations collected information on overstory and understory stand components including tree species, age, height, diameter, basal area, canopy closure, snags, and large downed logs.

These stand exams indicate that conditions in many of the old growth retention stands are not adequate for the needs of old growth dependent species (S-CRD 2003/2004 stand examination data). Exam results show that too few large live trees are present in many stands. The density of large snags is deficient in every stand examined. Likewise, the size and density of downed logs are inadequate in the old growth retention stands examined. Conversely, far too many small trees per acre are present and too much of the stand basal area is represented by the smaller size classes.

Aerial photograph interpretation and walk-through evaluations were also conducted on 36 old growth retention stands in 2003. The evaluation was intended to determine the current condition of each stand, presence of old growth features, suitability as old growth, juxtaposition to other cover types, and recommended management to maintain or enhance old growth character.

The stand examinations, aerial photograph interpretation and walk-through evaluations indicate that many of the designated old growth retention stands are changing with time. These changes result both from natural processes and from past and present land use practices, including fire suppression, forest succession, grazing, firewood cutting and road construction. These changes include shifts in species composition, increased density of small diameter understory trees, shifts from single-storied stands to multi-storied stands, degradation of understory vegetation, inadequate snag and down log densities and sizes along open roads, an interruption of the wood decay process essential to the foraging and reproductive strategies of many wildlife species and habitat fragmentation.

Due to planned timber harvest constraints at the time old growth was delineated for the Forest, some stands of immature conifers or harvested areas were designated as old growth retention stands. While these stands did not constitute old growth when they were designated, it was hoped that they would develop old growth features as they matured. Evaluation of old growth retention stands in the analysis area found that all or portions of 24 stands (approximately 1,072 acres) have very little or no potential of ever maturing into old growth. Some of these stands occur on harsh sites with very low productivity. Other stands are so densely stocked or diseased that even with treatment, the residual stand could not recover and begin to develop old growth features.

Two old growth retention stands (1227 and 1228) totaling 76 acres burned in the 2000 Fenster Fire. The fire severity was high in the area where these stands of mature Douglas-fir were located. They no longer provide for wildlife species that require old growth habitat conditions and will not do so again for at least another 100 years.

The evaluations found that many designated old growth retention stands containing Douglas-fir are immature, overstocked with dense ladder fuels or consist mostly of lodgepole pine with only scattered Douglas-fir relicts. These evaluations concluded that active management was required to achieve and maintain the desired condition of the old growth retention stands. The desired condition is a mix of stands in the mature successional stage and the two phases of the old growth successional stage: early phase old growth and late phase old growth.

The desired condition is a mix of stands in the mature successional stage and the two phases of the old growth successional stage: early phase old growth and late phase old growth. The mature stage is typified by stands in which the seral species trees are full-grown with crowns that are beginning to widen, but in which climax (shade tolerant) species are just beginning to make an appearance and large snags and large down, woody material are still uncommon. Early phase old growth is characterized by seral species as the usual dominant overstory component, development of large snags and large down, woody material, development of the climax species in the understory, and the presence of occasional small openings. Late phase old growth is represented by further development of climax species, greater amounts of large snags and large down, woody material in varying stages of decay, and a patchy appearance due to the presence of numerous small openings in the canopy.

Direct and Indirect Effects

The area of analysis for old growth is larger than the project area, consisting of approximately 74,000 acres. It is comprised of those 6th-field watersheds in which the project area is located. This analysis area was selected because the project area boundary bisects a number old growth retention stands. A larger analysis area is necessary to display effects to entire old growth retention stands instead of only those portions of the stands located within the project area. Effects analysis of proposed project implementation (vegetation and roads treatments) to designated old growth retention stands is confined to this analysis area.

Alternative 1 - No Action

Alternative 1 would not implement any fuels reduction treatments; therefore, there would be no change in the risk of wildfires. Most old growth retention stands in the analysis area do not meet the desired condition for old growth character. Much of this is the result of many decades of fire suppression and the resulting changes in forest succession. Due to these changes, which include increased basal area, accumulation of ladder fuels and the presence of three or more canopy layers, old growth retention stands in the analysis area are at high risk of lethal surface fires or lethal crown fires. In the event of a wildfire, most old growth retention stands in the analysis area would not survive. It would take well over a century to regain the habitat values presently available in these stands, which is why they were selected as old growth retention stands almost 25 years ago. This assessment is based on fire severity in old growth retention stands within the 2000 Clear Creek Fire area boundary (Salmon-Cobalt Ranger District, 04/2006, unpublished data). The fire severity analysis shows that 66 percent of the old growth retention stands within the fire area boundary experienced mixed severity to lethal severity fire in 2000. Of this percentage, 52 percent of the old growth retention stands were subjected to lethal fire. More than 50 percent of all Douglas-fir and lodgepole pine old growth retention stands and almost 50 percent of subalpine fir/Engelmann spruce old growth retention stands experienced lethal fire. These stands will not provide old growth habitat again for at least one hundred years.

In 2000, aspen clones in the Clear Creek Fire area that burned experienced 100 percent mortality (Salmon-Cobalt Ranger District, 04/2006, unpublished data). Similar mortality would be expected in the event of wildfire in the analysis area. Even though aspen is easily killed by fire, wildfire in and around aspen clones that was lethal to conifers would be beneficial because aspen regeneration would be favored over the slower growing conifer regeneration, particularly the shade tolerant species.

Under Alternative 1, no treatment to improve old growth characteristics would be implemented. Without fire or widespread insect or disease outbreaks, lodgepole pine would continue to encroach into aspen and Douglas-fir stands. Aspen clones currently proposed for treatment would continue to decline and would eventually die.

Reducing basal area and thinning from below in Douglas-fir stands is crucial to preventing further mortality of old Douglas-fir forests (Gibson, 2003). Under Alternative 1, there would be no treatment to reduce stem density and basal area in old growth Douglas-fir, increasing the mortality of large trees by Douglas-fir bark beetles.

Neither would there be benefits accrued from improving travel management and reducing road densities in the project area. The high density of year-round open roads would continue to contribute to attrition of large snags and logs (as a result of firewood gathering) and an interruption of the wood decay process essential to the foraging and reproductive strategies of many wildlife species.

Alternative 2

Most of the old growth retention stands in the analysis area possess the attributes that characterize desirable old growth habitat (Hamilton 1993). These include an abundance of large trees, large snags, and large dead wood on the forest floor. The overstory of these stands consists of trees larger than 15 inches dbh with good representation (up to ten percent of the overstory) of trees equal to or greater than 20 inches in diameter. Large (15 inches dbh and greater) snags are well represented (at least four per acre) and well distributed throughout the stands. Damaged trees (e.g. broken tops, dead tops, lightening scars, and leaning trees) are present to provide vertical diversity. Large dead wood is abundant on the forest floor, and insects and pathogens that induce wood rot and run the process of decay are present. The understory of these stands is productive with a variety of shrubs, forbs, and grasses.

Impacts of Proposed Vegetation Treatments: Proposed vegetation treatment within Units 30-S, 52-M, 23-S, 54-S, and 60-S would improve a total of 30 acres of designated old growth to improve old growth characteristics.

About 8 acres of post and pole-sized lodgepole pine would be harvested from patches of mature Douglas-fir (old growth retention stands 1214 and 1546) in proposed units 23-S and 30-S. All Douglas-fir and ponderosa pine trees would be retained regardless of size. This action would reduce competition from lodgepole pine to Douglas-fir and ponderosa pine: two of the most desirable conifer trees species for primary and secondary cavity nesters (Ritter 1997). The older, larger trees would remain vigorous longer, while young Douglas-fir and ponderosa pine trees would respond with an increased growth rate. Removal of encroaching lodgepole pine would also open up the understory and promote increased vegetative diversity (Covington and Moore 1992), another benefit to old growth dependent species.

Approximately 38 acres of lodgepole pine would be removed from aspen clones located in old growth retention stands (stands 1191, 1214, 1235 and 1574) in proposed units 52-M, 54-S and 60-S. The proposed treatment would reduce conifer competition in aspen clones and encourage aspen regeneration. It would also reduce competition from lodgepole pine to young Douglas-fir and Engelmann spruce trees, promoting rapid growth. Decreasing overstory tree density would also increase vegetative diversity in the understory.

Part of proposed unit 52-M is located within old growth stand 1191. The stand is located in a drainage bottom containing aspen, Engelmann spruce, Douglas-fir, and riparian shrub species. The harvest prescription for this unit would enhance and maintain the old growth character. Removing lodgepole pine and subalpine fir would favor the seral species (Douglas-fir and aspen). Thinning patches of densely grown Douglas-fir would promote rapid growth of retained trees for future old growth, and retain a large diameter tree component (all Englemann spruce and Douglas-fir greater than 12 inches dbh).

Unit 54-S is partially located in two old growth stands (1214 and 1574). This unit is situated on gentle terrain with a northerly aspect. The site is very moist and contains a number of spruce bogs with large Engelmann spruce trees, numerous aspen clones, and scattered large relict Douglas-fir. The prescription in this unit would maintain and enhance old growth character by favoring the seral tree species (Douglas-fir and aspen).

Approximately one acre on the east side of unit 60-S is located within old growth stand 1235. Vegetation treatment of this one acre is designed to enhance old growth characteristics.

Impacts of Proposed Roads Management: Proposed road closures and decommissioning (a net increase of almost 30 miles compared to present travel management) would benefit old growth through resumption of the dead wood decay cycle wherever those road closures or decommissioning actions pass through or adjacent to old growth stands. Closed and decommissioned roads would not be available for firewood gathering, which would yield increased retention of large snags and ongoing recruitment of large, down logs along those routes. Habitat capability and security would increase in old growth stands where road closures or decommissioning occur.

Alternatives 3 and 4

Impacts of Proposed Old Growth Management: Effects of proposed old growth management would be the same as Alternative 2.

Impacts of Proposed Vegetation Treatments: Effects of proposed vegetation treatments would be the same as Alternative 2.

Impacts of Proposed Roads Management: Proposed road closures and decommissioning (a net increase of almost14 miles compared to present travel management, but more than 17 miles less than Alternative 2) would benefit old growth through resumption of the dead wood decay cycle wherever those road closures or decommissioning actions pass through or adjacent to old growth stands. Closed and decommissioned roads would not be available for firewood gathering, which would yield increased retention of large snags and ongoing recruitment of large, down logs along those routes. Habitat capability and security would increase in old growth stands where road closures or decommissioning occur.

Cumulative Effects

Activities that cumulatively affect the old growth resource in the analysis area include past timber harvest and associated road construction, insect and disease outbreaks, livestock grazing, wildfires, firewood cutting, and the Dump Creek historical mining district.

Approximately 4,500 acres of mature Douglas-fir and/or ponderosa pine stands have been harvested in the analysis area to date, based on the Forest timber harvest history. This amounts to approximately 40 percent of mature Douglas-fir and/or ponderosa pine in the analysis area. The most recent Douglas-fir harvest occurred between 1989 and 1993 as three small sales totaling about 365 acres located in the northern portion of the analysis area. There has been no additional harvest of Douglas-fir or ponderosa pine since.

About 7,000 acres classified as mature single stratum or multi-strata stands by the forest vegetation database remain unharvested. Much of this is located at the bottom edge of the conifer distribution in timbered islands and stringers. These islands and stringers are typically narrow and isolated and provide only marginal old growth habitat conditions.

The miles of roads constructed for timber harvest combined with poor travel management have made most of the analysis area easily accessible by motorized vehicles. Because the analysis area has been harvested extensively, is so close to town, and has such high road densities, the dead wood decay cycle has largely been interrupted. Snags and down logs are necessary and vital components of old growth habitats. These components are under-represented, both in amount and in size, in many of the old growth stands in the analysis area that were examined (S-CRD 2003/2004 stand examination data).

The current insect and disease outbreak is balancing that loss, but firewood cutting will probably intensify in the project area due to the increase in dead trees. Many new snags within 300 feet of open roads will be removed for firewood. Within the Salmon-Moose project area, more than 11,000 acres of dead wood habitat within conifer cover types lie adjacent to roads and could potentially be affected by firewood gathering. Implementation of the action alternatives would reduce open road densities slightly, and therefore correspondingly reduce impacts to dead wood resources in areas where roads are closed or decommissioned although Alternative 2 would provide the greatest benefits. Habitat capability for old growth dependent wildlife species within the analysis area would eventually improve in those areas where road densities are reduced.

Insect and disease outbreaks affect old growth variably. Minor outbreaks create additional snags and downed logs in a stand, increasing a stand's value to primary cavity excavators and secondary cavity nesters. Minor outbreaks can also open up the forest canopy, releasing understory trees and contributing to multi-storied stand character. Conversely, under the right climatic conditions, even minor outbreaks can result in the mortality of entire stands. This can be beneficial to certain species, such as some woodpeckers, but detrimental to other species that require living trees, such as flammulated owls. Tree mortality due to the recent insect outbreak in the project area has been severe in a number of mature Douglas-fir stands; some stands have experienced overstory mortality of 50 percent of more. The majority of trees in these stands may eventually die. Sustained high mortality of mature trees will reduce old growth habitat values drastically.

Wildfire also affects old growth habitat variably. Low intensity understory fires can improve old growth values by thinning dense thickets of suppressed conifer regeneration, opening up small patches to create multi-storied stands and increasing snag numbers. A majority of old growth retention stands in the analysis area are at high risk of stand-replacing wildfire. High severity, stand-replacing fires result in the loss of old growth habitat for a century or more. For example, two old growth retention stands were eliminated by high severity wildfire in the 2000 Fenster Fire. These two stands have been replaced with a newly designated old growth retention stand north of the fire area. However, as has been demonstrated by the 2000 Clear Creek Fire, a large lethal wildfire can kill all or most old forest stands within the fire perimeter, leaving few stands left alive that can be used to replace the burned old growth. Livestock use in riparian areas and mesic upland sites has impacted old growth habitat in the Diamond and Wallace 7th

field HUC subwatersheds. Concentrated use has resulted in degradation of soil, vegetation, and water resources, and reduced the capability of the habitat to support various wildlife species.

Implementation of one of the action alternatives would be beneficial by demonstrating how mechanical treatments can re-establish the desired condition of old growth retention stands.

Old Growth Retention Stand Identification and Mapping
in Support of the
1988 Salmon National Forest Land and Resource Management Plan

During the forest planning process undertaken in the early 1980's for the Salmon National Forest, direction was provided from the WO with regard to identifying and mapping old growth in each planning unit. To comply with that direction, the Salmon National Forest supervisor assigned a team to develop a strategy for defining, identifying, mapping and tracking old growth as part of the land and resource management plan development.

This effort was completed relatively early in the forest planning effort and was ratified by the forest supervisor approximately five years prior to the completion of the forest plan in 1988.

The mapping and ratification process is described below based on various sources dating from the time the forest plan was under development.

A. Old Growth Retention Stand Mapping Process

Pat Hurt, Cobalt Ranger District Wildlife Biologist, was assigned to research definitions of old growth, the habitat needs of wildlife species associated with old growth and to develop mapping criteria (Source – Hurt, 1993). Pat did so by conducting as extensive literature review of contemporary old growth research and by interviewing wildlife biologists from other forests and regions that had already completed the old growth mapping process.

Based on this literature review and interview process, Pat developed a draft strategy and criteria for mapping old growth retention stands. Five other Salmon National Forest wildlife biologists (Jim Guest, Dick Wenger, Hadley Roberts, Craig Grother, and Karen Harvey; the first three with advanced degrees) reviewed and commented on the draft. The final mapping strategy and criteria were then approved by the Salmon National Forest Supervisor (Richard Hauff), the District Rangers, and the Forest Planning Team assigned to develop the forest plan (Source – Hurt, 1993).

The approved strategy required that ten percent of suitable timber acres (i.e. suitable for timber harvest) be mapped by timber class (including tree species and size category). To ensure an even distribution across the forest and within each timber class, old growth retention stands were mapped by Geographic Area (land unit delineations used during the planning process). Ten percent of each Geographic Area was delineated into designated old growth retention stands. Number, size and location of designated old growth retention stands within each Geographic Area varied depending on character of the Geographic Area, such as the timber classes present, previous timber harvest, etc.. Old growth retention stands were mapped using 1:24,000 scale orthophoto quadrangles, with stands delineated on Mylar overlays. Stand and compartment maps developed from the

1973 timber inventory (Source – Hurt and Jensen, 1 March 2005) were used to locate old growth stands for retention.

Mature and old forest stands were designated as old growth retention stands wherever possible. Younger stands were included when necessary to meet the requirements for species composition and spacing and minimum unit size of 80 acres (Source – Old Growth Retention Stand Mapping Criteria, 1983).

Doug Basford and forestry technician (with a degree in wildlife biology) Craig Grother mapped the initial old growth retention stands for the Salmon and Leadore Ranger Districts. Pat Hurt mapped the initial old growth retention stands for the Cobalt and North Fork Ranger Districts. Initial old growth retention stand mapping was completed 24 June 1983 (Source – Guest, 1983).

Once the initial mapping was completed in June 1983, line officers and members of the S.O. and District timber and transportation planning staffs reviewed the initial mapped old growth retention stands. Modifications were made to accommodate timber management and transportation plans where possible without compromising the objectives of the mapping strategy (Source – Hurt, 1993). Mapping revisions were finalized on 11 August 1983 (Source – Guest, 1983). A total of 71,879 acres were delineated based on calculations derived from dot-gridding and planimetric digitizing.

In 1984, a process was approved to further review old growth retention stands during the NEPA analysis for site-specific timber sale projects where designated old growth retention stand locations conflicted with proposed timber harvest units (Source – Hurt, 1993 and Hauff, 4/12/1984). Designated old growth retention stands could be compared to what was available in the general vicinity of the proposed project and associated geographic area(s). Adjustments to unit size and/or location could be made if doing so were to enhance old growth objectives or benefit other resource objectives without compromising old growth attributes. The forest supervisor stipulated that these adjustments for harvest unit layout or road location were to be minor and documented on the old growth retention stand map overlays. Changes were to be initiated only on interdisciplinary team recommendation and were to be identified and analyzed in the project NEPA document.

The completed FLRMP later amended this process by stipulating that stands that more effectively meet the needs of old growth dependent species could be substituted for stands currently identified as old growth retention stands upon examination by a certified silviculturist and a wildlife biologist. An approved silvicultural prescription, clearly stating the criteria for reclassification, must be prepared and be reviewed by the District Ranger. The Forest Supervisor is to be informed of the change. The stands are then reclassified as unsuitable, must be mapped and stand spatial and attribute information included in the Forest stand database (FLRMP IV- 39 and 40).

B. Approved 1983 Old Growth Retention Stand Mapping Criteria

- Allocate old growth by geographic areas.
- Within a drainage, allocate old growth to sites that are protected from catastrophic occurrences, especially wildfires that may wipe out old growth stands. Such sites include riparian areas and sites bordered by ridgelines and have supported old growth historically.
- Retain 10 percent of each species as old growth.
- Retain old growth in stands of at least 80 acres, to achieve maximum bird species richness. This will also satisfy the old growth requirement of 50 to 100 acres for the pileated woodpecker.
- Some old growth should be in stands greater than 100 acres, to provide for those species that find optimal habitat in larger expanses of old growth.
- Old growth stands should be dispersed throughout the 5000-acre unit (Note: Pat Hurt believes the word "unit" refers to Geographic Areas) to distribute animal populations and protect against catastrophic events.
- Old growth stands should be at least 200 feet wide and preferably wider.
- Retain travel corridors of mature or old growth timber between old growth retention stands. Riparian zones provide good travel lanes. Do not isolate old growth retention stands with miles of intervening clear cuts or young growth.
- Where possible, retain old growth stands in unsuitable, uneconomical, inaccessible, unmanageable, riparian, visual retention and other areas where timber management is constrained in <u>all</u> alternatives.
- Where feasible, connect stands less than 50 acres in size from adjacent Geographic Areas to achieve stands of 80+ acres.
- Don't map (allocate) isolated stands less than 80 acres (i.e. stringers/islands on winter range).
- Where possible, avoid allocating old growth retention stands with existing or expected future open roads.
- Mature timber stands with less than 30% canopy cover (i.e. xeric south slopes) do not meet the criteria for old growth.
- Planned timber sales hard-wired through 1985 should not have allocated old growth.
- When surplus and deficits occur in different Geographic Areas, allow for scheduled harvesting in the surplus areas while reserving the necessary acres of the next younger age class in the deficit areas.

C. Old Growth Retention Stand Mapping Timeline

The timeline for old growth retention stand mapping occurred as follows (Source – Hurt Old Growth Mapping Timeline Summary and Guest, 1983):

- **12/1981 – 2/1982** = Pat conducted a literature review of old growth research and interviews with biologists from other national forests in Regions 1, 4, 5 and 6.

- **3/1982** = Pat wrote a white paper on old growth definitions, characteristics, wildlife values and management recommendations gleaned from research and guidelines established by other forests.
- **5/2/1983** = Using the approved mapping process and selection criteria, the team began mapping old growth retention stands for the forest plan.
- **6/24/1983** = Initial mapping of the old growth retention stands was completed.
- **7/7/1983** = The team began the review process of the initial mapping with the foresters and engineers.
- **8/11/1983** = The mapping review was complete and the old growth retention stand quad overlays were finalized.

D. FLRMP Old Growth Guidance and Direction

The Salmon FLRMP intended the mapped and designated old growth primarily to provide for the needs of "old growth dependent species", but also to promote vegetative diversity by maintaining a component of old forest in managed landscapes. The FLRMP provides guidance and direction for the management and maintenance of old growth in chapters two through five. Specifically, the plan states:

Chapter II, C – Management Situation Summary, Resource Elements

- II-19 – Habitat diversity is a critical element necessary for the maintenance of the wildlife and fish populations on the forest.
- II-20 – Mature and old growth Douglas-fir, ponderosa pine and subalpine fir habitats were selected as indicators of specific biotic communities on the Forest.
- II-26 – Population levels of species dependent on old growth are judged to be met by maintenance of minimum levels of old growth forest. "Minimum levels" are specified as ten percent of forested land base withdrawn from the capable tentatively suitable timber classification (see standards in Chapter IV below).

Chapter III – Planning Issues, Concerns and Opportunities

- III-1 (2) – Habitat for old growth-dependent species outside wilderness areas will not fall below that necessary to support minimum viable populations.

Chapter IV – Forest Management Direction

- IV-1 – Provide wildlife habitat of sufficient quantity and quality to maintain at least minimum viable populations of non-economically important (i.e. all species other than the four big game species) management indicator species.
- IV-17 – (Direction) Maintain adequate structural diversity of vegetation on forest lands to ensure habitat for minimum viable or target populations of all wildlife species. (Standards and Guidelines, a) In forested areas, ten percent or more should be in old growth.
- IV-18 – The following MIS are listed as old growth dependent species: pine marten, northern goshawk, great gray owl, pygmy nuthatch and brown creeper. (Note: The pileated woodpecker was accidentally left off this list on IV-18, but was specified

along with these other five species on page II-28 as dependent on mature and old growth forest.)

- IV-19 – Habitat for each vertebrate wildlife species on the forest will be managed to ensure viable populations.
- IV-19 – A minimum of ten percent of applicable forested ecosystems dispersed across the forest will be managed and maintained (by timber class) as old growth.
- IV-38 (b) – Lands determined to not be appropriate for timber production and therefore classed as unsuitable: (1) Critical Wildlife Habitat (Suitability Class 800-809): (a) Identified stands of timber retained to meet the needs of old growth dependent species.
- IV-39 (d, 2) – Lands classed as suitable that may be found to meet the criteria for unsuitable. (2) Stands that more effectively meet the needs of old growth dependent species may be substituted for stands currently identified as old growth retention stands upon examination by a certified silviculturist and a wildlife biologist and an approved silvicultural prescription.
- IV-40 (d, 3) – The prescriptions for stands reclassified as unsuitable must be reviewed by the District Ranger and the Forest Supervisor should be informed. The criteria for reclassification should be clearly stated. Stands must be mapped and information included in the Forest stand database.
- IV-80 and IV-81 – Maintain at least ten percent (71,879 acres) of the forested lands outside of wilderness as old growth for dependent species.
- IV-88 – Ten percent of the forested lands outside of designated wilderness areas will be maintained as old growth for species dependent on that habitat.
- IV-89 – Those acres not managed for timber production will not be logged unless the harvest would benefit the resource that area is managed for and the removal can be accomplished in a manner compatible with the management objectives of that area.
- IV-116 – No harvest in identified and mapped old growth stands.

Chapter V – Implementation, Monitoring and Evaluation

- V-5 – Monitor the status of old growth retention stands annually for population and/or habitat trends for MIS. (Note: To date, the forest has not met this requirement due to budgetary constraints and the MAR target emphasis on restoration or enhancement as opposed to inventory and monitoring.)

Chapter VI – Glossary

- VI-28 – Old Growth – A stand of trees that is past full maturity and showing decadence; the last stage in forest succession.
- VI-28 - Old Growth Habitat – Habitat for certain wildlife that is characterized by over mature coniferous forest stands with large snags and decaying logs.
- VI-45 – Timber Base – The lands within the Forest capable, available and suitable for timber production.
    - Capable Lands (VI-5) – forested areas with an inherent ability to support trees for timber harvest, producing wood fiber at a minimum of 20 feet^3/acre/year.
    - Available Forest Land (VI –3) - land that has not been legislatively or administratively withdrawn from timber production by the Secretary of Agriculture or the Forest Service Chief, respectively.

- Suitable Forest Land (VI- 46) – land that is managed for timber production on a regulated basis.

- VI-46 - Timber Classification – Classification of forested land as it relates to management of the timber resource.
  - Forest Land – Land at least 10% occupied by forest trees of any size or formerly having had such tree cover and not currently developed for nonforest use.
  - Unsuitable Forest Land – Forest land not managed for timber production for any of five reasons, including withdrawal, inadequate technology to protect soil and watershed resources or to reforest within five years of final harvest, lack of data regarding responses to timber production activities, or timber management is not cost-effective or is inconsistent with FLRMP management requirements or objectives.
  - Tentatively Suitable (Commercial Timber Land) – Forest land that is producing or is capable of producing commercial timber crops and that has (a) not been withdrawn and (b) for which suitable technology exists to protect soil and watershed resources and for adequate restocking within five years of final harvest.

Chapter VII – Appendices

- VII –A-1. Appendix A - Timber Resource Land Suitability.

FORESTED & NON FORESTED	**NOT SUITED**			**ACRES**
	Not Capable →			235,000
	Non-Forest →			423,000
	Irreversible Soil and Watershed Damage→			3,000
	No Assurance of Adequate Restocking→			47,700
	Withdrawn from Timber Production →			323,000
			Sub-Total	***1,032,000***
	TENTATIVELY SUITED LAND	SUITED	**Lands Cost-Efficient to Meet Objectives**	
			Suited Timber Lands	407,000
			Sub-Total	***407,000***
		NOT SUITED	**Lands Not Cost-Efficient to Meet Objectives**	
			Low value species/High cost Logging/Inaccessible Stands	60,000
			Other Lands	
			Multiple-Use Objectives Preclude Timber Production	278,000
			Other Uses (RNA's)	0 or Unknown
			Proposed Wilderness	0 or Unknown
			Sub-Total	***338,000***
			Total National Forest Lands	***1,777,000***

These figures do not correspond to other figures shown in the forest plan for the same resource. In fact, the only figure that seems not to change from chapter to chapter is the net acres for the forest, which is ~1,777,000 acres. Nonetheless, we used these figures since they yield an amount of designated old growth acreage approaching the forest plan's ten percent minimum. Calculations based on these figures for forest lands yields approximately 9.7% (if the figure of 71,879 acres stated in FLRMP IV-80/81 is correct) in designated old growth retention stands. That rounds up to ten percent – actually, a very accurate total for the acreage calculation tools used at the time the designated old growth retention stands were mapped (dot grids and planimeters). However, this total does not account for acres harvested within designated old growth retention stands or for designated old growth retention stands that have burned since 1988.

E. Conversion from Mylar Overlays to a GIS Coverage

The original (approved final designated old growth retention stands) penciled Mylar overlays specific to each district were kept at the respective ranger district offices for use in managing old growth and timber sale project planning. A complete inked set of all Mylars (more than 70 overlays), covering the entire forest, was copied for the forest planning team to work from during preparation of the forest plan (which was not signed until 1988, more than four years after the old growth retention stand designation and mapping was approved). Several other sets were also made for use by the SO timber and engineering staffs and the SO wildlife staff.

For twenty years (from 1983 until 2003), the designated old growth retention stand maps existed as sets of these more than 70 Mylar overlays for 7.5-minute orthophoto quads. In 2003, the Salmon-Cobalt District Ranger directed the district wildlife biologists, Pat Hurt and Diane Schuldt, to convert the district's designated old growth retention stand Mylar overlays into a GIS coverage for more efficient use in project planning. (Note: At this time, the District Ranger also directed the biologists to begin a baseline inventory of district designated old growth retention stands. Since budget and personnel constraints prevented a full inventory, the district began the inventory with a sample of designated old growth retention stands by timber class. The inventoried stands were located in proposed timber harvest or fuels reduction project areas to provide site-specific data during project planning. The inventories use NRIS FSVeg stand exam protocols and all have been entered in the FSVeg database.)

Pat Hurt and Diane Schuldt met with the Forest GIS coordinators, Kathy Seaberg and Henry Logsdon, for recommendations on how best to convert the Mylar overlays to a GIS coverage. The GIS shop was working at that time to complete coverages of all forest layers and decided it would be best to create the designated old growth retention stand coverage for the entire north zone of the forest (Salmon National Forest) at once. A team consisting of Pat Hurt, Diane Schuldt, Doug Basford, Mike Fischer and several seasonal employees was assigned to complete this effort. Kathy Seaberg and Henry Logsdon oversaw the process and provided technical expertise. Forest Wildlife Biologist, Dick Wenger, assisted and Forest Service retirees, Gene Jensen and Cliff Keene, were

consulted as necessary (to help identify which sets of Mylar overlays were used by whom, review the use of Geographic Areas, the 1973 timber inventory, etc.).

The GIS coverage of Salmon National Forest designated old growth retention stands was completed in November 2003. The coverage was created using a combination of the original Mylar overlays and copies of the originals. The original overlays could not be used exclusively because many had been modified and no longer reflected the original mapping. Changes had been made through the years to accommodate timber harvest and road construction needs. The inked set copied from the original Mylars for use by the forest planning team could not be used for this procedure because it was destroyed in the early 1990's. Comparison of the several sets of copies show disparities of number, size, location and boundaries of designated old growth retention stands. A copy that had been used by the SO timber staff was most heavily relied upon for creating the GIS coverage because, of all the overlays still in existence, it had been altered the least.

F. Validation of the Old Growth Retention Stand GIS Coverage

Add Jen's validation effort

G. Interior Columbia Basin Ecosystem Management Plan Guidance

How to apply ICBEMP science findings
direction on old forest as well

H. Salmon-Challis National Forest Land and Resource Plans MIS Amendment

new MIS amendment direction
former MIS species, which now have another designation

Do we need this?
Any additional direction on Sensitive terrestrial vertebrate species?

Designated Old Growth within Salmon-Moose Old Growth Analysis Area

Stand	Acres	Comments
1156	92	Pure Douglas-fir stand with pinegrass understory. Loss of at least 25% of the overstory to Douglas-fir bark beetle. Multi-structured stand with denser patches that need to be thinned from below. Reduce basal area to protect remaining overstory.
1157	88	Stringer stand with three lobes with open sage/grass between. Fairly rocky along the ridge. Pure Douglas-fir stand with pinegrass understory. Approx. 10-14% Douglas-fir bark beetle mortality in the overstory. Thin from below and reduce basal area to protect overstory.
1160	74	Along the Salmon River west of the mouth of Dump Creek. Douglas-fir/ponderosa pine stand (approx. 10-15 pine). Two-storied. Overstory well-spaced. Douglas-fir habitat type with a variable understory. Shrub component inc. snowberry and ninebark. Mix of graminoids.
1164	98	Douglas-fir stand with minor ponderosa pine component (<5%). Large, open-grown overstory. Overstory mortality up to 25% from Douglas-fir bark beetle. Mixed graminoid understory, elk sedge, pinegrass, fescue. Shrub component. Aspen clones in meadows and drainages. Also willow along the streams.
1165	91	Fairly closed two-storied Douglas-fir stand with numerous small openings. Minor Douglas-fir bark beetle mortality, which may increase. Intersected by two small intermittent drainages. Aspen component in lower story. Understory a mix of graminoids, forbs and shrubs.
1167	77	Mixed conifer, multi-storied stand containing mostly mature Douglas-fir and lodgepole pine on east side of Napoleon Ridge north of Napoleon Hill. Some subalpine fir, also Engelmann spruce in the drainage. Mostly closed canopy. Some shade-tolerant understory deciduous shrubs. Reduce lodgepole pine and thin immature Douglas-fir.
1173	63	Head of Fan Gulch. Primarily multi-strata mature to old Douglas-fir stand with pinegrass/elk sedge. Contains and adjacent to numerous aspen clones. Contains a number of small wetlands and meadows. Very little Douglas-fir bark beetle activity. Thin small conifers from aspen and thin patches of conifer regeneration
1175	87	Douglas-fir/aspen stand. Little Douglas-fir bark beetle activity, but heavy mortality downslope. Two-storied stand with denser overstory than surrounding stands. Mixed graminoid understory of pinegrass, elk sedge, fescue.
1180	135	Douglas-fir/pinegrass stand. Douglas-fir mistletoe in upper south/west portion. Fairly heavy Douglas-fir bark beetle mortality in northeast corner.
1185	75	Rocky stand with granite boulders. Primarily lodgeple pine with grouse huckleberry understory. Central section is mature Douglas-fir. Little down woody material on the ground. Snowberry in understory. Little Douglas-fir bark beetle activity.
1186	138	Mixed conifer stand of mature Douglas-fir and lodgepole pine on east side of Dump Creek chasm just below Dump Creek meadow. Contains some aspen. Western thumb unstable at edge of chasm. Moderate amount of overstory mortality due to Douglas-fir bark beetle (approx. 25%). Recommend removal of lodgepole from aspen and tight patches, reduce basal area to protect remaining Douglas-fir overstory.
1190	41	Mixed conifer stand of lodgepole pine, Douglas-fir, Engelmann spruce and subalpine fir (primarily as regeneration). ABLA/VASC habitat type. Scattered large Douglas-fir relicts on the drier sites. Thin to favor Douglas-fir.
1191	84	In unnamed tributary to Dump Creek between Diamond Gulch and Sawmill Gulch. Fairly open to open mature stand of dry Douglas-fir grading to a mix of Douglas-fir/lodgepole pine at upper end. Contains a fair amount of aspen. Would benefit from removal of encroaching lodgepole pine. Existing harvest to NE and SW.

Designated Old Growth within Salmon-Moose Old Growth Analysis Area

Stand	Acres	Comments
1196	25	Lodgepole pine stand (90%) in ABLA/VASC habitat type with incidental large Douglas-fir. Numerous small wetlands and wet meadows with clumps of mature Engelmann spruce.
1197	70	Mixed conifer stand with Douglas-fir/lodgepole pine/Engelmann spruce and incidental subalpine fir (primarily in frost pockets and around wetlands. Mixed understory of graminoids, forbs and shrubs (inc. elk sedge, beargrass and buffalo berry). Several small wetlands.
1199	73	Mixed stand containing primarily lodgepole pine with a Douglas-fir component (10-15%) and scattered aspen clones. Several wetlands and wet meadows (meadows have camas). Douglas-fir is medium-sized with good crowns, approx. 12-15 inches DBH. Thin lodgepole pine to favor Douglas-fir and aspen where it occurs.
1200	138	Lodgepole pine stand in ABLA/VASC habitat type. Incidental relict Douglas-fir. Also some Engelmann spruce and a few subalpine fir.
1203	118	Mixed stand of Douglas-fir/lodgepole pine with minor component of aspen and Engelmann spruce. Numerous wetlands with dry ridges above. These ridges are almost pure Douglas-fir. Little Douglas-fir bark beetle activity.
1208	106	East Fork of Daly Creek. Primarily lodgepole pine in understory reinitiation stage. Treatment recommended to reduce lodgepole pine density, promote mixed conifer cover type and shift toward more desired species, particularly Douglas-fir.
1210	112	Mixed conifer stand with lodgepole pine, subalpine fir and Engelmann spruce. Contains a number of wetlands. Small amount of aspen.
1211	77	Daly Creek drainage between the forks north of Racetrack Meadow at base of Jackass Ridge. Multi-strata, mature Douglas-fir. Selectively thin to enhance and maintain old growth characteristics.
1214	188	Diamond Creek drainage. Mixed conifer stand, mostly Douglas-fir and lodgepole pine. Site contains adequate large Douglas-fir, deciduous shrubs and small openings. Contains small decadent aspen in small scattered clones. Moderate to severe cattle overuse of aspen clones. Lodgepole pine is encroaching heavily in some areas, including some aspen clones. Recommend removal of lodgepole pine and better cattle management to enhance old growth character. Surrounded by extensive Douglas-fir and lodgepole pine harvest.
1215	82	Very wet mixed conifer stand consisting of Douglas-fir/lodgepole pine/Engelmann spruce/subalpine fir and aspen. Mortality due to disease in the mature lodgepole pine. Alders, willows and wetland species in the understory.
1216	40	Medium-textured lodgepolepine stand on a dry site with incidental Douglas-fir. ABLA/VASC habitat type at fairly high elevation.
1217	103	Mixed conifer stand in the ABLA series consisting of lodgepole pine, subalpine fir and Engelmann spruce. North-facing slope with stream forming northern boundary. Patch of old lodgepole pine mortality, possibly due to a microburst. Small to medium-sized wetlands along western edge.
1220	85	Riparian stringer stand, very wet, stream runs through middle of stand. Mixed conifer stand in the ABLA series consisting of lodgepole pine, Engelmann spruce and subalpine fir. Patch of blow down in the eastern section.
1223	138	Mature lodgepole pine and subalpine fir stand in the ABLA series. Quite moist with small wetlands. Stream course along the eastern edge. Beargrass, elk sedge, woodrush.
1230	81	Mixed conifer stand in the ABLA series consisting of mature subalpine fir, Engelmann spruce and lodgepole. Very wet with a stream running through the middle. Small wetlands. Shrubby understory.
1231	61	Upper Middle Fork of Wallace Creek. Dry, rocky site with mix of Douglas-fir and lodgepole pine. Looks good overall, but small and isolated. Existing harvest to southeast.
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Designated Old Growth within Salmon-Moose Old Growth Analysis Area

Stand	Acres	Comments
1235	117	Headwaters of Deriar Creek. Mixed conifer stand primarily of Douglas-fir and lodgepole pine. About three acres have been partially harvested. Some mistletoe in the Douglas-fir. Stand is in good condition overall, but Douglas-fir bark beetle mortality is becoming apparent. selectively thin.
1242	156	Mature lodgepole pine stand in the ABLA/VASC habitat type below UP Lake.
1243	53	Bob Moore Creek drainage. Predominately Douglas-fir stand. Essentially a timbered stringer partially surrounded by sage/grass. Good condition overall, but isolated at present. Some Douglas-fir bark beetle mortality.
1529	257	Mixed conifer stand consisting primarily of lodgepole pine with lesser component of Douglas-fir, subalpine fir and Engelmann spruce. Contains small wetlands and stream courses.
1531	228	Excellent Engelmann spruce/subalpine fir old growth along Coffee Gulch in the headwaters of Daly Creek. Numerous bogs, seeps and springs. Stringer stand separated by lodgepole pine
1532	89	Mixed conifer stand in Webfoot Creek. Consists of Douglas-fir, lodgepole pine, Engelmann spruce and subalpine fir. Overtopped aspen component. Numerous wetlands, bogs, seeps and meadows. Recommend opening up the aspen for regeneration.
1534	208	Wet mixed conifer stand in Moose Creek and Beartrack Creek. Consists of Douglas-fir, lodgepole pine, subalpine fir, Engelmann spruce and aspen. Numerous wetlands and meadows.
1539	257	Dry two-layered Douglas-fir stand along the Salmon River face. Rocky site. Medium-sized trees, many infested with mistletoe. Moderate amount of overstory mortality due to Douglas-fir bark beetle. May not expand in this stand since the large tree component is small.
1545	148	Mature Douglas-fir stand with heavy Douglas-fir bark beetle mortality. Up to 70% of the overstory is dead. Mistletoe in the overstory as well. Minor aspen component. Underthin to reduce basal area to protect remaining overstory and open up aspen clones.
1546	134	Mature Douglas-fir stand with heavy Douglas-fir bark beetle mortality. Up to 50-60% of the overstory is dead. Mistletoe in the overstory as well. Minor aspen component. Steep and rocky. Underthin to reduce basal area to protect remaining overstory and open up aspen clones.
1548	85	Large mature Douglas-fir. Very heavy Douglas-fir bark beetle mortality. 70%+ mortality in the overstory.
1551	47	Mixed conifer stand on a steep NE face. Consists of Douglas-fir and lodgepole pine grading to subalpine fir at the higher elevations. Meadows and wetlands in interior of stand. Clumps of Engelmann spruce. Minor – moderate Douglas-fir bark beetle activity.
1552	232	High elevation mixed lodgepole pine with scattered relict whitebark pine. ABLA/VASC habitat type with elk sedge and beargrass. North of Wallace Lake.
1554	94	Mature Douglas-fir stand with a minor aspen component. Mix of habitat types (PSME/CARU, DF/SYAL). Heavy Douglas-fir bark beetle mortality of approx. 50%.
1555	72	Mature Douglas-fir stand with a minor aspen component. PSME/CARU habitat type. Very heavy Douglas-fir bark beetle mortality of 70%+.
1560	66	Mature Douglas-fir stand with a mix of dry Douglas-ifr habitat types. Moderate Douglas-fir bark beetle mortality of 30 – 40%.
1561	94	Mature Douglas-fir stand in PSME/FEID and PSME/AGSPIC habitat types. Extremely heavy Douglas-fir bark beetle mortality, up to 90% of the overstory is dead.
		BLANK
		BLANK

Designated Old Growth within Salmon-Moose Old Growth Analysis Area

Stand	Acres	Comments
1565	341	West side of Dump Creek, extends down to the Dump Creek chasm. Douglas-fir/aspen stand. Experienced a Douglas-fir bark beetle attack in the late 1980's – plenty of older large snags. Current Douglas-fir bark beetle mortality approx. 10-15%. Quite a lot of moisture in this stand – numerous small meadows and wetlands. Mix of Douglas-fir habitat types. Snowberry and mixed graminoids predominate the understory.
1570	277	Mixed conifer stand containing Douglas-fir and lodgepole pine. Overtopped aspen component. Recommend thinning from below to reduce basal area representation of lodgepole pine, release Douglas-fir and open up aspen clones. Little evidence of Douglas-fir bark beetle mortality to date.
1571	93	Open high elevation stand of mixed conifers – Lodgepole pine, Douglas-fir and whitebark pine. Above UP Lake. Little evidence of Douglas-fir bark beetle to date, but small pockets of mortality downslope to the east.

INTEROFFICE MEMORANDUM

TO: TERRY HERSHEY, SALMON-COBALT DISTRICT RANGER

FROM: DOUG BASFORD, SILVICULTURIST, AND DIANE SCHULDT, WILDLIFE BIOLOGIST

SUBJECT: SALMON-MOOSE FUELS REDUCTION PROJECT – DESIGNATED OLD GROWTH STANDS CURRENT AND DESIRED CONDITION AND RATIONALE FOR TREATMENT IN STANDS 1191 AND 1214

DATE: 9/11/2006

CC: LYNN BENNETT, SALMON-MOOSE IDT LEADER

Salmon National Forest Land and Resource Management Plan – Old Growth Guidance

The Salmon National Forest Land and Resource Management Plan (FLRMP, 1988) provides guidance and direction for the management and maintenance of old growth and old growth dependent wildlife species. The FLRMP defines old growth as a stand of trees that is past full maturity and showing decadence (i.e. the last stage in forest succession (VI-28)) and defines old growth habitat as characterized by over mature coniferous forest stands with large snags and decaying logs (VI-28). The FLRMP intended that old growth stands be designated to provide primarily for the needs of "old growth dependent species" (IV-80, IV-81), but also to promote vegetative diversity by maintaining a component of old forest in managed landscapes (IV-1 and IV-17). Mature and old growth Douglas-fir, ponderosa pine and subalpine fir habitats were selected as indicators of the specific biotic communities on which old growth dependent species rely (II-20).

Designated old growth stands are to be retained to meet the needs of old growth dependent species and are not to be intensively managed for timber production or contribute to the allowable sale quantity (IV-38, a and b; IV-116). However, the Forest recognized that forested lands outside those managed for timber production might require active management to retain, enhance or restore biotic communities for other resource needs. Therefore, the FLRMP stipulates those forest lands not managed for timber production may be treated with timber harvest as a tool where the harvest would benefit the resource that area is managed for and where the removal can be accomplished in a manner compatible with the management objectives of that area (IV-89).

Desired Condition

Old growth habitat provides for wildlife and plant species that require the specific structural attributes offered by mature to old stands of trees. Old age alone does not ensure that these "old growth" conditions are present, but mature/old stands are most likely to contain "old growth" attributes. Therefore, the age of a stand is often used as an indicator that the appropriate conditions may be offered. In the Intermountain West, the overstory of old forest Douglas-fir, ponderosa pine or mixed conifer stands ideally features trees larger than 15 – 20 inches in diameter (Hamilton 1993). Large snags (15 – 20 inches in diameter and greater) are well represented (preferably four per acre or more) and well distributed throughout the stands (Bull et al. 1997). Down logs of varying sizes and decay classes are present, preferably in densities of 50-90 per acre (Bull et al. 1997). Ideally, logs with large end diameters of twelve inches or larger are well represented (25-50 percent of the logs present) in the stand (Bull et al. 1997). Diameter sizes of other old forest cover types, such as lodgepole pine or aspen, are typically smaller, usually in the range of 10-15 inches, although larger trees may also be

present (Hamilton 1993). Damaged trees (broken tops, dead tops, lightening scars, leaning trees, etc.) are present to provide vertical diversity (Society of American Foresters, 1991). Insects and pathogens that induce wood rot and run the process of decay are present (Society of American Foresters 1991, USDA Forest Service 1991). The presence of these attributes is not limited to undisturbed stands only, but may also be found in stands that have experienced non-lethal fires or selective timber harvest.

Current Condition

On the Salmon-Challis National Forest, old growth Douglas-fir, ponderosa pine and mixed conifer stands provide the greatest benefits to the most species dependent on old growth habitat. Mature and old stands of cottonwood and aspen also form very high quality old growth habitat where found in conjunction with conifer forest.

In 2003 and 2004, twelve old growth retention stands covering almost 2,000 acres (approximately 35 percent of the designated old growth in the 74,000 acre old growth analysis area) were examined to assess current stand conditions (Refer to Map 1, which depicts the old growth analysis area). The stand examinations collected information on overstory and understory stand components, including tree species, age, height, diameter, basal area, canopy closure, snags and large downed logs.

These stand exams indicate that conditions in many of the old growth retention stands are not adequate for the needs of old growth dependent species (Salmon Cobalt Ranger District 2003/2004 stand examination data). Exam results show that too few large live trees are present in many stands. The density of large snags is deficient in every stand. Likewise, the size and density of downed logs are inadequate in the old growth retention stands examined. Conversely, far too many small trees per acre are present and too much of the stand basal area is represented by the smaller size classes.

In 2003, aerial photograph interpretation and walk-through evaluations were also conducted on 36 old growth retention stands covering more than 5,400 acres. The evaluation was intended to determine the current condition of each stand, presence of old growth features, suitability as old growth, juxtaposition to other cover types, and recommended management to maintain or enhance old growth character.

The stand examinations, aerial photograph interpretation and walk-through evaluations indicate that many of the old growth retention stands are changing with time. These changes result both from natural processes and from past and present land use practices, including fire suppression, forest succession, grazing, firewood cutting and road construction. These changes include shifts in species composition, increased density of small diameter understory trees, shifts from single-storied stands to multi-storied stands, degradation of understory vegetation, inadequate snag and down log densities and sizes along open roads, an interruption of the wood decay process essential to the foraging and reproductive strategies of many wildlife species and habitat fragmentation.

As is the case across much of the Forest, there is a Douglas-fir bark beetle epidemic in the old growth analysis area. Insect and disease outbreaks affect old growth variably. Minor outbreaks create additional snags and downed logs in a stand, increasing a stand's value to primary cavity excavators and secondary cavity nesters. Minor outbreaks can also open up the forest canopy, releasing understory trees and contributing to multi-storied stand character. Conversely, under the right climatic conditions, even minor outbreaks can result in the mortality of entire stands. This can be beneficial to certain species, such as some woodpeckers, but detrimental to other species that require living trees, such as flammulated owls. Tree mortality due to the recent insect outbreak in the

project area has been severe in a number of mature Douglas-fir stands. The majority of trees in these stands may eventually die (Gibson 2003).

Therefore, active management to maintain or enhance old growth attributes is considered the most effective strategy to prevent the loss of the late successional habitat in the Douglas-fir old growth retention stands within the analysis area, as well as in Douglas-fir old growth stands elsewhere across the Forest that are impacted by the Douglas-fir bark beetle epidemic (Gibson 2003).

Old growth attributes in stands across the Forest are also threatened by wildfire. Like insect outbreaks, wildfire affects old growth habitat variably. Low severity understory fires can improve old growth values by thinning dense thickets of suppressed conifer regeneration, opening up small patches to create multi-storied stands, diversifying the shrub/herbaceous understory, and increasing snag numbers. Conversely, high severity, stand-replacing fires typically result in the loss of old growth habitat for a century or more.

Whether or not a stand experiences lethal fire is partially based on stand structure. Stands in dry forest ecosystems with abundant ladder fuels, multiple canopy layers or with large or numerous patches of closed canopy structural stages (such as stem exclusion closed canopy or multi-strata young forest) are more likely to experience lethal surface or crown fires (Graham et al. 2004, Schoennagel et al. 2004). A higher proportion of fire intolerant species, such as lodgepole pine and subalpine fire, in the stand also increase the risk (Peterson et al. 2004). These stand conditions exemplify many of the dry or mesic Douglas-fir or mixed conifer old growth retention stands in the project area due particularly to lodgepole pine encroachment resulting from decades of fire suppression. Analysis of the recent Clear Creek, Fenster and Withington wildfires (Bennett 2004 and 2006) depicts the link between multi-layer, closed canopy stand conditions in dry forest ecosystems, in particular, and stand-replacing fires. As an example, an analysis of fire severity in old growth retention stands within the boundary of the 2000 Clear Creek fire shows that 66 percent of the old growth retention stands within the fire area experienced mixed severity to lethal severity fire in 2000 (Salmon-Cobalt Ranger District, 2006, unpublished data). Of this amount, 52 percent of the old growth retention stands were subjected to lethal fire. Specifically, more than 50 percent of all Douglas-fir and lodgepole pine old growth retention stands and almost 50 percent of subalpine fir/Engelmann spruce old growth retention stands experienced lethal fire. These stands will not provide old growth habitat again for at least one hundred years. These recent wildfires provide a realistic scenario of the fire severities that could be experienced, given the trend toward stand-replacing fires (Graham et al. 2004) within most of the old growth retention stands in the analysis area.

As with Douglas-fir bark beetle outbreaks, active management is recognized as one of the most effective means of reducing the risk of lethal wildfire (Graham et al. 2004, Peterson et al. 2004). Thinning from below, reducing stand density and favoring fire resistant species in dry forest ecosystems through mechanical treatment and/or prescribed fire greatly reduces the risk of a stand experiencing lethal wildfire (Graham et al. 2004, Peterson et al. 2004, Schoennagel et al. 2004).

Treatment Recommendations

In the absence of natural disturbance or active management (such as mechanical treatments or prescribed fire) old growth attributes will continue to decline and habitat capability will likewise decline. Lodgepole pine in aspen clones and Douglas-fir stands will increase in total basal area. Without a regeneration event, aspen clones will continue to decline. The cover type would shift from the historical Douglas-fir/aspen cover type to mixed conifers or subalpine fir.

Stand conditions, (e.g., basal area occupied by lodgepole pine, dense ladder fuels, etc.) are such that a wildfire or insect or disease outbreak would likely result in stand mortality (Bennett 2004 and 2006; Gibson 2003). The current Douglas-fir bark beetle epidemic underscores this concern; mortality of large overstory trees due to bark beetles has occurred in all Douglas-fir old growth retention stands in the analysis area. Some stands have experienced overstory mortality of 50 percent or greater in the past five years. Overstocked stands containing large diameter trees are at the greatest risk of beetle-induced mortality (Gibson 2003). Therefore, prescribed fire is not presently an option for treating most old growth stands (Bennett 2004 and 2006).

Loss of old growth habitat to wildfire or to insects or disease will not be regained for more than a century. For this reason, the Salmon-Cobalt District proposes to implement the use of mechanical treatments in small portions of two old growth retention stands to move the current stand conditions back toward desired old growth stand conditions (Refer to Map 2 for the location of these two stands). Both of these old growth retention stands contain a substantial aspen component, restoration of which is one of the primary project objectives.

Old growth retention stand 1191 is an 84 acre stand located in the Dump Creek drainage between Diamond Gulch and Sawmill Gulch. It is characterized by fairly gentle benches bisected by a small, intermittent stream flowing east to west. Stand aspect varies, including both north and south-facing slopes. Stand elevation ranges from 7,000 to 7,200 feet. The stand consists of fairly open dry Douglas-fir on the uplands at the lower, western and northern sides of the stand, grading to a mix of Douglas-fir ingrown with lodgepole pine at the upper, eastern side. The drainage bottom is occupied by a mix of aspen, lodgepole pine, Douglas-fir and Engelmann spruce. Subalpine fir appears in the drainage at the upper end (east side). There is a fair amount of aspen throughout the central and southern portions of the stand, both in the drainage and on the benchy uplands. Lodgepole pine is most prevalent in the central and southern portions of the stand, but lodgepole pine regeneration is increasing in the more open, northern portion of the stand as well.

Old growth retention stand 1214 is located in the upper reaches of the Diamond Creek drainage. The stream is dendritic in nature here and the stand is intersected by four headwater branches of Diamond Creek. Stand aspect varies, but is southerly or easterly overall. The elevation ranges from 6,200 feet at the lower, eastern side of the stand to 7,000 feet at the western, upper side. This is a mixed conifer stand containing Douglas-fir, lodgepole pine, aspen, Engelmann spruce, subalpine fir and a few ponderosa pine, in that order. The stand contains an adequate representation of large Douglas-fir trees and clumps of large Engelmann spruce trees clustered around a number of small wetlands. Aspen is common as small clones throughout the stand, but is moderately to heavily ingrown with lodgepole pine. The existing aspen stems are becoming decadent and there is little aspen regeneration. Small openings are present throughout, but are regenerating to conifers. A lower canopy layer of Douglas-fir saplings is present, but is also mixed with lodgepole pine. The understory is very productive, consisting of a variety of graminoids, forbs and shrubs. Lodgepole pine seedlings are numerous.

Portions of these two stands where lodgepole pine is particularly dense have been proposed for harvest to favor the Douglas-fir and aspen. Under the preferred alternative (Alternative 4), approximately 31 acres of lodgepole pine would be removed in proposed units 52M and 54S located in old growth retention stands 1191 and 1214 respectively. Almost 11 acres in proposed unit 52M would be located in Old Growth Retention Stand 1191 and 20 acres in proposed unit 54S located in Old Growth Retention Stand 1214.

The silvicultural prescription for these 31 acres of designated old growth would be different from the prescription for the remainder of these two proposed harvest units. The old growth prescription would reduce stand density by approximately 50 percent. The majority of lodgepole pine and subalpine fir trees would be removed through commercial harvest and non-commercial thinning. All Douglas-fir and Engelmann spruce trees fifteen inches or larger in diameter would be retained. All ponderosa pine would be retained regardless of size.

This mechanical treatment would reduce conifer competition in aspen clones and encourage aspen suckering. It would also reduce competition from lodgepole pine and subalpine fir to Douglas-fir, Engelmann spruce and ponderosa pine trees, which are the desired conifers for providing habitat to old growth dependent species of wildlife. The older, larger trees would remain vigorous longer, while younger trees would respond with an increased growth rate. Decreasing tree density by removing encroaching lodgepole pine would also open up the understory and promote increased vegetative diversity (Covington and Moore 1992), another benefit to old growth dependent species.

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Terrestrial Management Indicator Species

Management indicator species (MIS) are defined as key species that represent life forms and have habitat requirements similar to other groups of plants or animals. They are species for which populations and habitat objectives can be established and will be tracked as indicators of habitat capability (LRMP MIS Amendment 2/2/2004). Federal regulations require the selection of MIS to estimate the effects of land management activities on fish, wildlife, and invertebrate species (36 CFR 219.19(a)(1)).

The pileated woodpecker, spotted frog, and greater sage-grouse are designated as terrestrial MIS for the S-CNF. The reasons these species were selected as MIS are described in the Forest Plan amendment.

Sage-grouse are not analyzed for this project, as this species does not occur in or adjacent to the project area. Sage-grouse are not present on the west side of the Salmon River north of the Iron Creek Subwatershed, approximately 20 air miles south of the project area. Project activities would not affect habitat for sage-grouse since there are no proposed harvest units in or near suitable habitat for this species.

Pileated Woodpecker

Existing Condition

Species Habitat Requirements

The pileated woodpecker typically occurs in dense coniferous forest, but may also forage in open forests and second growth if there are large, dead trees and down logs set in the matrix of younger forest (Hutto 1995; TNC 1998). Mature to old stands with a high density of large snags and large down logs on the forest floor and a moderate to high degree of canopy closure are most often selected by pileated woodpeckers for foraging and nesting (Hutto 1995). Important habitat components include conifer stands with high basal area, dense tree canopies, a high percentage of large (≥20 inches dbh) snags or live trees with damage from insects or disease, and numerous down logs.

Pileated woodpeckers are known to feed on a variety of insects and often eat fruits and berries in late summer and fall (Aney and McClelland 1990). However, forest-dwelling ants in the genera *Camponotus* and *Formica* are their primary food source (Torgersen and Bull 1995). These ants can comprise more than 95 percent of a pileated woodpecker's diet (Torgersen and Bull 1995). Pileated woodpeckers are always closely tied to stand conditions that are favorable to these forest-dwelling ants (Aney and McClelland 1990). These forest-dwelling ants occur in large snags or large, down logs with advanced decay. Snags and logs must be large enough to retain humid conditions for decay processes. Moderate to high canopy closure helps retain the necessary humidity.

Pileated woodpecker nests are usually found in Douglas-fir, ponderosa pine, or cottonwood trees (Aney and McClelland 1990). Nest trees are often located in a clump of other snags or trees to provide protection from weather and predators. Large trees are needed because the pileated woodpecker is a big bird that raises several young (Bull 1980). Nest cavities are usually 10-inches wide and located between 20 and 60 feet up the bole of the tree, so the nest tree must be large enough to accommodate a nesting

cavity of this size that high up the tree and still have sufficient girth to provide insulation (Bate 1995; Bull et al. 1997). Studies show that pileated woodpeckers consistently select the largest trees for nest sites and nest trees are almost always in excess of 20 inches dbh (Bull 1980; Mellen et al. 1992).

Pileated woodpeckers also use cavities as roosts at night, during inclement weather, and in the winter (Clark et al. 1989). Large diameter (≥20 inches dbh) snags or live trees with defect are typically selected for roosts. A pileated woodpecker usually has a number of roosts that are used alternately throughout the year (Bull et al. 1990).

Recent research on the size and distribution of pileated woodpecker territories suggests that each pair of pileated woodpeckers probably requires about 1,000 acres of forest containing abundant large snags and down logs (Bull and Holthausen 1993). Larger blocks of suitable habitat are required to support several pairs in proximity to one another to promote self-sustaining populations of pileated woodpeckers.

Regional Population and Trend

The North American Breeding Bird survey depicts an overall upward trend for pileated woodpeckers between 1966 and 2002 across much of the northwestern United States, including the state of Idaho (Sauer et al. 2003). However, data for this same timeframe depict a downward trend in Washington. There are also several potential deficiencies in the Breeding Bird Survey data for pileated woodpeckers in the western United States. Therefore, it is possible that the data do not accurately reflect the real trend. For example, in areas where few pileated woodpeckers are detected by the Breeding Bird Survey, the sample size is small. Sample size is one factor that affects the accuracy of the trend estimate.

The pileated woodpecker is assigned a global conservation status rank of G5, meaning that the species is considered demonstrably widespread, abundant, and secure across its range (NatureServe 2002). In Idaho, the pileated woodpecker has a state conservation priority rank of S4 (NatureServe 2002), which means that the species is considered apparently secure and usually widespread. While an S4 species may be uncommon, it is not considered rare.

The pileated woodpecker is not considered a priority species in the Idaho Partners in Flight priority ranking (Idaho Partners in Flight 2000). The national Partners in Flight species assessment for the pileated woodpecker indicates a strong upward trend in the Central Rocky Mountains physiographic region (2005). Partners in Flight scores the population trend data for pileated woodpeckers as high quality (RMBO 2005).

The primary risk factors that could affect pileated woodpecker populations are timber harvest and firewood cutting. Both activities tend to reduce the number of large trees and large snags that pileated woodpeckers require to persist in an area (Bate 1995; TNC 1998). Timber harvest can also drastically reduce or eliminate canopy cover, drying the forest floor and creating conditions unsuitable for forest-dwelling ants (TNC 1998). Timber management practices that remove most or all woody debris from the forest floor are also recognized as a threat (Torgersen and Bull 1995; TNC 1998), since removal of large downed logs can reduce or eliminate forest-dwelling ants as well as other forest insects that pileated woodpeckers eat.

Local Habitat Condition, Population, and Trend

The area of analysis for pileated woodpeckers slightly exceeds that of the project area, consisting of approximately 40,500 acres. It extends from Douglas-fir habitat in the project area, east to the Salmon River to encompass islands and stringers of mature Douglas-fir and ponderosa pine on the river face and mixed cottonwood/conifer habitat along the river. Most of the islands and stringers are managed by the Salmon Field Office BLM, while others are privately owned. Most of the cottonwood habitat along the river is privately owned, although several larger cottonwood stands have recently been acquired by the BLM. This analysis area was selected based on the location of pileated woodpecker observations in and near the project area. From these observations, it appears that pileated woodpeckers are not using habitat in the project area in isolation from that along the river.

The pileated woodpecker analysis area is large enough to support multiple pairs of pileated woodpeckers and would depict project-level effects to these pairs. Based on estimates from published studies of pileated woodpecker pair densities in various conifer habitats (Mellen et al. 1982; Aney and McClelland 1990; Bull and Holthausen 1993), it is possible that the analysis area could provide for about 10 pairs of pileated woodpeckers year-round.

The pileated woodpecker is considered an uncommon resident in Lemhi County (Roberts 1992). It is evenly distributed throughout the upper Salmon River drainage in low numbers. Roberts (1992) found pileated woodpeckers in the highest densities between 5,000 and 7,000 feet in elevation in mature Douglas-fir communities. Pileated woodpeckers are known to occur in and near the project area based on recent sightings (NRIS Fauna database 12/2003). Sufficient data does not currently exist to either establish a forest-wide population baseline or indicate a population trend for this species (USFS 2004).

Within the analysis area, pileated woodpeckers occur in mature mixed conifer, Douglas-fir, aspen, and cottonwood cover types. Each of these cover types has been affected by past and present land use practices.

The mixed conifer cover type consists of two or more conifer species. Within the analysis area, a mix of mature Douglas-fir and lodgepole pine, often with some ponderosa pine at lower elevations and Engelmann spruce or subalpine fir at higher elevations is typical. Mixed conifer stands are used by pileated woodpeckers, some to a greater degree and some to a lesser, depending on several factors. These include which tree species dominate the stand, the structural stage, the presence of large snags and down logs, as well as the amount of past timber harvest. Approximately 650 acres of mixed conifer stands dominated by Douglas-fir have been harvested in the analysis area previously. The majority of the overstory in these stands has been harvested. They are currently classified in the multi-strata young forest structural stage, in which there are none or very few large trees in the overstory. Few of these stands currently provide habitat for pileated woodpeckers. Approximately 1,360 acres of unharvested mixed conifer cover type occurs in the project area, primarily at higher elevations and in cold air drainages. These stands are dominated by subalpine fir and Engelmann spruce, tree species that are seldom used by pileated woodpeckers in western states (TNC 1998).

There are 18,000 acres of Douglas-fir cover type in the analysis area, of which a little more than 8,000 acres is currently suitable for pileated woodpeckers. A small ponderosa pine component, found occasionally in xeric Douglas-fir stands or along the river, is included here in the Douglas-fir cover type. Table 1 displays the current management status and structural stage of Douglas-fir stands comprising pileated woodpecker habitat in the analysis area.

Table 1 Pileated Woodpecker Habitat Characteristics

Douglas-Fir and Ponderosa Pine Cover Type	Harvested Acres <40% canopy removal	Harvested Acres >40% canopy removal	Unharvested Acres	Total Acres by Structural Stage
Old Forest Multi-	165	802	5,995	6,962
Old Forest Single Stratum	16	96	925	1,037
Total Acres	**181**	**898**	**6,920 acres**	**7,999 acres**
Douglas-Fir Cover Type (percent)	2	11	87	100

According to the Forest timber harvest history, a little less than 4,500 acres of mature Douglas-fir and ponderosa pine has been harvested in the analysis area to date. Of the acreage harvested, approximately 900 acres were harvested lightly to moderately (canopy removal of ≤40 percent). Of this, about 200 acres retain an old forest structural appearance while the majority (about 700 acres) of these stands are open with a widely spaced overstory and a regenerating conifer understory. The dead wood decay cycle has been interrupted to some degree and the amount of large snags and large down logs is less than optimal, particularly in stands located on drier sites.

Although research indicates that pileated woodpecker densities may decline in moderately harvested areas (Bate 1995), pileated woodpeckers are known to successfully use these areas provided: (1) the necessary structural components are still present, (2) there is adequate canopy closure, and (3) the area is close to intact forest (Bull and Holthausen 1993; Hutto 1995). Since these conditions are met, it is assumed that these 900 acres remain suitable as pileated woodpecker habitat.

More than 10,500 acres of the Douglas-fir cover type are unharvested. Of this acreage, about 7,000 acres are in the old single stratum and multi-strata forest structural stages. Many of these acres have not been harvested because they occur as islands and stringers or are located along the river face and are difficult to access. The multi-strata old forest stands comprise the majority of the unharvested habitat. These are characterized by a broken overstory with large old trees, several lower canopy strata represented by two or more age classes and vertical and horizontal diversity in the understory. The single stratum old forest stands have a broken or continuous overstory dominated by large, old trees. Grasses and forbs often typify the understories. Conifers may be present in the understory or are represented by seedling and saplings only. Most stands in both of these structural stages are in the mature or early old growth phases.

There are probably about 1,000 acres of quaking aspen within the analysis area. Aspen is a highly valuable species for cavity excavators, including most species of woodpeckers (DeByle and Winokur 1985). Based on field reconnaissance and stand exam data, the majority of aspen clones in the analysis area contain attributes that make them suitable for use by pileated woodpeckers

However, with more than 50 years of active fire suppression, most aspen clones have shrunk in acreage as succession moves toward closed conifer canopies. Lodgepole pine and Douglas-fir in-growth is common in most quaking aspen clones across the Forest, including the analysis area. In addition, many aspen clones associated with upland meadows and mid to lower elevation riparian areas have been impacted by cattle. The majority of aspen clones in the analysis area are in poor condition and, as they continue to deteriorate without replacement, aspen habitat will gradually disappear (refer to section on Aspen).

Cottonwood stands in the analysis area have been reduced to narrow galleries along the river with approximately 150 acres extant. However, cottonwood is a very high quality habitat for pileated woodpeckers. Individual birds and pairs are regularly observed in these stands, including active nests (NRIS Fauna database 12/2003). Several stands are regenerating and may provide habitat for pileated woodpeckers in the future, if allowed to mature. None of the existing mature cottonwood galleries and stands along the Salmon River is large enough to provide completely for a nesting pair of pileated woodpeckers.

These figures indicate that 75 percent of the mature conifer and deciduous habitat present in the analysis area in the past 50 years currently retains attributes suitable for pileated woodpecker nesting and foraging year-round.

Direct and Indirect Effects

Alternative 1 - No Action

Under the No Action Alternative, aspen clones in the project area would continue to decline without some event to set back forest succession and stimulate sprouting. The acreage occupied by aspen would further decrease.

No action would be taken to reduce road densities through decommissioning and travel management improvements, thereby improving retention of large snags and of large downed logs. The high density of year-round open roads would continue to contribute to attrition of large snags and logs and an interruption of the wood decay process essential to the foraging and reproductive strategies of the pileated woodpecker.

Alternative 2

Cottonwood habitat along the Salmon River would not be affected by implementation of the proposed project.

Fifty units are proposed for harvest in the lodgepole pine cover type. Lodgepole pine does not provide habitat for pileated woodpeckers, since this species very seldom grows large enough to provide nesting cavities for pileated woodpeckers and because carpenter ants do not occur in adequate densities in small snags and logs (Bull 1980). Some of the proposed lodgepole pine units contain a small component of Douglas-fir. The harvest prescription specifies that Douglas-fir would not be harvested in these units. These

stands provide little, if any, foraging or nesting habitat for pileated woodpeckers currently, as the Douglas-fir component is so minor. The proposed lodgepole pine treatments would not affect pileated woodpeckers and would not fragment or otherwise affect suitable habitat for pileated woodpeckers.

Islands and stringers of Douglas-fir and ponderosa pine in the analysis area are small and surrounded by non-forested plant communities. These are too small to provide for the needs of a single pair of pileated woodpeckers, but pileated woodpecker foraging activity is evident, suggesting a pattern of use. These areas are not managed for timber production. Most are not accessible by roads and are little affected by firewood cutting. In compliance with Forest Plan standards, no units are located within any of these conifer islands or stringers. Implementation of this alternative would not further isolate or otherwise affect these patches of habitat.

The only harvest of Douglas-fir in the analysis area would occur within and adjacent to aspen clones. Fourteen units would be treated to promote aspen regeneration. The prescription for these units would thin conifers from below, leaving most large trees in place while reducing conifer in-growth to encourage sprouting within the clones. This includes proposed units 53-S and 54-S, both of which contain habitat managed as old growth, and unit 700-S which is heavily infested with dwarf mistletoe.

Douglas-fir trees in unit 700-S are stunted and small due to the heavy dwarf mistletoe damage. This stand is not suitable for nesting pileated woodpeckers. The stand is not densely occupied by forest-dwelling ants since the woody debris component is small overall.

Treatments in proposed units 53-S and 54-S are designed to encourage aspen regeneration while promoting old growth characteristics. Implementation of the proposed aspen treatments in 14 units would not impact pileated woodpeckers or reduce the overall percentage of habitat suitable for pileated woodpeckers within the analysis area. Treatment activities would occur after July 31 annually, reducing potential effects to nesting pileated woodpeckers. Existing large conifer and aspen trees would be retained. The growth of a new aspen cohort would be rapid. Aspen restoration, especially in conjunction with other restoration or rehabilitation projects, would contribute to enhanced habitat conditions in the future.

Alternatives 3 and 4

Impacts to pileated woodpecker habitat as a result of proposed vegetation treatments under Alternatives 3 and 4 would essentially be the same as Alternative 2. Although fewer acres of lodgepole pine and aspen would be treated under these alternatives, the changes in treatment acres would have little to no effect on pileated woodpeckers or the percentage of habitat suitable for pileated woodpeckers in the analysis area.

However, there would be substantially fewer miles of road management improvements under Alternatives 3 and 4 (14 miles as opposed to 30 miles). While snags and down log recruitment could increase in areas adjacent to these 14 miles of road, the improvement is commensurately less than that offered by Alternative 2.

Cumulative Effects

The pileated woodpecker can be affected by changes in the successional stage of forest habitat that removes large-diameter trees or snags, decreases canopy closure, converts forest to an earlier successional stage, or removes down logs. Activities that cumulatively affect pileated woodpeckers in the project area include past timber harvest and associated road construction, insect and disease outbreaks, agriculture and livestock grazing, wildfires, firewood cutting, and mining.

A variety of other species is dependent on nesting cavities that pileated woodpeckers excavate (Bull et al. 1997; Wisdom et al. 2000), including Sensitive species such as boreal owls and flammulated owls (see Boreal Owls and Flammulated Owls). Activities that affect the pileated woodpecker indirectly affect these species as well.

Approximately 40 percent of the mature Douglas-fir and/or ponderosa pine in the analysis area have been harvested to date. The last harvests of Douglas-fir in the project area occurred between 1989 and 1993. Approximately 365 acres were harvested in three sales in the Diamond Creek and Dump Creek subwatersheds. There has been no commercial harvest of mature Douglas-fir or ponderosa pine in the analysis area since. Almost 70 percent of the Douglas-fir habitat in the analysis area remains suitable for nesting and foraging by pileated woodpeckers year-round.

Insect and disease outbreaks favor pileated woodpeckers as long as the outbreaks remain minor. Insect and disease agents can cause mortality in host trees or contribute to weakening the tree and introducing secondary mortality agents. These can create favorable conditions for nesting and for foraging. Conversely, larger outbreaks that kill entire stands reduce the closed canopy conditions required by forest-dwelling ants, leading to reductions in the pileated woodpecker's dietary mainstay.

Livestock grazing affects pileated woodpeckers primarily through impacts to aspen clones. Most aspen clones in the analysis area have been moderately to severely impacted by decades of livestock use (refer to Aspen section). Livestock use has changed plant community composition, triggered soil erosion and stream downcutting, lowered the watertable, compacted soil, and reduced aspen regeneration. This in turn has reduced the value of the clones as nesting and foraging habitat for pileated woodpeckers.

The most recent wildfire in the analysis area was the Fenster fire of 2000. Over 500 acres of mature Douglas-fir habitat were burned, most at high severity. Severe, stand-replacing fire can eliminate large downed logs from a stand for centuries and create open conditions that are too hot and dry for forest-dwelling ant species.

Loss of large snags and down logs is recognized as a threat to pileated woodpecker populations. A major human use of sound snags is for firewood. The constant removal of sound snags ultimately yields an overall reduction in dead wood from an area because the progression of decay from sound snags to soft snags to down logs is interrupted. Stand examinations conducted in old growth retention stands in the analysis area in 2003 indicate that there is an insufficient amount of large snags and down logs (S-CRD data 2003/2004). Since road densities are so high in the analysis area, there are few stands isolated from the effects of roads.

Firewood cutting is linked to open roads. High road densities affect pileated woodpeckers largely by opening up areas to firewood cutting. Road densities in the project area are high (see Roads). The analysis area is very close to the town of Salmon, Idaho, and receives a high degree of use by firewood cutters. Snags alongside roads or within easy reach of roads in the analysis area are often removed by firewood cutters. More than 11,000 acres of conifer stands in the project area within 300 feet of a road could potentially be affected. For now, this effect may be offset by the current insect outbreak in the analysis area, but duration and extent of the outbreak are unknown.

Livestock grazing affects pileated woodpeckers primarily through impacts to aspen and cottonwood clones. Most aspen and cottonwood clones in the analysis area have been impacted by decades of over-use. The degradation has changed plant community composition, triggered soil erosion, stream downcutting, lowered the watertable, compacted soil, and reduced regeneration. This in turn has reduced the value of the clones as nesting and foraging habitat for pileated woodpeckers.

The cottonwood cover type has been greatly reduced from its pre-European settlement acreage and extent. Overall, the cottonwood cover type has been reduced to narrow galleries along the river, having been affected by conversion to agriculture, historical mining, and flood control efforts. Cottonwood requires active hydrologic processes for successful regeneration. While land use practices tend to inhibit regeneration, several stands along the river within the analysis area have had successful regeneration episodes in recent years. If these regenerated stands are allowed to mature, a continuum of minimal cottonwood habitat will be retained.

Mining activity in the Dump Creek Subwatershed resulted in a loss of aspen clones, wet meadows, and wetlands at the head of Dump Creek. This habitat can never be fully recovered since the Dump Creek Subwatershed now exists as a deep and unstable chasm. Current and future restoration projects to stabilize vegetation and watershed resources would benefit pileated woodpeckers.

Implementation of any of the action alternatives would promote future aspen habitat for pileated woodpeckers in the analysis area, although Alternative would offer the most benefits. There would be a slight reduction in open road densities under Alternative 2 while this reduction would be almost imperceptible under Alternatives 3 and 4. These reductions would slightly lessen impacts to dead wood resources on which pileated woodpeckers depend. Overall, implementation of the action alternatives could eventually contribute to stable or improved habitat capability for pileated woodpeckers in the analysis area while none would contribute to a downward change in the forest-wide population baseline or trend for this species.

Spotted Frog

Existing Condition

In addition to being a Forest MIS, the Columbia spotted frog is also currently a USFS Intermountain Region sensitive species. Effects to the Columbia spotted frog are assessed in this section only.

Habitat Requirements

The Columbia spotted frog occurs in a variety of forest and non-forest communities as long as suitable aquatic habitat is available. This aquatic species occupies slow-moving cool water streams, beaver ponds, ephemeral pools, and the marshy edges of lakes (USFWS 1993; Gomez 1994). It uses adjacent upland habitats for basking and foraging and migrates regularly between breeding sites and hibernacula (Gomez 1994; Maxell 2000).

Breeding takes place in permanent or ephemeral shallow ponds with warm water (Maxell 2000). Adult Columbia spotted frogs congregate at breeding sites in early spring, often before ice is completely melted from the ponds. After the breeding season, adults are often found some distance from ponds and lakes in various plant communities as long as surface water (e.g. seeps, springs, and drying ephemeral pools) is available nearby (Gomez 1994).

Adult Columbia spotted frogs are carnivorous, while larvae are herbivorous (Maxell 2000). The adults feed opportunistically on a variety of invertebrates, mollusks, crustaceans, and arachnids, as well as preying on younger age classes of amphibians. Larval Columbia spotted frogs consume algae, decomposed plant material, and bacteria.

Important habitat attributes include permanent slow-moving or still water, well-developed vegetation, and sandy or muddy substrates (Gomez 1994; Maxell 2000). Hiding cover, such as algal mats, submerged aquatic vegetation, emerged vegetation, and overhanging banks, provide protection against predators to adults and tadpoles. Adults hibernate in unfrozen muddy or soupy substrates in springs, streams, lakes, or ponds where water is constantly renewed throughout the winter (Gomez 1994; Maxell 2000).

Regional Population and Trend

The Columbia spotted frog is widely distributed. The main population extends from southeast Alaska through the western edge of Alberta and northern British Columbia south to central Idaho, western Montana, and western Wyoming (NatureServe 2003). Disjunct populations also occur in southwestern Idaho and other more southerly locales (NatureServe 2003).

Total population estimates for the Columbia spotted frog are unknown (NatureServe 2003). It is numerous in some areas of its range with many known occurrences, including the S-CNF. The main body of population is widespread, well distributed, and numerous, although declines have been consistently reported for many of the disjunct populations (NatureServe 2003). Population declines are often, but not always, related to human causes. Natural declines occur in response to weather events and patterns (NatureServe 2003).

The Columbia spotted frog is assigned a global conservation status rank of G4 (NatureServe 2003), meaning that the species is considered apparently secure across its range, but with cause for long-term concern. In Idaho, the Columbia spotted frog has a state conservation priority rank of S3S4 (NatureServe 2003). This means that the species is considered relatively common, although rare in some locales. Most populations appear secure, although with cause for long-term concern, while other populations are considered vulnerable to extirpation from the state.

There are a number of human-related risks to population stability. Habitat loss or alterations is a major threat. Columbia spotted frogs are sensitive to changes in habitat parameters such as riparian vegetation, water temperature, and water quality (Gomez 1994; Maxell 2000). Land uses such as timber harvest, road construction, water diversions, and livestock grazing that alter these parameters may lead to population declines (Gomez 1994). Loss of historical beaver populations, fish stocking, and the introduction of non-native fish and amphibian species into Columbia spotted frog habitats also threaten populations (Maxell 2000).

Since this species reproduces and develops in standing pools of water, individuals in polluted habitat may be exposed to high concentrations of environmental contaminants (NatureServe 2003). Rangewide, however, the Columbia spotted frog does not appear to be at risk from acidification or UV-B radiation (NatureServe 2003).

Local Habitat Condition, Population, and Trend

The area of analysis for Columbia spotted frogs is confined to the project area. Columbia spotted frogs are known to move overland between suitable habitats. The longest recorded overland migrations by Columbia spotted frogs on the S-CNF were greater than 1,000 meters, or about 0.7 mile (Pilliod 2001). However, most Columbia spotted frogs remain within less than 0.5 mile of wetlands and streams (NatureServe 2003). The project area is spread over more than fifty square miles and is more than large enough to adequately depict project-level effects to resident Columbia spotted frogs.

Columbia spotted frogs are common to abundant in suitable habitat (including irrigation ditches) across the Forest. Based on inventory and monitoring, this species can reasonably be expected to occur wherever there is suitable habitat (O'Siggins 1995). Because of an apparent upward trend in source habitat (riparian areas) and the extensive occurrence record of this species across the Forest, the population trend for Columbia spotted frogs on the Forest is conservatively estimated to be stable (USFS 2004).

Columbia spotted frogs are known to occur in the Dump Creek and the Bob Moore Creek subwatersheds based on incidental observations (NRIS Fauna database 9/2005), and in the Moose Creek Subwatershed based on sightings during fisheries and amphibian surveys (S-CRD data 2000, 2004, 2005). Columbia spotted frogs have also been observed in the East Boulder Creek, Jesse Creek, and Napias Creek drainages adjacent to the project area. Columbia spotted frogs have not been detected to date during tailed frog inventories or fisheries inventories of other streams in the project area. Nonetheless, it is assumed that Columbia spotted frogs are present in suitable habitat throughout the project area.

Lentic and lacustrine habitat for the Columbia spotted frog within the project area is spotty and irregularly distributed. Most of the habitat has been affected by historical grazing, mining and irrigation practices (see Cumulative Effects below). The habitat is characterized by occasional ponds, wet meadows, and numerous smaller wetlands connected by dendritic stream courses. Larger streams with a gentle gradient were dredged 100 to 150 years ago. Many of the ponds are associated with dredge mining in floodplains. Riparian and hydric vegetation around ponds and along streams is often limited due to past land uses.

Direct and Indirect Effects

Alternative 1 - No Action

The District would continue efforts to improve management of cattle on the Diamond-Moose cattle allotment, particularly in wet meadows and riparian areas.

The proposed road and travel management improvements would not be implemented. There would be no reclamation of roads close to streams. There would be no elimination of travel routes through wet meadows. Motor vehicle travel through these sites would continue, contributing to further resource degradation. This would undermine ongoing restoration efforts and continue to contribute to habitat degradation for Columbia spotted frogs.

Alternatives 2, 3 and 4

Direct and indirect effects to Columbia spotted frogs from implementation of the proposed vegetation treatments would be unlikely. The impacts of timber harvest to amphibians often appear to be related to the effects of roads rather than the harvest (Maxell 2000). Moreover, few of the proposed harvest units contain or lie adjacent to habitat suitable for Columbia spotted frogs.

There is no breeding or hibernating habitat in or directly adjacent to the lodgepole pine units. All proposed lodgepole pine units are one mile or more from potential breeding habitat, with the exception of proposed units 13-M and 19-M. These units are located within 0.5 mile of dredge ponds near the mouth of Daly Creek. It is not known whether Columbia spotted frogs use these ponds, but it is reasonable to assume that they do. These proposed units are located on benches dominated by lodgepole pine and contain no wetlands or riparian corridors. Spotted frogs would be most likely to move along riparian corridors (NatureServe 2003) and probably would never be present in the proposed units since they do not contain surface water.

There is no breeding or hibernating habitat in Deriar Creek for Columbia spotted frogs in or adjacent to proposed unit 700-S. The stream channel and riparian area have been severely impacted by cattle. In addition, Deriar Creek is usually dry during the summer months.

Columbia spotted frogs are known to be present approximately 0.5 mile southwest of proposed unit 53-M in the Dump Creek drainage. Migrating Columbia spotted frogs might also occasionally be present in or near proposed units 52-M, 53-S and 54-S since there are scattered small bogs in each of these units. These units do not contain suitable year-round habitat for Columbia spotted frogs.

These units would be harvested during the dry season to protect soil and vegetation resources. All seeps and springs in the unit would be protected from direct disturbance during harvest activities. Harvest equipment would be limited to designated skid trails and would not be permitted to operate on sites with year-round surface water. Columbia spotted frogs would not likely be present in the units during this season of harvest and would not be disturbed by harvest activities.

Since Columbia spotted frogs use wet meadows with surface water during the summer (Pilliod 2001), resident Columbia spotted frogs would benefit indirectly from the aspen

restoration activities proposed in unit 53-M. Soil friability, soil water-holding capacity, wetland vegetation recovery, and the amount of surface water present would all improve over time. These outcomes would provide Columbia spotted frogs with improved summer habitat conditions.

Implementation of the proposed road reclamation and travel management actions would benefit Columbia spotted frogs in two ways. First, there would be immediate benefits where current road-related impacts to streams and wet meadows are halted. This would prevent further degradation of aquatic and riparian resources, allowing the healing process to begin. Second, an overall gradual improvement in watershed conditions as a result of road closures or decommissioning actions would benefit all species that depend on aquatic and riparian habitats, including the Columbia spotted frog. Long-term benefits would include stabilization of stream banks, reduced erosion and channel downcutting, regeneration of riparian vegetation, and improved water retention. However, these benefits could not be fully realized without concurrent improvements in livestock management (B. Rieffenberger pers. comm.).

Cumulative Effects

The Columbia spotted frog has been affected cumulatively within the project area by road construction, livestock grazing, special uses, and mining.

Road construction and road use have affected habitat for Columbia spotted frogs in a number of ways. Road densities in the project area are high to very high (see Roads). Roads in the project area bisect numerous streams, meadows, and wetlands or are often located next to streams or in floodplains. Motorized vehicle travel across wet meadows on user-built roads is common. Direct effects to Columbia spotted frogs may include mortality, displacement, and changes in dispersal patterns (Gomez 1994). Indirectly, road construction and use cause habitat fragmentation, soil compaction, altered flow patterns, loss of wetlands, and the introduction of sediments and contaminants to water bodies (Gomez 1994; Maxell 2000).

The proposed roads and travel management actions would reduce the number of year-round open motor vehicle travel routes through some wet meadows and alongside some streams (Table 12). This would improve the success of on-going watershed restoration efforts and contribute to improved habitat conditions for Columbia spotted frogs.

Cattle have impacted riparian areas, wetlands, and meadows throughout the project area. Effects of livestock use include the loss of riparian and wetland vegetation, soil compaction, bank instability, downcutting, lowering of the water table, increased water temperatures, and eutrophication of ponds and lakes from cattle feces. These impacts result in reductions or loss of Columbia spotted frog foraging habitat, protective cover, prey species, and suitable breeding sites (Koch et al. 1997).

Water diversion for irrigation and mining purposes occurs or has occurred on a number of streams in the project area, in the Moose, Salmon-Fenster and Salmon-Wallace subwatersheds. Water diversions affect amphibians by changing hydroperiods (i.e. the amount of time and season in which a water body contains surface water), lowering watertables, and drying out wet meadows, wetlands, and riparian areas (Gomez 1994).

Cumulatively, these diversions have resulted in permanent habitat loss as well as fluctuating hydroperiods that interfere with breeding, metamorphosis, and foraging.

Much of the available amphibian habitat in the project area has been impacted by historical dredge and placer mining operations. Widespread historical mining occurred primarily in the Moose Creek Subwatershed, including Daly, Dump, and Moose creeks. Available data indicate that spotted frogs, western toads, tailed frogs, and long-toed salamanders are successfully reproducing in previously mined areas (S-CRD data 2005). While amphibian habitat has been reduced and impaired, there is no evidence (such as disease or deformation) that this has precluded continued occupation in the remaining habitat. Effects to habitat for the Columbia spotted frog included dredging of stream channels, loss of wetlands and floodplains, channel downcutting, changes in hydrology, and contamination of water bodies with mine effluent, including potentially toxic substances. Many of these effects are essentially permanent and the original habitat conditions cannot be restored. Rehabilitation projects are aimed at stabilizing stream channels, preventing additional livestock impacts, and re-establishing riparian vegetation.

Mined areas containing ponded water can offer habitat to amphibians, provided there are no environmental toxins present. Like many amphibians, Columbia spotted frog reproduces and develops in standing pools of water, where they may be exposed to high concentrations of environmental contaminants. Even small amounts of toxins can affect amphibians because of their semipermeable skin and process of development. Effects may include malformation, arrested development, and mortality (Gomez 1994). Spotted frogs are known to occur in ponds created by dredge mining in the Dump Creek and Moose Creek subwatersheds. Placer tailings are seldom associated with environmental toxins (B. Rieffenberger pers. comm.). Although water quality studies in the Dump Creek historical mining district have not focused specifically on toxicity (B. Rieffenberger pers. comm.), it is unlikely that toxins are a problem since spotted frogs are present and reproducing successfully.

Implementation of any of the action alternatives would reduce cumulative effects to spotted frogs in the project area by reducing motor vehicle impacts to wet meadow habitat and riparian habitat. These improvements would enhance habitat capability for spotted frogs in the vicinity where those road closures or decommissioning actions occur. Alternatives 2 and 3 could contribute to an upward trendin source habitat (riparian areas and wetlands) for spotted frogs in the project area.while Alternative 4 would not since road management improvements at Racetrack Meadows are not included in this alternative. Nonetheless, the population trend for this species on the Forest would be expected to remain stable.

Sensitive Terrestrial Animal Species

Terrestrial animal species designated as sensitive are identified by Regional Foresters as species for which population viability is a concern as evidenced by current or predicted downward trends in population numbers, density, or habitat (FSM 2670.5 1995). The Forest Service must implement management practices that ensure that sensitive species do not become threatened or endangered and must implement management objectives for populations or habitat of sensitive species (FSM 2670.22 1995).

The Regional Forester for the Intermountain Region has designated 5 mammal, 8 bird, 1 amphibian, 1 fish, and 7 plant species as sensitive for the S-CNF. This includes the pygmy rabbit and greater sage-grouse, which were designated as sensitive species for the Forest in November 2003.

The Columbia spotted frog has recently been designated as an S-CNF MIS as well as a sensitive species (LRMP MIS amendment 2/2/2004). Effects to the Columbia spotted frog are assessed under the section Spotted Frog.

A number of sensitive species are not analyzed because there is either no habitat in the project area for the species or the project area lies outside the existing distribution of the species. These include the spotted bat, fisher, pygmy rabbit, peregrine falcon, harlequin duck and greater sage-grouse. In addition to the previous analysis of the Columbia spotted frog, the following Forest Service sensitive species are analyzed in this section: Western big-eared bat, wolverine, northern goshawk, boreal owl, flammulated owl, three-toed woodpecker and great gray owl.

Western Big-eared Bat

Existing Condition

Habitat Requirements

The Western big-eared bat is categorized as a cave-dwelling species (ISCE 1995). This species is also known to frequent abandoned mine workings that contain suitable habitat attributes. The Western big-eared bat occurs in a variety of habitats ranging from sagebrush communities to conifer forests, but its distribution within these habitats is limited by the availability of caves or old mine shafts and tunnels (ISCE 1995).

The Western big-eared bat is a sedentary species that roosts colonially, using the same sites year after year (ISCE 1995). Appropriate roosting habitat for several purposes is crucial to Western big-eared bats' use and persistence in any locale (ISCE 1995). Secure sites with the proper characteristics are necessary for maternity roosts, hibernacula (winter roosts), summer day roosts for males and non-reproducing females, and night roosts. In addition, maternity roost sites and summer day roosts need to be located close to quality foraging habitat. Maternity roosts and hibernacula are the roosts most crucial to the survival of Western big-eared bat populations. Bats in maternity roosts are sensitive to disturbance, which can result in injury, abandonment, or death of the infants. They also emerge from hibernacula when disturbed by humans. Bats disturbed by humans may not re-enter hibernation and often starve to death before spring.

Summer day roosts and night roosts often include a variety of sites ranging from caves and mines to culverts and bridges (ISCE 1995). These roosts are usually used by individual bats or small groups. Individual tend to return to the same summer day roosts, but shift often between night roosts.

Western big-eared bats consume noctuid moths almost exclusively. They may also sporadically consume small amounts of other insects (ISCE 1995).

Regional Population and Trend

The population numbers and trend of Western big-eared bats throughout its range in western North America are generally unknown. The stability of populations appears to vary by location (ISCE 1995; Wisdom et al 2000). This species is considered most abundant in the western United States and in Mexico, but more rare in the east (NatureServe 2002). Substantial declines have been noted in some western states, such as California and Oregon (ISCE 1995).

Western big-eared bat numbers appear to have declined considerably from historical levels throughout the interior Columbia River Basin due to anthropogenic threats (Wisdom et al. 2000). The same may be true for the population of big-eared bats in Idaho due largely to roost disturbance in caves, lava tubes, and mines (ISCE 1995). The species is considered very vulnerable to local extirpations that may contribute to a range-wide downward trend due to its restricted roosting requirements and sensitivity to human disturbance (Wisdom et al. 2000).

The Western big-eared bat is assigned a global conservation status rank of G4, meaning that the species is not considered rare and is apparently secure across its range, but there are causes for long-term concern (NatureServe 2002). In Idaho, the Western big-eared bat has a state conservation priority rank of S2? (? denotes uncertainties in the rank), which means that the species may be imperiled in the state because of rarity or other factors that make it vulnerable to extirpation from the state (NatureServe 2002).

The greatest threat to the Western big-eared bat is loss of suitable roosting sites (ISCE 1995). The Western big-eared bat is also very susceptible to human disturbance, especially at maternity roosts and hibernacula (Wisdom et al. 2000). Human disturbance, including destruction of roosting habitat, disturbance to maternity roosts and hibernacula from recreation, and the deliberate killing of bats, poses a serious threat to this species' viability.

Local Habitat Condition, Population, and Trend

The area of analysis for Western big-eared bats is confined to the project area. Effects to Western big-eared bats would be limited to the stands proposed for vegetation treatment and would not extend beyond the project area.

There are known locations of the Western big-eared bat along the Salmon River corridor near Salmon (NRIS Fauna database 12/2003). Western big-eared bats are known to occur in the project area at least seasonally, based on summer inventories.

There are a number of old abandoned mines within the project area, many of which are occupied by various bat species. Based on bat presence/absence surveys or reviews of mine characteristics (e.g. complexity, temperature ranges, air flow), these sites are known

to provide seasonal or year-round bat habitat. The Forest has an active abandoned mines reclamation program. An important component of this program is maintenance of ingress/egress for bats while cleaning up and securing sites for human protection. Several mine sites in or near the project area have been reclaimed with design adaptations that meet the roosting needs of bats.

The Western big-eared bat is a habitat generalist from a foraging perspective. This species uses a variety of cover types and structural stages, including edge habitat (e.g. riparian areas or forest edges), open areas such as meadows, and conifer forests (ISCE 1995). The project area contains a range of forested and non-forested cover types in a variety of structural stages. Any cover type and structural stage that provide suitable conditions for noctuid moths may be used by Western big-eared bats.

The majority of foraging habitats for Western big-eared bats within the project area are functional plant communities. However, the functionality of high value plant communities, particularly aspen, moist upland and riparian shrub, grass/forb meadows, and wetlands has been compromised in the last 120 years. Fire suppression, forest succession, weed invasion, and livestock grazing are factors contributing to reduced habitat capability of these communities (see Aspen and Noxious Weeds for more information).

Direct and Indirect Effects

Alternative 1 - No Action

There would be no effects to Western big-eared bats in the project area. Ongoing inventory, assessment, and reclamation of abandoned mine sites, including sites in the project area, would continue. The needs of bats inhabiting the mines would be considered when determining reclamation actions.

There would be no reduction in overall road densities and open road densities or improvements in travel management. The current effects of roads providing human access to roost sites and possible disturbance of bats would continue.

Alternatives 2, 3 and 4

No proposed harvest units are located near sites occupied by Western big-eared bats, so there would be no direct disturbance to roosts. Beneficial or detrimental effects to Western big-eared bats would be indirect or cumulative.

Dense lodgepole pine stands, where many of the proposed lodgepole pine units are located, are unlikely to be used currently due to high stem densities and lack of a deciduous/herbaceous understory. Removing the majority of the overstory in these stands would increase production of deciduous shrubs and forbs, which would benefit Western big-eared bats. Likewise, regeneration treatments in the proposed aspen units, if successful, would provide foraging benefits for Western big-eared bats.

The proposed timber harvest could increase the risk of spread of existing noxious weed species within the project area or introduce new weed species. Unchecked noxious weed invasion, if it were to occur, would eventually create major changes in plant community structure and composition (Sheley and Petroff 1999). This could result in changes in the density and population composition of the noctuid moth species that are the primary prey

species for Western big-eared bats. Reductions of the prey base would, in turn, reduce Western big-eared bat habitat capability. The likelihood that these impacts would occur would be somewhat reduced by noxious weed prevention measures that have been incorporated into all action alternatives. With appropriate weed control measures, the proposed road decommissioning (30 miles net increase under Alternative 2 and 14 miles net increase under Alternatives 3 and 4) would reduce the risk of future noxious weed invasion or spread along and adjacent to those routes post-project.

Cumulative Effects

The Western big-eared bat is a relatively sedentary species that does not make long distance migrations (ISCE 1995). Bats of individual colonies tend to remain in the same area lifelong. Western big-eared bat colonies make habitual use of specific sites for roosting and foraging, greatly increasing this species' vulnerability to disturbance and habitat alteration or loss (ISCE 1995). Activities that cumulatively affect big-eared bats in the project area include road construction, livestock grazing, mining, wildfires, noxious weed invasion, and noxious weed treatments.

Roads are recognized as detrimental to Western big-eared bat populations (Wisdom et al. 2000). Motor vehicle access to roosts and hibernacula increases the threat of human-caused disturbance that often results in bat mortality (NatureServe 2003). There is year-round motor vehicle access to most of the abandoned mine sites in the project area. The District has undertaken a program to inventory, assess, and reclaim abandoned mine sites with special attention to the needs of bat species that inhabit the mines. One mine site in the project area has been reclaimed and others are under review. The proposed road closures and decommissioning would be beneficial to Western big-eared bats wherever those actions restrict motor vehicle access to abandoned mine sites.

Livestock grazing, wildfire, and noxious weed management can affect Western big-eared bat populations by altering prey species' composition, density, and distribution. Livestock grazing is thought to have consequences to foraging habitat for Western big-eared bats, but the degree is uncertain (ISCE 1995). Wildfire could temporarily decrease foraging habitat, but deciduous shrub communities, particularly in riparian areas, typically recover quickly from fire and exhibit renewed vigor (Kelly 1998). Weed management activities, including prevention, inventory and control actions, that maintain native plant communities would likewise benefit foraging habitat.

Historical mining activity has created a great deal of additional habitat for Western big-eared bats (NatureServe 2002). However, this artificial habitat has uncertain longevity. Mines may be closed as a safety hazard or become unstable and cave in. These events have produced high mortality of bats in colonies using the sites and a loss of the roosts, which in turn has resulted in local declines (Wisdom et al. 2000). Big-eared bat colonies are also easily disturbed by human activity at abandoned mine sites, whether from re-working the mine or from people exploring mine sites out of curiosity (ISCE 1995). Bat mortality is high at sites often visited by people, frequently from deliberate killing (ISCE 1995). The District has implemented a program to block human access to abandoned mines. This program includes eliminating motor vehicle access to abandoned mine sites and installing closure devices on portals that currently house bat populations. These devices prevent human access, but allow free ingress and egress by bats.

Implementation of any of the action alternatives could have the potential to enhance habitat capability for Western big-eared bats in the project area, however Alternative 2 would provide the greatest benefits and Alternative 4 the least.

Wolverine

Existing Condition

Habitat Requirements

Wolverines occur naturally at very low densities and tend to occupy very large home ranges that are based on the abundance and distribution of available food sources (USFWS 2003). In the northern Rocky Mountains, wolverines typically are found in mid to higher elevation montane forests, usually in remote locations (USFS 1994; Copeland 1996). Wolverine distribution coincides with the distribution of wild ungulates, particularly elk and mule deer. Wolverines exhibit an elevational shift in habitat use from summer to winter. During the summer, wolverines typically are found at higher elevations in the subalpine and alpine zones. During the winter, wolverines often move downward into montane forest communities. Important habitat features include large snags and down logs, secure den sites, abundant primary and secondary prey species, and escape cover (Ruggiero et al. 1994; Wisdom et al. 2000).

Reproductive dens are most often found in talus slopes in cirque basins, but wolverine may also den in down logs, hollow trees, or cavities in live trees (Copeland 1996; Wisdom et al. 2000). Research indicates that female wolverines are sensitive to human disturbance at den sites (Copeland 1996; Wisdom et al. 2000).

Wolverines are opportunistic omnivores and scavengers (USFS 1994; Copeland 1996). Scavenging is particularly important during the winter. Wild ungulate carcasses are a mainstay of a wolverine's diet. Small mammals and birds such as snowshoe hares, red squirrels, forest grouse, and a variety of rodents are also eaten. They also eat fruits, berries, and insects when available.

Regional Population and Trend

The wolverine is considered one of the most rare and least understood mammals in North America due to its low densities, low reproductive rate, large spatial requirements, and solitary lifestyle (USFS 1994, Copeland 1996). The population of wolverine in the northern Rocky Mountains is unknown, but it is believed that numbers are low and that there has been a decline from historical levels across the wolverine's range in the northern Rocky Mountains (Ruggiero et al. 1994, NatureServe 2002). Wolverine numbers may now be stable and increasing in the northern Rocky Mountains (Hash 1987, Wisdom et al. 2000, USFWS 2003), although more monitoring is needed to verify this trend.

The wolverine is assigned a global conservation status rank of G4, meaning that the species is not considered rare and is apparently secure across its range, but there are causes for long-term concern (NatureServe 2002). In Idaho, the wolverine has a state conservation priority rank of S2, which means that the species may be imperiled in the state because of rarity or other factors that make it vulnerable to extirpation from the state (NatureServe 2002). The population in Idaho may number about 100 animals, but this is

largely speculation since snow track surveys conducted by the IDFG and the Forest Service are capable only of documenting presence, not determining population size or trend (C. Harris pers. comm.).

Several years ago, the USFWS announced a 90-day finding for a petition to list the wolverine in the contiguous United States. The USFWS found that there is insufficient information regarding all aspects of wolverine ecology, current distribution, and historical range. However, the USFWS also found that wolverines are distributed in the states of Idaho, Montana, Washington, and Wyoming in apparently stable populations. The USFWS concluded that there is no substantive evidence to show listing the wolverine in the contiguous United States is warranted (USFWS 2003).

There are a number of possible threats to wolverines throughout their range. These include increasing levels of backcountry summer and winter recreation, loss of large refugia to harbor thriving sub-populations, fragmentation, loss of dispersal corridors, trapping, and illegal shooting mortality, high road densities, and extensive timber harvest. The USFWS has concluded that too little is presently known about wolverine population numbers, distribution, and dispersion to determine the effects of these threats to wolverine population viability (USFWS 2003).

Local Habitat Condition, Population, and Trend

The area of analysis for wolverines is confined to the project area, even though wolverines travel very widely (females with young kits may occupy home ranges of almost 30,000 acres) (Ruggiero et al. 1994). The project area is large enough to demonstrate effects to a female wolverine with young kits.

Wolverines are known to occur in central Idaho, including the S-CNF (Copeland 1996). There are occasional records of wolverine observations on the S-CRD, including two observations within 12 to 15 air miles of the project area (NRIS FAUNA database 12/2003).

Habitat quality for wolverines is partially predicated on the sufficiency of the area they inhabit to provide for the needs of their prey species, particularly wild ungulates (Ruggiero et al. 1994). The primary prey species for wolverines are elk and mule deer (although rodents are important on a seasonal basis) in the project area (see elk and mule deer in the section Gray Wolf).

The entire project area receives a variety of human uses. Cattle occupy the Diamond-Moose Allotment from spring through fall in the project area. The project area has been intensively managed for timber production and, correspondingly, has high road densities throughout. Timber harvest benefits wild ungulates and, therefore, wolverines, by furnishing new foraging areas. Conversely, road construction associated with timber harvest is detrimental to elk and deer as well as wolverines where roads remain open to motorized vehicle traffic year-round, since habitat security and escapement are greatly compromised in those locations (Ralphs et al. 1981; Ruggiero et al. 1994).

Direct and Indirect Effects

Alternative 1 - No Action

No vegetation treatments would be implemented that would increase transitory forage for primary wolverine prey species (elk and deer). No action would be taken to reduce road densities through road closures or decommissioning. Thus, there would be no improvement in habitat security for wolverines or for their primary prey.

Alternatives 2, 3 and 4

Direct effects to wolverines from the action alternatives would be improbable since wolverines typically travel many miles in a day. If there were any contact, it would likely be only short, chance encounters between harvest personnel and wolverines.

The indirect effects of timber harvest to wolverines are uncertain (Ruggiero et al. 1994). Wolverines are habitat generalists in terms of foraging and seem to benefit from a diversity of cover types and structural stages (Wisdom et al. 2000). It is not certain, though, that all forest openings can be considered comparable. Research in Montana found that clearcuts and recent burns were avoided by wolverines while traveling (Hornocker and Hash 1981). However, Copeland (1996) found that wolverines in his central Idaho study area routinely crossed natural openings. Based on this lack of knowledge, it is not possible to determine the effects of the proposed vegetative changes to individual wolverines that may occupy habitat in the project area or to wolverine distribution and productivity. Since elk and deer are the primary prey species for wolverine, timber harvest practices that promote elk and deer productivity would seem to potentially benefit wolverine as well (Ruggiero et al. 1994).

However, if all habitat features necessary for wolverine reproduction and survival are not present, then promoting prey species' productivity is compromised. Wolverines appear to be dependent on escape cover, secure den sites, mature forest stands, and protection from human-caused mortality to maintain population numbers (Ruggiero et al. 1994; Wisdom et al. 2000). Therefore, in order for timber harvest to provide benefits to wolverine, provisions to retain these features would be necessary.

The action alternatives would provide for these needs. Snags and downed woody debris would be retained in harvest units. Patches of dense mature forest would be retained between harvest units and within riparian habitat conservation areas. Proposed road management actions that reduce road densities and year-round open road densities would offer improved habitat security for wolverines and for elk and deer in those portions of the project area where the road closures or decommissioning are implemented.

Cumulative Effects

Activities that cumulatively affect wolverines in the project area include past timber harvest and associated road construction, wildfires, noxious weed invasion, and noxious weed management.

The balance of effects of timber harvest to wolverines is uncertain (Ruggiero et al. 1994). However, there are thought to be several threats to wolverines resulting from vegetation alteration. Loss of mature montane and subalpine forest is believed to be detrimental, since these forest types are important to successful wolverine reproduction (Wisdom et

al. 2000). Likewise, the loss of snags is indicated as detrimental to successful wolverine production. There has been extensive harvest of the subalpine fir habitat type in the project area, but most of this has been in the lodgepole pine cover type. Within the project area, high elevation conifer stands are unharvested, as is the majority of the Douglas-fir cover type. Riparian habitat conservation area buffers are applied to all intermittent and perennial streams as well as to wetlands. These buffers provide linkage among habitats in different cover types and structural stages.

Human disturbance at den sites, trapping, and hunting mortality are identified as affecting wolverine populations (Ruggiero et al. 1994). Roads and road densities increase the probability of negative human-wolverine encounters (Wisdom et al. 2000). Road densities in the project area are high to very high. Throughout much of the project area, high road densities compromise security offered by topography and forest cover. The proposed road management actions would provide a slight decrease in open road densities, which would improve habitat security and reduce the risk of noxious weed transmission in locations where the road closures or decommissioning are implemented.

The effects of wildfire to wolverine are largely unknown; however, the availability of adequate year-round food sources seems more important than particular cover types or structural stages (Ruggiero et al. 1994). Therefore, wildfires that improve habitat for elk and deer would seem to be beneficial to wolverine, provided other needs are met. The 2000 Fenster fire changed forest succession on over 1,000 acres within the project area. Elk and deer were observed in the burned area as soon as vegetation began resprouting after the fire. The Fenster fire area will provide increased forage for several decades.

Implementation of the action alternatives would create new transitory forage for the wolverine's primary prey species, offsetting a loss of current forage as older units regenerate. These forage increase could be affected over the long term by the increased risk of transmitting noxious weeds into currently un-infested areas or establishing new weed species in the project area.

Since habitat capability for wolverines is partially dependent on prey base, effects to elk and deer likewise affect wolverines. Wild ungulate winter range in the project area is very vulnerable to the rapid spread of spotted knapweed. The likelihood of new invaders (e.g. blue weed) establishing, increases the threat. Proposed weed prevention measures are expected to reduce the risk of noxious weed invasion during project implementation. The proposed road closures and decommissioning actions would also slow the spread of noxious weeds, providing a balance that maintains overall stable habitat capability for wolverine in the project area. Implementation of any of the action alternatives would not impact wolverines or their habitat. Alternative 2 would provide the greatest benefits to wolverine in terms of reduced road densities and improved travel management while Alternative 4 would provide the fewest.

Northern Goshawk

Existing Condition

Habitat Requirements

In the western United States, the northern goshawk occurs in montane coniferous forests (The Nature Conservancy 1999). Ponderosa pine, Douglas-fir, spruce-fir, and lodgepole

pine cover types are usually selected by northern goshawks in the Intermountain West. Occasionally, aspen clones are also used. Important habitat components include mature to old forest stands, large trees, large snags, large downed logs, and a variety of abundant prey (Hayward et al. 1990).

Northern goshawks typically nest in stands of mature or old conifers with a moderate to high degree of canopy closure and dense patches of large trees capable of holding their bulky stick nests (Hayward et al. 1990). Northern goshawks may also nest in a mosaic of younger forest stands, provided necessary structural components are present as small patches of mature forest with large trees (Federal Register 1998). Most nest stands are located on gentle terrain near water, often with a northerly exposure (Hayward and Escano 1989). On the Salmon-Challis National Forest, a number of northern goshawk nest sites have been located in lodgepole pine stands with a high degree of advanced dwarf mistletoe infestation.

Goshawks prey on a variety of small mammals and birds, including rodents, tree squirrels and ground squirrels, forest grouse, and songbirds (Hayward et al. 1990). Northern goshawks readily forage in a range of forested habitats, including closed canopy forest with an open understory, open canopy forest, forest edges, and meadows. Dense conifer stands with a high percentage of small understory trees do not provide suitable foraging habitat since northern goshawks hunt in the understory. Stands with these characteristics restrict goshawk flight and reduce growth of forbs that support goshawk prey species (Wisdom et al. 2000).

A northern goshawk pair's home range consists of three components; (1) the nest area, (2) a buffer area around the nest site, known as the post fledging-family area, where young goshawks learn to forage while still under the care of their parents, and (3) a larger foraging area used by the adults (Graham et al. 1995). The nest area is usually quite small, often no more than 20 to 30 acres in size. A northern goshawk pair typically maintains several alternate nest sites within its territory (Reynolds et al. 1992). The post fledging-family area that surrounds the nest area is usually between 300 and 600 acres. Adult goshawks actively defend the nest area and post fledging-family area. The foraging area is typically quite large, ranging from about 5,000 acres to 10,000 acres in size (Reynolds et al. 1992). The foraging area is not actively defended from other northern goshawk pairs. Northern goshawk pairs are faithful to their territory and return to it annually (Wisdom et al. 2000).

Regional Population and Trend

North American Breeding Bird Survey data indicate an overall stable trend from 1966 through 2002 in the Western Breeding Bird Survey Region, which includes Idaho (Sauer et al. 2003). These data may be deficient in one or more ways and may not accurately reflect the real trend. For example, northern goshawks are typically detected at low levels by the Breeding Bird Survey, resulting in low sample sizes. Sample size is one factor that affects the accuracy of the data. In addition, the northern goshawk may be declining in one or more physiographic regions that comprise the Western Breeding Bird Survey Region (Sauer et al. 2003).

The northern goshawk is assigned a global conservation status rank of G5, meaning that the species is considered widespread, abundant, and secure across its range (The Nature

Conservancy 1999). In Idaho, the northern goshawk has a state conservation priority rank of S4, which means that the species is considered apparently secure and usually widespread. While an S4 species may be uncommon, it is not considered rare.

In 1997, the U.S. Fish and Wildlife Service initiated a status review in response to a petition for listing the northern goshawk in the United States west of the 100th meridian (Federal Register 1998). This status review found that the northern goshawk is still widely distributed throughout its historical range and there is no evidence of a declining trend (Federal Register 1998). Based on this status review, the Service found that listing the northern goshawk in the United States west of the 100th meridian was not warranted (Federal Register 1998). The 9th U.S. Circuit Court of Appeals recently upheld a 2001 decision made in U.S. District Court that ruled that the Service was not arbitrary and capricious in coming to this decision (Center for Biological Diversity *versus* Badgley 2003).

While the northern goshawk is secure across its range, there have been widespread alterations to habitats historically occupied by this species (Federal Register 1998). Timber management practices that remove large trees and greatly reduce or eliminate canopy closure have been identified as potential risks to northern goshawk populations (Federal Register 1998, The Nature Conservancy 1999). Past harvest techniques such as extensive clear cutting have altered the distribution, amount, and structural features of goshawk habitat. However, the U.S. Fish and Wildlife Service status review concluded that changes in forest management have largely halted this decline and that habitat conditions for northern goshawks are improving in many areas (Federal Register 1998).

Local Habitat Condition, Population, and Trend

The area of analysis for northern goshawks is confined to the project area. At almost 31,000 acres, the forested portion of the project area is large enough to support multiple pairs of northern goshawks (NatureServe 2003). The project area would reasonably depict project level effects to these pairs.

The northern goshawk is considered a rare resident in the upper Salmon River drainage (Roberts 1992). On the Salmon-Challis National Forest, northern goshawks occur primarily in mature to old stands of lodgepole pine or mixed conifers with a high degree of canopy closure and numerous large trees (Craig 1992, NRIS Fauna database 12/2003).

The most recent surveys for northern goshawks in the project area were conducted in May 2005 (Salmon-Cobalt Ranger District 2005 northern goshawk inventory data). No goshawks were detected in the project area during these surveys or during earlier surveys. However, northern goshawks are known to occur in the project area based on incidental observations (NRIS Fauna database 9/2005).

Douglas-fir, lodgepole pine, and mixed conifer stands in the understory reinitiation, multi-strata young forest, and old forest structural stages provide goshawk habitat in the project area. Of the unharvested Douglas-fir in the project area, 8,500 acres occur in these three structural stages. Of the 900 acres of lightly harvested Douglas-fir in the project area, approximately 650 acres provide suitable northern goshawk habitat. This previous harvest yielded a reduction of three percent in suitable Douglas-fir habitat, while

97 percent of the Douglas-fir habitat suitable for northern goshawks remained available for use. None of these acres would be affected by the currently proposed timber harvest.

Over 12,000 acres of lodgepole pine and mixed conifer stands occur in the project area. Of this acreage, there are currently 7,600 acres of unharvested lodgepole pine and a little more than 2,000 acres of unharvested mixed conifers in structural stages suitable for use by northern goshawks. Approximately 2,500 acres of lodgepole pine and a little more than 200 acres of mixed conifer stands have been harvested within the project area to date. All or most of the overstory was removed from these stands through timber harvest. These stands at the time of harvest would have provided suitable habitat for three-toed woodpeckers. Therefore, at present, seventy-eight percent of lodgepole pine and mixed conifer habitat within the project area remains for use by northern goshawks, while 22 percent is now unsuitable.

The amount of time these stands will remain unsuitable for northern goshawks depends on time since timber harvest and the productivity of the site. Most lodgepole pine stands on the Forest typically require about eighty to one hundred years for trees to become large enough to provide nesting habitat for northern goshawks (BK Thin Program, 1993, 9/1/2005 model run). Since most lodgepole pine units were harvested between the 1960s and the 1980s, these stands will not provide even the minimal habitat requirements of northern goshawks for at least another thirty to fifty years.

Direct and Indirect Effects

Alternative 1 - No Action

Northern goshawks are known to nest and forage in aspen stands set in a matrix of coniferous forest (NatureServe 2003). The current condition of many mature aspen clones in the project area appears to provide suitable nest sites for northern goshawks. Due to degraded understory conditions, far fewer appear to provide high quality foraging habitat. Nonetheless, aspen clones in the project area are probably used at least occasionally by northern goshawks. There would be no regeneration of aspen in fourteen areas containing substantial amounts of treatable aspen. Aspen clones in the project area would continue to decline without some event to set back forest succession and stimulate sprouting. The acreage occupied by aspen would further decrease, resulting in fewer acres of nesting and foraging habitat for northern goshawks.

Most northern goshawk nest sites on the Forest have been found in the lodgepole pine cover type. There would be no effects to goshawk pairs, since no vegetation treatment of lodgepole pine stands would occur under Alternative 1.

Alternative 2

Approximately 1,062 acres of lodgepole pine in 54 proposed units would be clearcut harvested. Many of these units provide the habitat features selected by northern goshawks for nesting. It is not known whether northern goshawks occupy territories in the lodgepole pine stands proposed for harvest, since surveys to date have not been successful in locating and defining northern goshawks territories in the project area. As top-level predators, northern goshawks typically occur at low densities (Braun et al. 1996), and it is possible that no northern goshawk nest territories would be harvested. However, since northern goshawks establish large territories, it is likely that at least some

of the proposed harvest would occur in or near northern goshawk post fledging-family areas or foraging territories.

Eighty percent of the overstory would be removed in the lodgepole pine units, while twenty percent of the overstory would be retained in patches. While this would meet Forest guidelines for snag retention and snag replacements, it would not meet the minimum needs of northern goshawks. Since the northern goshawk is an interior forest species that does not nest in open areas, these units would no longer provide suitable nesting habitat for northern goshawks. Implementation of the lodgepole pine harvest would reduce habitat for northern goshawks in the project area by 1,062 acres for eighty to one hundred years.

The effects of harvest would be variable should northern goshawk territories coincide with proposed harvest, depending on several factors such as location, season, and the amount of disturbance. If harvest were to occur in nest stands, the stands would be completely or partially destroyed by the harvest. This would require northern goshawk pairs to locate another nesting territory. The degree of the effect would depend on the pair finding another suitable stand that was not already occupied by another pair.

Stands would be harvested in late summer (after July 31) or during the fall and winter (dry or frozen conditions). Northern goshawk young will have fledged by late summer and would be able to move out of the way of harvest operations. Winter operations would not directly affect northern goshawks, as they migrate out of their territories for the winter.

The larger harvest units (i.e. 10 – 20 acres or larger) would detract from post fledging-family areas and from foraging territories since northern goshawks typically avoid larger openings (Hayward et al. 1990). If several harvest units, particularly larger units, were located in post fledging-family areas or foraging territories, northern goshawk pairs might have to enlarge their territories to accommodate the loss of habitat. This could force northern goshawks into less suitable habitat, especially because so much of the lodgepole pine and Douglas-fir cover types in the project area has already been harvested (refer to Cumulative Effects below). Small harvest units would likely have little effect to post fledging-family areas and foraging territories since northern goshawks will hunt along the margins of small openings (Hayward et al. 1990).

Northern goshawks are known to nest and forage in aspen stands set in a matrix of coniferous forest (NatureServe 2003). The current condition of many mature aspen clones in the project area appears to provide suitable nest sites for northern goshawks. Due to degraded understory conditions, far fewer appear to provide high quality foraging habitat. Nonetheless, aspen clones in the project area are probably used at least occasionally by northern goshawks.

The proposed aspen treatment in unit 700-S would have no effect to northern goshawks. The stand is located near the bottom edge of conifer distribution in the project area and is largely surrounded by sagebrush/grassland communities. While northern goshawks have been observed to forage occasionally along sagebrush ecotones, they nest in montane forest habitats (NatureServe 2003).

The proposed aspen treatments are intended to change forest succession and promote aspen regeneration (refer to section on Aspen). The current condition of the clones proposed for treatment would be drastically altered (refer to Pileated Woodpecker). Treated aspen clones could provide quality foraging opportunities for northern goshawks as the clones regenerated. However, even with the proposed harvest prescriptions, the aspen clones would provide only marginal conditions for nesting northern goshawks post-treatment. The 569 acres of treated clones would not provide preferred northern goshawk nesting habitat for many decades, since they prefer mature, closed forest (i.e. high canopy closure) conditions with abundant large trees. In the future, the proposed aspen restoration, in conjunction with other restoration or rehabilitation projects, would contribute to enhanced nesting and foraging habitat conditions.

Northern goshawks depend on numerous snags and downed logs to provide a variety of abundant prey. The 30-mile net increase in road closures and decommissioning under Alternative 2 would benefit northern goshawks, since the abundance of snags and large downed logs would increase over time along the routes that would be closed or decommissioned.

Alternative 3 and 4

Effects would be the same as Alternative 2, with the following differences in the extent and location of impacted areas: Only 977 acres would be treated in lodgepole pine units. Four units would not be treated and several additional units would be reduced in size. Potential impacts to goshawk pairs and habitat in lodgepole pine habitats would thus be proportionately less than Alternative 2.

Thirty-two fewer acres under Alternative 3 and 60 fewer acres under Alternative 4 would be treated in aspen units providing proportionately fewer benefits compared to Alternative 2.

Finally, there would be a 14-mile net increase in road closures and decommissioning under Alternatives 3 and 4, yielding proportionately less benefit in terms of future potential for snag retention and recruitment of large, down logs compared to Alternative 2.

Cumulative Effects

Activities that cumulatively affect northern goshawks in the project area include past timber harvest and associated road construction, livestock grazing, wildfires, firewood cutting, and the Dump Creek historical mining district.

Approximately 4,500 acres of Douglas-fir have been harvested in the project area to date. The last harvest of Douglas-fir occurred in 1993. Most units were heavily harvested (50% to 90% of the overstory trees were removed). Most of these stands were harvested in the late 1970s to mid 1980s and are only 20 to 25 years old. Few of these stands currently provide northern goshawk nesting habitat. Most do not offer foraging habitat to northern goshawks. Approximately 2,500 acres of lodgepole pine have been harvested in the project area to date. The last harvest of lodgepole pine in the project area occurred in 1997. Most lodgepole pine units are less than 30 years old and do not currently provide foraging or nesting habitat for northern goshawks. In addition to past harvest impacts, the proposed vegetation treatments would reduce goshawk nesting and/or foraging habitat

for approximately 80-100 years by 1,631 acres under Alternative 2 and 1,514 acres under Alternative 3. The proposed vegetation treatments would decrease currently suitable nesting/fledgling habitat for northern goshawks by approximately 9 percent (Alternative 2) or 8 percent (Alternative 3), leaving approximately 78-79 percent of all northern goshawk habitat in the project area in a suitable condition.

Livestock grazing in the project area has affected northern goshawks primarily through impacts to riparian areas and aspen clones. Most aspen clones in the analysis area have been moderately to severely impacted by decades of livestock use (refer to Aspen section). The degradation has reduced habitat capability for prey species through changes in plant community composition, lowering of the water table, soil compaction and erosion, stream downcutting, and lack of successful aspen regeneration. This in turn has reduced the value of the clones as foraging habitat. The proposed vegetation treatments would reduce goshawk habitat suitability in the aspen cover type on 569 acres for Alternative 2, 537 acres for Alternative 3 and 509 acres for Alternative 4 for about 80 years. However, after the treated areas regenerate, the extent of healthy aspen clones in the project area would increase to provide at least as many acres of suitable aspen habitat as existed prior to project implementation.

Non-lethal fire regimes that maintain a mosaic of forest conditions are beneficial to northern goshawks (Graham et al. 1995). However, high severity, stand-replacing fire may create openings larger than those typically used by northern goshawks. The 2000 Fenster fire burned more than 500 acres of primarily Douglas-fir and mixed conifer stands in the southeastern portion of the project area. The burned area will not provide nesting habitat for northern goshawks for almost a century. Since most of the stands burned at high severity, goshawks may not use the area for foraging for many decades as well.

Snags and large, down logs are important to northern goshawk prey species and indirectly to goshawks as well. A major human use of sound snags is for firewood. The constant removal of sound snags by firewood cutters ultimately yields an overall reduction in dead wood from an area because the progression of decay from sound snags to soft snags to down logs is interrupted. Proposed project mitigations would retain all snags in treatment units, unless they pose a safety concern. Thus the proposed vegetation treatment actions would have no effect on snag retention in those units. Proposed road closures and decommissioning would, over time, increase the amount of snags and down logs along 30 miles of road (Alternative 2) or 14 miles of road (Alternatives 3 and 4). The current insect outbreak in the area may also contribute to snag and large, down wood abundance; however, the duration and extent of this outbreak in the project area is unknown.

Mining activity in the Dump Creek drainage resulted in a loss of aspen clones, wet meadows, and wetlands at the head of Dump Creek. This habitat can never be fully recovered since the Dump Creek drainage now exists as a deep and unstable chasm. Current and future restoration projects to stabilize vegetation and watershed resources would benefit northern goshawks.

Implementation of any of the action alternatives would yield both positive and adverse effects to northern goshawk habitat. However, Alternative 2 would yield the greatest benefits and fewest impacts by providing the most improvements in road densities and

travel management. Alternative 4 would provide the fewest benefits and the most adverse effects.

Boreal Owl

Existing Condition

Habitat Requirements

Boreal owls use high elevation mature and old forest habitat with a high degree of canopy closure and abundant large snags (Hayward and Verner 1994). This species occurs primarily in subalpine fir or mixed conifer forest, but may also use Engelmann spruce and high elevation, mesic Douglas-fir stands (Reynolds et al. 1989). Necessary habitat components include large snags, mature forest, hunting perches, and day roost sites.

The boreal owl is a secondary cavity nester that uses cavities excavated by the larger woodpecker species, mainly pileated woodpeckers, and northern flickers (Hayward and Verner 1994). Most documented boreal owl nest sites in central Idaho have been in old pileated woodpecker cavities (Hayward and Verner 1994). A sufficient number of snags containing woodpecker cavities for boreal owls to use as nest sites are obligatory to provide suitable habitat.

Boreal owls use mature forest stands with abundant prey for hunting, typically selecting microsites with the highest densities of rodents (Hayward and Verner 1994). Boreal owls hunt at night from perches. Voles are the primary prey species. Boreal owls also prey on mice, shrews, gophers, squirrels, chipmunks, small birds, and insects.

During the day, boreal owls roost in trees that provide protection from weather and predators. Roost sites are usually located in dense conifer patches with moderate to high canopy closure (Hayward and Verner 12994).

Regional Population and Trend

Population numbers in North America are unavailable for this species (Hayward and Verner 1994). The trend in the United States and in Canada is also unknown (Hayward and Verner 1994). The boreal owl is assigned a global conservation status rank of G5 (NatureServe 10/2002). This means that the species is considered widespread, abundant, and secure across its range.

In North America, an increasing alteration of forest structure in boreal owl habitat would suggest a downward trend (Hayward and Hayward 1993, Hayward and Verner 1994). The boreal owl has a state conservation priority rank of S2 in Idaho, which means that the species is considered imperiled due to rarity or factors that make it highly vulnerable to extirpation from the state (NatureServe 10/2002). The boreal owl is widely distributed in suitable habitat in Idaho, based on presence/absence surveys (Reynolds et al. 1989), but the population status is uncertain.

The primary threat to the viability of boreal owl populations is timber harvest (Hayward and Hayward 1993, NatureServe 10/2002). Even-age timber harvest practices that eliminate mature forest structure affect boreal owls. The most serious effects of these structural changes are reductions in prey densities and the availability of suitable nest sites (Hayward and Verner 1994). Management practices that diminish or eliminate

habitat components required by large woodpeckers are highly detrimental to the boreal owl since it is an obligate secondary cavity nester.

Local Habitat Condition, Population, and Trend

The area of analysis for boreal owls is the same as the analysis area for old growth. Apparently, suitable habitat for boreal owls in the project area is isolated from other suitable habitat to the north, east, and south by large expanses of xeric conifer and sagebrush/grass plant communities. The analysis area for designated old growth includes apparently suitable habitat for boreal owls west of, and contiguous to, the project area.

There are almost 7,000 acres of subalpine fir and Engelmann spruce in the analysis area, most of which is available for use by boreal owls. Subalpine fir is confined mostly to high elevation drainage bottoms and frost pockets. Engelmann spruce stands are scattered throughout the analysis area along high elevation stream reaches and wetlands. In addition to providing prime habitat for boreal owls, these cover types also provide linkage among the other boreal owl habitats in the project area.

There are approximately 15,000 acres of Douglas-fir cover type above 6,000 feet in the analysis area. Douglas-fir habitat suitability for boreal owls in the analysis area is in flux with the recent bark beetle outbreak. Tree mortality is beneficial up to a point. However, if the overstory experiences complete mortality and the stand is exposed to increased sunlight and drying, then fewer large woodpeckers roost and nest in the stand. When habitat capability for woodpeckers declines, habitat capability for secondary cavity nesters, such as the boreal owl, declines as well.

The boreal owl is considered a rare resident in the upper Salmon River drainage (Roberts 1992). Calling surveys have located this species in the Williams Creek drainage south of the project area (NRIS Fauna database 2003). Due to a lack of presence/absence inventories and no records of any incidental sightings, it is not known if boreal owls occur in the project area. However, apparently suitable habitat is present above 6,000 feet in elevation and the species is assumed to be present year-round.

Direct and Indirect Effects

Alternative 1 - No Action

There would be no effects to boreal owls from regeneration of aspen in fourteen areas containing substantial amounts of treatable aspen. However, aspen clones in the project area would continue to decline without some event to set back forest succession and stimulate sprouting. The acreage occupied by aspen would further decrease.

No action would be taken to reduce road densities through road closure or decommissioning, which would reduce snag losses in boreal owl habitat. The high density of year-round open roads would continue to contribute to attrition of large snags and logs and an interruption of the wood decay process essential to boreal owls.

Alternative 2

There are approximately 6,400 acres of unharvested mature Douglas-fir and about 1,500 acres of unharvested mature subalpine fir and Engelmann spruce in the project area. Most Douglas-fir is located on the east side of the project area. Subalpine fir is mostly confined to high elevation drainage bottoms and frost pockets. Engelmann spruce is

scattered throughout the forested portion of the project area along streams and around bogs. These cover types provide linkage among the various habitats in the project area.

The proposed harvest of lodgepole pine in the project area would be unlikely to directly or indirectly affect boreal owls. In the Rocky Mountains, boreal owls nest in mature stands of mixed conifers, typically containing large subalpine fir, Englemann spruce, or mesic Douglas-fir (Hayward and Verner 1994). A few of the lodgepole pine stands contain clumps of mature subalpine fir, Engelmann spruce, and Douglas-fir, but most do not. There would be no harvest in riparian habitat conservation areas where most of the Engelmann spruce is located. All Douglas-fir would be retained in lodgepole pine units.

The proposed treatment in aspen unit 700-S would have no effect to boreal owls. The stand is located near the bottom edge of conifer distribution in the project area and is largely surrounded by sagebrush/grassland communities. This stand does not constitute habitat for boreal owls.

Fourteen other units containing substantial amounts of aspen and potential boreal owl habitat would be treated to promote aspen regeneration. Boreal owls are known to regularly nest in aspen clones with suitable characteristics (Hayward and Verner 1994), and retaining large diameter trees in aspen clones is a recommended conservation measure for boreal owls (NatureServe 2003). Direct effects due to disturbance would be mitigated by permitting harvest operations in the units to occur only after July 31 annually to protect active raptor and pileated woodpecker nests

The silvicultural prescription in the aspen units would maintain current wildlife habitat within and around the clones as much as possible while removing enough overstory and conifer ingrowth to promote aspen sprouting. Habitat capability for boreal owls would be temporarily reduced in the aspen regeneration units, for a temporary loss of five percent of currently suitable habitat, but would quickly begin to regain habitat capability, provided aspen regeneration is effectively protected. These treatment units would continue to contribute to the needs of woodpeckers and thus boreal owls, albeit at a reduced level until the stands mature in approximately 80-100 years.

Several mitigation measures would be applied to reduce the impacts of proposed vegetation treatments on wildlife habitat. Existing conifer and aspen snags would be retained, except where they pose a safety concern. Four large (20" dbh or greater wherever possible) green Douglas-fir or Engelmann spruce trees per acre would be designated as conifer snag replacements in the aspen treatment units. At least twenty percent of the live aspen trees in each clone would be retained as aspen snag replacements, selecting the largest trees available. Even with these mitigation measures, the aspen clones would provide reduced habitat conditions for pileated woodpeckers and secondary cavity nesters post-treatment.

The 30 miles of road closure and decommissioning actions proposed in Alternative 2 would benefit boreal owls by increasing the amount of snags and large, down logs along the routes identified for closure or decommissioning.

Alternatives 3 and Alternative 4

Effects to boreal owls would be the same as Alternative 2, with the following differences: Aspen treatments that have the potential to affect boreal owl habitat would occur on 5537

acres under Alternative 3 and 509 acres under Alternative 4. The percentage of total boreal owl habitat affected would not change from approximately five percent.

Alternatives 3 and 4 would close or decommission 14 miles of road (compared to 30 miles under Alternative 2), yielding proportionately less benefit in terms of future potential for snag retention and recruitment of large, down logs compared to Alternative 2.

Cumulative Effects

Activities that cumulatively affect boreal owls in the project area include past timber harvest and associated road construction, insect and disease outbreaks, livestock grazing, wildfires, firewood cutting, and restoration projects in the Dump Creek historical mining district.

Almost 2,500 acres of lodgepole pine have been harvested in the project area to date. The last harvest of lodgepole pine in the project area occurred in 1997. Most lodgepole pine units are less than 30 years old and do not currently provide foraging or nesting habitat for boreal owls. Approximately 4,500 acres of Douglas-fir have been harvested in the project area to date. The last harvest of Douglas-fir occurred in 1993. Most Douglas-fir stands were heavily harvested (50% to 90% of the overstory trees were removed). Most of these stands were harvested in the late 1970s to mid 1980s and are only 20 to 25 years old. Few of these stands currently provide nesting or foraging habitat for boreal owls.

High open road densities affect boreal owls largely by allowing motorized access to areas for firewood cutting. Loss of large snags is recognized as a threat to snag dependent species (Bate et al. 1999). Loss of large snags and down logs is recognized as a threat to boreal owls (Hayward and Verner 1994). A major human use of sound snags is for firewood. The constant removal of sound snags ultimately yields an overall reduction in dead wood from an area because the progression of decay from sound snags to soft snags to down logs is interrupted. Road densities in the project area are high (see Roads/Travel Management), but would be reduced under both Alternatives 2 and 3 through proposed road closures and decommissioning (30 miles under Alternative 2 and 14 miles under Alternative 3).

Minor insect and disease outbreaks that favor pileated woodpeckers would benefit boreal owls as well by creating nesting habitat (refer to Pileated Woodpecker for more information).

Livestock grazing has affected boreal owls indirectly through impacts to aspen clones. Most aspen clones in the analysis area have been moderately to severely impacted by decades of livestock use, including changes in plant community composition, lowering of the water table, stream downcutting, soil compaction, and erosion (refer to Aspen). The degradation has prevented aspen sprouting to rejuvenate the clones and has reduced habitat capability for many species that use aspen habitats, including boreal owls.

The effects of fire to boreal owls are largely unknown. However, severe stand-replacing fire is likely detrimental to boreal owls since they are closely linked to mature forest conditions. Boreal owls' primary prey species is the red-backed vole, which occurs almost exclusively in mature to old forested stands (Hayward and Verner 1994), and so

would not likely be present in severely burned forest stands. Secondary prey species such as deer mice might be abundant in burned areas (Hayward and Verner 1994). Boreal owls are known to forage in open areas during the spring and summer months (Hayward and Hayward 1993), so burned areas could offer some foraging opportunities to boreal owls. The burned forested portion of the Fenster fire area would not provide suitable habitat to nesting boreal owls for many decades.

Mining activity in the Dump Creek drainage resulted in a loss of aspen clones, wet meadows, and wetlands at the head of Dump Creek. This habitat can never be fully recovered since the Dump Creek drainage now exists as a deep and unstable chasm. Current and future restoration projects to stabilize vegetation and watershed resources would benefit boreal owls.

The action alternatives would reduce currently suitable habitat for boreal owls in the analysis area by about 550 acres (569 acres in Alternative 2, 537 acres in Alternative 3 and 509 acres in Alternative 4) due to regeneration treatments in the fourteen aspen units. This would reduce the quality of approximately five percent of currently suitable boreal owl habitat in the analysis area for about one hundred years. All action alternatives would reduce open road densities slightly, which would lessen impacts to dead wood resources on which boreal owls depend. Overall, implementation of any of the action alternatives could contribute to stable or slightly improved habitat capability for boreal owls in the project area, however, Alternative 2 would be the most beneficial and Alternative 4 the least beneficial.

Flammulated Owl

Existing Condition

Habitat Requirements

The flammulated owl is typically found in xeric ponderosa pine, Douglas-fir, or a mix of ponderosa pine and Douglas-fir (Hayward and Verner 1994). Stands occupied by flammulated owls have several consistent characteristics. The stands are mature to old with a moderate degree of canopy closure, an abundance of large live trees and large snags, and occasional dense thickets of conifer regeneration or clumps of tightly grown trees (Havward and Verner 1994). These structural characteristics comprise necessary habitat attributes for nesting, foraging, and roosting.

The flammulated owl is a secondary cavity nester. Sufficient large snags with old woodpecker cavities are obligatory for a site to support flammulated owls. Flammulated owls usually occupy pileated woodpeckers cavities in the northern part of their range (Hayward and Verner 1994).

Flammulated owls are insectivores that hunt at night from perches (Reynolds and Linkhart 1992). A major component of their diet is noctuid moths, but they also eat a variety of insects, including beetle, butterfly, cricket, grasshopper and spider species (Reynolds and Linkhart 1992). Flammulated owls forage in large conifers with open crowns, gleaning insects from foliage and branches or on the ground beneath open conifer stands and along forest edges (Hayward and Verner 1994). The ponderosa pine and Douglas-fir stands selected by flammulated owls provide high densities of insects

used by flammulated owls compared to other conifer communities (Reynolds and Linkhart 1992).

Flammulated owls roost during the day in dense clumps of conifer regeneration or patches of closely grown trees (Hayward and Verner 1994). These clumps provide protection to owls during the day.

Regional Population and Trend

Population numbers in the United States are unavailable for this species. The available data are insufficient to determine trend. The flammulated owl has a global conservation status rank of G4, indicating that the species is apparently secure on a range-wide basis (NatureServe 2002). Species with a G4 rating are considered uncommon, but not rare. However, there may be causes for concern regarding long-term viability. The flammulated owl has a state conservation priority rank of S3B for the breeding population in Idaho, which means that the species is considered vulnerable with regard to population viability for one or more reasons (NatureServe 2002). These include rarity, a restricted range, or other factors that could contribute to extirpation in the state.

Current records indicate that the flammulated owl is still well distributed throughout its known historical range and may be locally common in some areas (Hayward and Verner 1994, NatureServe 10/2002). Numbers may be declining in the northern Rocky Mountains, but the data are inadequate and too little is known about the status of this species in the Rocky Mountains to confirm this trend (Hayward and Verner 1994).

Several risk factors may affect flammulated owl populations. The primary threat is habitat loss or alteration resulting from timber harvest that removes large trees and snags (The Nature Conservancy 1999). Timber harvest practices and firewood cutting that severely reduce or eliminate large snags result in a loss of nesting habitat. Timber management that reduces pileated woodpecker populations will be detrimental to flammulated owls as well (Hayward and Verner 1994, NatureServe 10/2002). The use of insecticides to control outbreaks of forest pest insects can also reduce populations of non-target insects important to flammulated owls (Reynolds et al. 1989, NatureServe 10/2002).

Local Habitat Condition, Population, and Trend

The area of analysis for flammulated owls is confined to the project area. Suitable habitat in the project area is isolated from other occupied habitat to the north, south, and west of the project area.

Flammulated owls occur in suitable habitat throughout Idaho and are locally abundant in some areas (Groves et al. 1997). Surveys of the northern portion of the Forest indicate that flammulated owls are present and successfully reproducing in suitable habitat (Atkinson and Atkinson 1990). Presence/absence surveys for flammulated owls were conducted in 1990 along the major ridge system running north and south through the middle of the project area. This survey detected only a single singing male (Atkinson and Atkinson 1990). This survey suggests that flammulated owls are present in the project area, but at low to very low densities. If flammulated owls are present at low to very low densities, then the habitat in the project area may be marginal, possibly because of isolation or other unknown factors.

Flammulated owls most often select pileated woodpecker cavities as nest sites, although flicker and sapsucker cavities are also used where pileated woodpeckers are absent (Hayward and Verner 1994). Pileated woodpeckers appear to be distributed throughout the Douglas-fir cover type in the project area, suggesting that pileated woodpecker cavities would be the main source of nest sites for flammulated owls. This could also indicate that flammulated owls might be distributed throughout the Douglas-fir cover type in the project area.

There are almost 8,000 acres of mature Douglas-fir and Douglas-fir/ponderosa pine that could be utilized by flammulated owls. More than 85 percent of this acreage is multi-strata old forest. These stands are characterized by a broken overstory with large old trees, several lower canopy strata represented by two or more age classes, and vertical and horizontal diversity in the understory. The remaining acreage is in single stratum old forest. The overstory in these stands may be broken or continuous and is dominated by large, old trees. Grasses and forbs are typical in the understory. Conifers may be present in the understory, but are often represented by seedlings and saplings only. Most stands in both of these structural stages are in the mature or early old growth phases. Refer to the section on pileated woodpeckers for more specific information.

Aspen is a highly valuable species for most cavity excavators, including pileated woodpeckers, and secondary cavity nesters. Flammulated owls are known to use cavities in the aspen cover type for nesting (DeByle and Winokur 1985). About 569 acres containing substantial amounts of aspen would be treated in fourteen units to promote aspen regeneration. Refer to the section on Aspen for information on the current condition of aspen.

Direct and Indirect Effects

Alternative 1 - No Action

There would be no regeneration of aspen in fourteen areas containing substantial amounts of treatable aspen. Aspen clones in the project area would continue to decline without some event to set back forest succession and stimulate sprouting. The acreage occupied by aspen would further decrease.

There would be no benefits accrued from improving travel management, reducing overall road densities and reducing open road densities. The high density of year-round open roads would continue to contribute to attrition of large snags and logs and an interruption of the wood decay process essential to flammulated owls.

Alternative 2

Flammulated owls do not use habitats in the lodgepole pine cover type since large woodpeckers tend not to use it. Although there is a small component of Douglas-fir containing large, relict trees in a number of the proposed clearcut units, these are used little, if at all, by pileated woodpeckers (refer to the section on pileated woodpeckers). Furthermore, Douglas-fir or ponderosa pine trees in the proposed lodgepole pine units would not be harvested. Therefore, the proposed lodgepole pine harvest would not affect flammulated owls directly or indirectly.

Implementation of this alternative would not perceptibly affect habitat for flammulated owls. The only Douglas-fir habitat suitable for flammulated owl use targeted for harvest

occurs within or adjacent to the proposed aspen treatment units. The largest Douglas-fir trees would be retained while smaller trees would be thinned from below to promote growth. Healthy Douglas-fir regeneration would be retained to provide a continuum of Douglas-fir habitat. This would indirectly benefit the pileated woodpecker and, in turn, the flammulated owl. Direct effects due to disturbance would be mitigated by only permitting harvest operations to occur after July 31 to protect active raptor and pileated woodpecker nests.

The proposed treatments are intended to set back forest succession and promote aspen regeneration (refer to the section on Aspen). The regeneration of these clones would not directly benefit large woodpeckers, such as the pileated woodpecker, for decades since they require large trees and mature forest conditions for reproducing and foraging. However, the silvicultural prescription has been designed to maintain current wildlife habitat within and around these clones as much as possible while removing enough overstory and conifer ingrowth to promote aspen sprouting. Habitat capability would be reduced in the aspen regeneration units, for a temporary loss of five percent of currently suitable habitat, but would quickly begin to regain habitat capability, provided aspen regeneration is effectively protected. These treatment units would continue to contribute to the needs of woodpeckers and thus flammulated owls, albeit at a reduced level. Aspen restoration, especially in conjunction with other restoration or rehabilitation projects, would contribute to enhanced habitat conditions in the future. Actions that benefit the pileated woodpecker and other large woodpeckers would therefore benefit the flammulated owls as well.

The 30 miles of road closure and decommissioning actions proposed in Alternative 2 would benefit flammulated owls by increasing the amount of snags and large, down logs along the routes identified for closure or decommissioning.

Alternatives 3 and 4

Effects to flammulated owls would be the same as Alternative 2, with the following differences: Aspen treatments that have the potential to affect flammulated owl habitat would occur on 537 acres under Alternative 3 and 509 acres under Alternative 4 compared to Alternative 2, which would treat 569 acres).

Alternative 3 would close or decommission 14 miles of road (compared to 30 miles under Alternative 2), with proportionately less benefit in terms of future potential for snag retention and recruitment of large, down logs compared to Alternative 2.

Cumulative Effects

Activities that cumulatively affect flammulated owls in the project area include past timber harvest and associated road construction, insect and disease outbreaks, livestock grazing, wildfires, noxious weed treatments, and firewood cutting.

Approximately 40 percent of the mature Douglas-fir and/or ponderosa pine (about 4,500 acres) in the analysis area have been harvested to date. The last harvests of Douglas-fir in the project area occurred between 1989 and 1993. Approximately 365 acres were harvested in three sales in the Diamond Creek and Dump Creek drainages. There has been no commercial harvest of mature Douglas-fir or ponderosa pine in the analysis area since.

Many of the harvested stands contained substantial amounts of mature lodgepole pine, especially those at higher elevations (project area timber harvest history GIS coverage). These stands may have been marginal habitat that most likely would have been occupied only by unmated males, if at all. However, if the habitat used by flammulated owls in the project area is marginal, then flammulated owls may be distributed very thinly over large territories. In this case, even slight reductions in habitat could have affected flammulated owls.

Of the acreage harvested, approximately 900 acres were harvested lightly (canopy removal of forty percent or less). It is assumed that these 900 acres continue to provide nesting habitat for pileated woodpeckers. Flammulated owls are also known to use harvested areas provided the structural attributes needed for nesting and foraging remain (Hayward and Verner 1994). The forest vegetation database estimates that there are approximately 7,000 acres of mature unharvested Douglas-fir and/or ponderosa pine habitat within the analysis area. These figures suggest that almost 70 percent of the mature Douglas-fir habitat in the analysis area contains attributes suitable for pileated woodpecker nesting and therefore potentially may be suitable for flammulated owls as well.

Insect and disease outbreaks that favor pileated woodpeckers would benefit flammulated owls as well by creating foraging habitat (refer to Pileated Woodpecker for more information).

Livestock grazing has affected flammulated owls indirectly through impacts to aspen clones. Most aspen clones in the analysis area have been moderately to severely impacted by decades of livestock use, including changes in plant community composition, lowering of the water table, stream downcutting, soil compaction, and erosion (refer to Aspen). The degradation has prevented aspen sprouting to rejuvenate the clones and has reduced habitat capability for many species that use aspen habitats, including flammulated owls. If the proposed aspen restoration were successful, at most 569 acres of aspen habitat would become available within as soon as 50 years. The ability to protect young aspen sprouts is necessary for successful restoration.

Livestock grazing has also affected flammulated owls indirectly through the introduction and spread of noxious weeds and impacts to aspen clones. The xeric conifer types in which flammulated owls are often found are highly vulnerable to invasion by noxious weeds. Livestock are recognized as a major vector for the establishment of noxious weeds, disseminating noxious weed seeds from private lands in their coats, hooves and digestive tracts (Sheley and Petroff 1999). Once weed infestations establish at livestock loafing areas, water troughs, or along trails, weeds are further dispersed by livestock, big game animals, small mammals, and birds.

Unchecked noxious weed invasion would eventually create major changes in plant community structure and composition (Sheley and Petroff 1999). This would likewise yield changes in the density and population composition of arthropod species on which flammulated owls prey. This would in turn potentially reduce flammulated owl habitat capability. Successful weed management would control noxious weeds and help restore the native plant communities on which flammulated owls depend.

The most recent wildfire in the analysis area was the Fenster fire of 2000. Over 500 acres of mature Douglas-fir habitat were burned, most at high severity. The effects of wildfire on flammulated owls are uncertain, but probably variable, depending on severity, patch size, and reductions in canopy closure (Hayward and Verner 1994, Wisdom et al. 2000). The vegetative and structural composition changes of stand-replacing fire can last for a century or more.

Loss of large snags and down logs is recognized as a threat to flammulated owls (Hayward and Verner 1994). The removal of sound snags for firewood ultimately yields an overall reduction in dead wood from an area because the progression of decay from sound snags to soft snags to down logs is interrupted. High open road densities contribute to reduced snag densities and recruitment of large, downed logs by opening up areas to firewood cutting. In the project area, more than 11,000 acres of forest cover types within 300 feet of roads are potentially affected (see Roads/Travel Management). Six thousand of these acres occur in cover types used by flammulated owls. For now this effect may be offset by the current insect outbreak in the analysis area, but the duration and extent of the outbreak are unknown. Proposed road closures and decommissioning (30 miles in Alternative 2 and 14 miles in Alternatives 3 and 4) would restore the wood decay cycle along those miles of road that are closed or decommissioned, although there would proportionately less benefit in terms of future potential for snag retention and recruitment of large, down logs under Alternatives 3 and 4, compared to Alternative 2.

Currently suitable habitat for flammulated owls in the analysis area would be affected in the 576 acres proposed for aspen regeneration (Alternative 2), 569 acres (Alternative 3) and 509 acres (Alternative 4). The regeneration of these clones would not benefit flammulated owls directly for several decades since they require mature forest conditions for reproducing and foraging. However, the silvicultural prescription has been designed to maintain current wildlife habitat within and around these clones as much as possible while removing enough overstory and conifer ingrowth to promote aspen sprouting. Habitat capability would be reduced in the aspen regeneration units, for a temporary loss of four percent of currently suitable habitat, but would quickly begin to regain habitat capability, provided aspen regeneration is effectively protected. These treatment units would continue to contribute to the needs of woodpeckers, albeit at a reduced level, and therefore to flammulated owls as well. The proposed aspen restoration under any of the action alternatives, in conjunction with other restoration or rehabilitation projects, would contribute to enhanced habitat conditions in the future. However, Alternative 2 would provide the most benefits to flammulated owls by far while Alternative 4 would offer the fewest benefits.

Three-toed Woodpecker

Existing Condition

Habitat Requirements

In the northwestern United States, three-toed woodpeckers are typically found in lodgepole pine or in higher elevation mixed conifer stands, especially those containing spruce (Wisdom et al. 2000, Clark et al. 1989). They may also be found in aspen clones located in or near suitable conifer habitat (Spahr et al. 1991). Three-toed woodpeckers

appear to be constrained by heat intolerance to higher elevation areas with cooler summer temperatures (Goggans et al. 1987). Key habitat components include mature and old lodgepole pine and mixed conifer stands, high snag densities, and trees containing wood-boring insects and heart rot (Wisdom et al. 2000).

Three-toed woodpeckers usually occupy mature to old stands with a high degree of insect and disease activity and numerous snags (Wisdom et al. 2000, Clark et al. 1989). Three-toed woodpeckers are strongly attracted to tracts of timber infested by wood-boring beetles or recently burned areas. Large stand-replacing fires may result in local increases in three-toed woodpeckers beginning three to five years after the fire (Spahr et al. 1991).

Three-toed woodpeckers are most often found in lodgepole pine or spruce stands because these species have flaky bark (Clark et al. 1989). Three-toed woodpeckers forage by scaling the bark flakes from the tree trunk to locate insect prey. Primary prey species are the larvae and pupae of wood-boring insects (Goggans et al. 1987).

Three-toed woodpeckers are one of the few woodpeckers that nest in lodgepole pine (Bull 1980). They are able to do so because they are a small bird that excavates small cavities, so they can utilize lodgepole pine, a tree species that seldom grows to diameters large enough for the bigger woodpecker species. Lodgepole pine suitable as nesting habitat for three-toed woodpeckers needs to be at least eight to ten inches in diameter, although trees and snags up to twenty inches dbh may be selected as nest sites (Goggans et al. 1987, Bull 1980). Nest cavities are excavated in trees with heart rot and are close to good foraging habitat (Goggans et al. 1987, Bull 1980).

Regional Population and Trend

Three-toed woodpeckers have an extensive circumboreal distribution, but are not common anywhere within their range (Clark et al. 1989). The three-toed woodpecker has a global conservation status rank of G5 (NatureServe 2002). This indicates that the species is considered demonstrably widespread, abundant, and secure across its range. In Idaho, the three-toed woodpecker has a state conservation priority rank of S3, which means that the species is considered vulnerable in the state for one or more of several reasons. These include rarity, a restricted range, or other factors that could contribute to extirpation in the state.

Existing data are inadequate to determine the size and trend of three-toed woodpecker populations. Limited data from the Breeding Bird Survey suggest an upward trend in the western United States, including the northern Rocky Mountains (Sauer et al. 2003). However, these data may be deficient in one or more ways and may not accurately reflect the real trend. For example, few three-toed woodpeckers are detected by the Breeding Bird Survey, resulting in a very low sample size that affects the accuracy of the trend estimate.

In an assessment of habitat requirements and trends in the Columbia River Basin, it was noted that the current geographic distribution of habitat for the three-toed woodpecker appears to coincide with the historical distribution of habitat (Wisdom et al. 2000). Wisdom et al. also documented an increasing trend in suitable habitat in the central Idaho mountains for three-toed woodpeckers. A sufficient amount of well-distributed habitat is

available to support three-toed woodpeckers in central Idaho, although there is potential for a decline in key habitat components.

Risk factors that may affect three-toed woodpecker populations include timber management practices that reduce or eliminate snags, or permanently convert mature lodgepole pine habitat to younger age classes, or clearcutting large tracts of lodgepole pine due to mountain pine beetle epidemics (NatureServe 2003, Wisdom et al. 2000, Goggans et al. 1987).

Local Habitat Condition, Population, and Trend

The area of analysis for three-toed woodpeckers is confined to the project area. The project area is large enough to contain multiple pairs of three-toed woodpeckers and to depict project level effects. Effects from project implementation would be confined to the proposed treatment units.

The three-toed woodpecker is considered a rare resident in east central Idaho (Roberts 1992). Roberts (1992) has found three-toed woodpeckers evenly distributed throughout the upper Salmon River drainage above 6,000 feet in elevation wherever the lodgepole pine cover type occurs. They are occasionally observed in high elevation mesic Douglas-fir stands as well. This species may reasonably be expected to occur in the project area, although there are no known observations of three-toed woodpeckers in the project area.

Over 12,000 acres of lodgepole pine and mixed conifer stands occur in the project area. Of this acreage, there are currently 7,600 acres of unharvested lodgepole pine and a little more than 2,000 acres of unharvested mixed conifers in structural stages suitable for use by three-toed woodpeckers. Approximately 2,500 acres of lodgepole pine and a little more than 200 acres of mixed conifer stands have been harvested within the project area to date. All or most of the overstory was removed from these stands through timber harvest. These stands at the time of harvest would have provided suitable habitat for three-toed woodpeckers. Therefore, at present, seventy-eight percent of lodgepole pine and mixed conifer habitat within the project area remains for use by three-toed woodpeckers while 22 percent is now unsuitable.

The amount of time these stands will remain unsuitable for three-toed woodpeckers depends on the years since timber harvest, site productivity, and the presence of bark beetles and other insect prey. Most lodgepole pine stands on the Forest typically require about fifty years for trees to become large enough to provide nesting habitat for three-toed woodpeckers and as much as eighty to one hundred years to provide good foraging habitat (BK Thin Program, 1993, 9/1/2005 model run). Since most lodgepole pine units were harvested between the 1960s and the 1980s, these stands will not provide even the minimal habitat requirements of three-toed woodpeckers for at least another ten to thirty years.

Direct and Indirect Effects

Alternative 1 - No Action

There would be no effect to three-toed woodpeckers from the clearcut harvest of up to 1,062 acres of lodgepole pine. Barring other disturbances, such as wildfire, the current structural stages and distribution of lodgepole pine stands would remain unaltered.

Without some event to set back succession and rejuvenate aspen, clones in the project area would continue to decline. The acreage occupied by aspen would further decrease.

There would be no improvement in total road miles and open road densities. The high density of year-round open roads would continue to contribute to attrition of large snags and logs and an interruption of the wood decay process essential to three-toed woodpeckers.

Alternative 2

Three-toed woodpeckers are typically found in unharvested mixed conifer or lodgepole pine stands. Studies in Oregon and Montana indicate that three-toed woodpeckers in the northern Rocky Mountains often utilize lodgepole pine stands as nesting habitat (Bull 1980, Goggans et al. 1987). Lodgepole pine snags usually do not stand long (Bate 1995). This requires a renewed supply of snags for a continuum of habitat. Three-toed woodpeckers are known to nest in lodgepole pine snags ranging in size from as small as seven inches in diameter to more than 17 inches in diameter (Lester et al. 1980, Goggans et al. 1987).

The lodgepole pine stands proposed for harvest are located from 6,000 to 7,000 feet in elevation. This is within the elevational range of three-toed woodpeckers on the Forest. Most proposed lodgepole pine units currently provide at least some nesting and foraging habitat for three-toed woodpeckers, especially in areas where mountain pine beetles are active. Eighty percent of the overstory would be removed in the 54 proposed lodgepole pine units. Twenty percent of the overstory would be retained in patches. Three-toed woodpeckers may continue to use these patches to some extent, but overall, implementation would reduce conifer habitat for three-toed woodpeckers in the project area by 1,062 acres for as much as eighty to one hundred years.

Three-toed woodpeckers are known to nest in aspen clones (NatureServe 2003). Most of the estimated 1,000 acres of aspen in the project area are suitable for use by three-toed woodpeckers. Of this acreage, 576 acres containing substantial amounts of aspen within 14 delineated treatment units would be treated to promote aspen regeneration.

The proposed treatments are intended to set back forest succession and promote aspen regeneration (refer to section on Aspen). The regeneration of these clones would not benefit three-toed woodpeckers directly for several decades since they require mature forest conditions for reproducing and foraging. However, the silvicultural prescription has been designed to maintain current wildlife habitat within and around these clones as much as possible while removing enough overstory and conifer ingrowth to promote aspen sprouting. Habitat capability would be reduced in the aspen regeneration units, for a temporary loss of five percent of currently suitable habitat, but would quickly begin to regain habitat capability, provided aspen regeneration is effectively protected. These treatment units would continue to contribute to the needs of three-toed woodpeckers, albeit at a reduced level. The proposed aspen restoration, in conjunction with other restoration or rehabilitation projects, would contribute to enhanced habitat conditions in the future.

The proposed road closures and decommissioning actions would partially offset the effects of proposed vegetation treatments by re-establishing the woody decay cycle along 30 miles of routes that would be closed or decommissioned.

Alternatives 3 and 4

The effects to three-toed woodpeckers would be the same as Alternative 2, except for the following differences: Fewer acres would be treated in lodgepole pine units (977 acres in 50 units compared to 1,062 acres in 54 units under Alternative 2).

Fewer acres would also be treated in aspen units (537 acres under Alternative 3 and 509 acres under Alternative 4 vs. 569 acres under Alternative 2), with proportionately less impact to three-toed woodpecker habitat.

Fourteen miles of road closures and decommissioning would take place under Alternatives 3 and 4, compared with 30 miles of these actions under Alternative 2; thus, there would be proportionately less benefit in terms of future potential for snag retention and recruitment of large, down logs.

Cumulative Effects

Activities that cumulatively affect three-toed woodpeckers in the project area include past timber harvest and associated road construction, insect and disease outbreaks, livestock grazing, wildfires, firewood cutting, and restoration projects in the Dump Creek historical mining district.

More than 2,700 acres of conifer stands in structural stages suitable for three-toed woodpeckers have been harvested in the project area to date (i.e. 22 percent of the three-toed woodpecker conifer habitat in the project area). The last harvest of lodgepole pine in the project area occurred in 1997. Most lodgepole pine units are less than 30 years old and do not currently provide foraging or nesting habitat for three-toed woodpeckers.

There are approximately 2,200 acres of unharvested mature lodgepole pine and mixed conifer stands remaining in the project area in addition to another 7,300 acres of lodgepole pine and mixed conifers in understory re-initiation and young, multi-strata forest structural stages (Forest vegetation database). This amounts to approximately 9,600 acres of habitat in structural stages currently suitable for three-toed woodpeckers.

The proposed lodgepole pine units would conifer reduce habitat suitable for three-toed woodpeckers by 1,062 acres (9%) under Alternative 2 and 977 acres (8%) under Alternative 3. The total of all lodgepole pine and mixed conifer harvest, past and proposed, would place 30 to 31 percent of three-toed woodpecker habitat in the project area in an unsuitable condition.

Insect and disease outbreaks and wildfire favor three-toed woodpeckers (Wisdom et al. 2000). Insect and disease agents can cause mortality in host trees or contribute to weakening the tree and introducing secondary mortality agents. These can create favorable nesting and foraging conditions for three-toed woodpeckers. The large increase in bark beetle densities during an insect outbreak offers an abundant food supply, boosting three-toed woodpecker productivity (Lester et al. 1980). The current outbreak of Douglas-fir bark beetle throughout much of the project area could offset the 8 to 9 percent loss of lodgepole pine incurred by implementation of the proposed project. Most

of the Douglas-fir stands in the project area occur above 6,000 feet elevation and are suitable for use by three-toed woodpeckers.

Livestock grazing has affected three-toed woodpeckers indirectly through impacts to aspen clones. Most aspen clones in the analysis area have been impacted by decades of livestock use, including changes in plant community composition, lowering of the water table, stream downcutting, soil compaction, and erosion (refer to Aspen). The impacts have prevented aspen sprouting to rejuvenate the clones and reduced habitat capability for many species that use aspen habitats, including three-toed woodpeckers.

Habitat capability within the units proposed for aspen regeneration treatment would decline over the mid-term (ten to twenty years) since an overall reduction in conifer and aspen basal area is necessary to relieve conifer competition and to stimulate a sprouting response. These areas would still provide suitable habitat, however, for several reasons. Treatment would select smaller or defective trees for removal while retaining large conifers and aspen. Growth of retained smaller conifer and aspen trees would be rapid as they would be released from competition for sunlight, nutrients, and water. Since aspen grows quite rapidly given protection from overbrowsing, new sprouts would grow quickly provided measures to protect regeneration are successful. With the release of existing regeneration and the potential for rapid growth of new aspen regeneration, habitat capability should begin to rise within five to ten years of treatment.

The most recent wildfire in the analysis area was the Fenster fire of 2000. Approximately 2,000 acres of primarily Douglas-fir stands burned in the Fenster Fire five years ago, most at high severity. This may have created a productive short-term nesting and foraging environment for three-toed woodpeckers through creation of snag habitat and abundant insect prey. However, much of the conifer stands burned in the Fenster Fire are located at elevations below 6,000. Therefore, less than a third of the burned area may have been suitable for use by three-toed woodpeckers.

Firewood cutting is linked mostly to roads. High road densities affect three-toed woodpeckers largely by opening up areas to firewood cutting. Loss of large snags is recognized as a threat to woodpecker populations (Wisdom et al. 2000). Road densities in the project area are high (see Roads/Travel Management). Snags alongside roads or within easy reach of roads in the analysis area have largely been removed by firewood cutters. For now this effect may be offset by the current insect outbreak in the analysis area, but duration and extent of the outbreak are unknown. The proposed road closures and decommissioning actions (30 miles under Alternative 2 and 14 miles under Alternatives 3 and 4) would allow snags and large, down wood to accumulate along the closed and decommissioned routes, improving three-toed woodpecker habitat in those areas over the long term. However, there would be proportionately less benefit in terms of future potential for snag retention and recruitment of large, down logs under Alternatives 3 and 4, compared to Alternative 2.

Mining activity in the Dump Creek drainage resulted in a loss of aspen clones, wet meadows, and wetlands at the head of Dump Creek. This habitat can never be fully recovered since the Dump Creek drainage now exists as a deep and unstable chasm. Current and future restoration projects to stabilize vegetation and watershed resources would benefit three-toed woodpeckers.

Implementation of the action alternatives would decrease currently suitable habitat for three-toed woodpeckers in the project area by about 1,670 acres under Alternative 2 and 1,553 acres under Alternatives 3 and 4. This would be long-lasting within the proposed lodgepole pine units (up to 80 to 100 years). Habitat capability would also be reduced in the aspen regeneration units, but those units would quickly begin to regain habitat capability, provided aspen regeneration is effectively protected. Although a reduction in road densities, particularly in the Daly Creek drainage, would benefit northern three-toed woodpeckers by reducing impacts to dead wood resources, overall habitat capability for three-toed woodpeckers in the project area would be diminished for at least three decades. While each of the action alternatives would yield adverse effects to three-toed woodpecker habitat, Alternative 2 would provide the most benefits to three-toed woodpeckers and Alternative 4 would provide the fewest benefits in terms of reduced road densities and improved travel management.

Great Gray Owl

Existing Condition

Habitat Requirements

Great gray owls usually occupy forest communities in close proximity to meadow complexes (Bull and Duncan 1993, Hayward and Verner 1994). More than 90 percent of sightings of great gray owls in a study in southern Idaho were in lodgepole pine, Douglas-fir, and aspen cover types (Franklin 1988). During the breeding season, great gray owls are mostly found in cool forested communities since their dense plumage makes them susceptible to high temperatures (Bull and Duncan 1993). During the winter months, they move to lower elevations where snow cover is thinner to facilitate hunting (Clark et al. 1989, Bull and Henjum 1990). On the Salmon-Challis National Forest, great gray owls are typically found in lodgepole pine stands adjacent to meadows and often in aspen clones interspersed within lodgepole pine communities (Roberts 1992, NRIS Fauna database 12/2003).

Great gray owls do not build their own nests; they use a variety of existing platforms including broken trees, mistletoe brooms, old hawk and raven nests, snags in an advanced state of decay, and even artificial platforms (Franklin 1988, Bull and Henjum 1990). Pairs of great gray owls tend to return to the same nest site year after year (Franklin 1988, Bull and Henjum 1990). Young owls leave the nest before fledging and climb perches to avoid predators until they learn to fly (Clark et al. 1989, Bull and Henjum 1990).

Great gray owls forage in meadows, open riparian areas, upland willow communities, forests with open understories, and along forest edges (Bull and Duncan 1993, Bull and Henjum 1990). Great gray owls can also forage in harvested areas as long as the necessary perches from which to hunt are available (Hayward and Verner 1994), since great gray owls are primarily perch hunters. Birds fly from perch to perch, watching and listening for prey at each one (Bull and Henjum 1990). Deep soils, high vegetative cover, and large downed logs are common features of foraging sites (Bull and Henjum 1990). These characteristics are indicative of areas that potentially support high rodent densities.

Voles in the genus *Microtus* are a major food item for great gray owls in North America (Hayward and Verner 1994). They also use a wide variety of other prey depending on

availability, including other vole species, shrews, deer mice, tree squirrels, chipmunks, songbirds, and amphibians. They also occasionally take larger prey such as other raptors, snowshoe hares, and forest grouse (Bull and Duncan 1993).

Regional Population and Trend

Great gray owls have a large circumboreal range and the species seems to be stable throughout most of its range (Bull and Duncan 1993). In most areas, however, little data is available to verify this assumption (Hayward and Verner 1994). Populations in the western United States appear to be more stable than those to the north.

The great gray owl has a global conservation status rank of G5 (NatureServe 2002). This indicates that the species is considered demonstrably widespread, abundant, and secure across its range. In Idaho, the great gray owl has a state conservation priority rank of S3, which means that the species is considered vulnerable in the state for one or more of several reasons. These include rarity, a restricted range, or other factors that could contribute to extirpation in the state.

Timber harvest poses the greatest threat to great gray owl populations (Clark et al. 1989, Bull and Duncan 1993). A number of timber management practices affect great gray owls. Removing large diameter trees and snags, removing diseased trees, eliminating dense canopy closure in nest stands that are necessary to protect fledglings, and clearcutting without providing hunting perches are detrimental to great gray owls (Hayward and Verner 1994). Firewood cutting is also a risk factor that affects great gray owl populations (Clark et al. 1989). Livestock grazing practices that reduce prey populations may affect great gray owls (Bull and Duncan 1993). Permanent habitat loss due to ongoing development of the urban/forest interface for primary homes or vacation homes has been identified as a threat as well (Bryan and Forsman 1987).

Local Habitat Condition, Population, and Trend

The area of analysis for great gray owls is confined to the project area. The project area is large enough to display effects to multiple pairs of great gray owls. Effects from project implementation would be limited to the proposed treatment units.

The great gray owl is thought to be a very rare resident in east central Idaho (Roberts 1992). On the Salmon-Cobalt Ranger District, great gray owls have most often been observed in the Napias Creek and Moose Creek drainages. This species is probably observed more frequently in these drainages because they contain large tracts of lodgepole pine interspersed with numerous small wetlands and meadows. A portion of the project area is located in the Moose Creek drainage. Although there are no recorded observations of great gray owls within the boundaries of the project area, they can reasonably be expected to occupy suitable habitat in the project area.

Suitable habitat for great gray owls in the project area is located at mid to higher elevations and is comprised of mesic meadows, aspen communities, mature unharvested conifer stands, and harvested stands in structural stages that contain the necessary attributes for use by great gray owls.

Currently, the project area contains approximately 21,730 acres of habitat suitable for use by great gray owls. This includes 10,383 acres of Douglas-fir, 9,845 acres of lodgepole

pine above 6,000 feet elevation, approximately 1,000 acres of aspen, and an estimated 500 acres of meadow habitat.

Within the cover types where great gray owls occur, all structural stages except those with high stem densities and most of the basal area in small trees (e.g. stem exclusion structural stages), may potentially be used for either nesting or foraging. This includes harvested stands. Timber harvest is compatible with management for great gray owls. Management for great gray owls focuses on providing and protecting sufficient high quality nesting habitat and promoting productive foraging habitat (Clark et al. 1989, Bull and Henjum 1990, Hayward and Verner 1994).

Most timber harvest in great gray owl habitat occurred 20 to 30 years ago. Typically, a majority of the overstory was removed from most harvest units. For lodgepole pine stands, the percent removal was commonly 80 to 100 percent and for Douglas-fir stands, more than 60 percent. The harvested conifer stands included in the acreage above contain the necessary structural attributes for nesting or foraging great gray owls.

Harvest within the aspen cover type was incidental, being related to conifer management and not intended to benefit aspen as an objective of the harvest. However, conifer removal and domestic livestock exclusion resulted in regeneration of these clones (D. Basford, personal communication, 2/2/2004). Almost all aspen habitat within the project area is at risk of extirpation due to fire suppression, forest succession, and many decades of grazing by domestic livestock.

Direct and Indirect Effects

Alternative 1 - No Action

There would be no effects to great gray owls from efforts to regenerate aspen in the project area. However, aspen clones in the project area would continue to decline without some event to set back forest succession and stimulate sprouting. The acreage occupied by aspen would further decrease.

There would be no effect to great gray owls from the clearcut harvest of up to 1,062 acres of lodgepole pine. Barring other disturbances, such as wildfire, the current structural stages and distribution of lodgepole pine stands would remain unaltered. Other than natural disturbances, there would be no other changes in the current vegetative condition of plant communities in the project area.

There would also be no reduction in overall road densities and open road densities or improvements in travel management. There would be no reclamation of roads through aspen clones and wet meadows. Motor vehicle travel through these sites would continue to contribute to resource degradation. This would undermine ongoing restoration efforts. The current effects of roads and road densities would continue.

Alternative 2

This alternative would affect approximately 1,670 acres of habitat used or potentially used by great gray owls. Fifty-four clearcuts would be created from approximately 1,062 acres in the lodgepole pine cover type. Another fourteen units containing aspen would also be harvested from 569 acres to regenerate aspen.

Timber harvest is compatible with management for great gray owls. Management for great gray owls focuses on providing and protecting sufficient high quality nesting habitat and promoting productive foraging habitat (Clark et al. 1989, Bull and Henjum 1990, Hayward and Verner 1994).

Timber harvest that removes most of the overstory trees can provide excellent foraging opportunities for great gray owls (Hayward and Verner 1994). To permit use of these harvest units for foraging, hunting perches must be provided (Bull and Henjum 1990). Perches can be as short as ten feet tall, but need to be dispersed throughout a unit at 65-foot minimum intervals. This requirement would be fulfilled in the proposed lodgepole pine units in several ways. All Douglas-fir trees would be retained. All existing snags in each unit would be left to the extent possible during harvest operations. Twenty percent of the lodgepole pine in the units would be retained. These leave clumps would be grouped around existing snags as much as possible. Scattered stubs and broken-topped trees would also remain in harvest units after treatment.

Burning harvest units to clear logging slash is detrimental to rodent populations. Large woody debris needs to be left on site for a harvest unit to function as foraging habitat (Bull and Henjum 1990). At least four and up to fifteen tons of woody debris per acre would remain on the ground after all treatments were complete. One ton per acre consisting of logs ten to twelve inches in diameter would meet the minimum Forest Plan standard for wildlife structural diversity. This standard would be easily met since all proposed lodgepole and aspen units contain numerous trees in this diameter range.

The survival rate of juvenile great gray owls is quite low (Clark et al. 1989, Bull and Henjum 1990). It is necessary to maintain snags, leaning trees, and dense cover in nesting habitat to provide protection to juveniles and improve the chances of survival (Franklin 1988, Bull and Henjum 1990). Nesting habitat would be provided near the lodgepole pine units within the riparian habitat conservation areas along perennial and intermittent streams, in designated old growth retention stands, in untreated aspen clones, and along the edges of forest meadows. Snag density, structural diversity, and canopy closure would be unaffected in these areas.

Aspen provides high quality habitat for many wildlife species, including great gray owls (DeByle and Winokur 1985). Most sightings of great gray owls in Idaho have been in the lodgepole pine/Douglas-fir/aspen zone (Hayward and Verner 1994). However, the majority of aspen clones in the analysis area are in poor condition, and as they continue to deteriorate without replacement, aspen habitat will gradually disappear.

Fourteen units containing substantial amounts of aspen would be treated to promote aspen regeneration. Most of the aspen clones proposed for treatment are situated in naturally moist areas, the canopy is closed by increasing numbers of conifers and large Douglas-fir trees, and large mature aspen trees and woody debris are all present. The proposed treatments are intended to set back forest succession and promote aspen regeneration (refer to section on Aspen). The regeneration of these clones would not benefit great gray owls directly for many decades, since they require large platforms for their nests and mature forest conditions for reproducing (Hayward and Verner 1994). However, aspen restoration, in conjunction with other restoration or rehabilitation

projects, would contribute to enhanced habitat conditions in the future. In the meantime, the proposed treatments are designed to maintain the clones as foraging habitat at least.

Alternatives 3 and 4

Effects to great gray owls would be the same as Alternative 2, except fewer acres of lodgepole pine and aspen would be treated. Fewer acres would be treated in lodgepole pine units (977 acres in 50 units compared to 1,062 acres in 54 units under Alternative 2) and aspen units (537 acres under Alternative 3 and 509 acres under Alternative 4 vs. 569 acres under Alternative 2), with proportionately less immediate impact to great gray owl habitat.

Fourteen miles of road closures and decommissioning would take place under Alternatives 3 and 4, compared with 30 miles of these actions under Alternative 2; thus, there would be proportionately less benefit in terms of future potential for snag retention and recruitment of large, down logs.

In terms of improvements to meadow complexes, Alternative 3 would relocate a section of road out of Racetrack Meadows and would reduce motor vehicle traffic in Dump Creek Meadows, thereby improving more than 100 acres of foraging habitat for great gray owls. Alternative 4 would not provide the benefit of relocating the road in Racetrack Meadows.

Cumulative Effects

Activities that cumulatively affect great gray owls in the project area include past timber harvest and associated road construction, insect and disease outbreaks, livestock grazing, wildfires, firewood cutting, and restoration projects in the Dump Creek historical mining district.

Almost 2,500 acres of lodgepole pine have been harvested in the project area to date. The last harvest of lodgepole pine in the project area occurred in 1997. Most lodgepole pine units are less than 30 years old and do not currently provide foraging or nesting habitat for great gray owls. Approximately 4,500 acres of Douglas-fir have been harvested in the project area to date. The last harvest of Douglas-fir occurred in 1993. Most Douglas-fir stands were heavily harvested (50% to 90% of the overstory trees were removed). Most of these stands were harvested in the late 1970s to mid 1980s and are only 20 to 25 years old. Few of these stands would provide nesting habitat, but would offer foraging opportunities for great gray owls.

About 9,000 acres of mature conifer forest remains unharvested within the project area. This includes stands of Douglas-fir, ponderosa pine, spruce/fir and lodgepole pine. These stands and the surrounding areas provide nesting and foraging habitat for great gray owls. Approximately 900 acres of harvested Douglas-fir and ponderosa pine were lightly harvested (forty percent or less of the overstory was removed). Since lightly harvested stands can support great gray owls provided necessary habitat attributes are available (Bull and Henjum 1990, Hayward and Verner 1994), it is assumed these stands continue to offer foraging and nesting habitat.

The effects of fire to great gray owls are variable. Stand-replacing fire would eliminate nesting habitat for great gray owls, possibly for up to a century. The most recent wildfire in the analysis area was the Fenster fire of 2000. More than 500 acres of mature

Douglas-fir habitat were burned, most at high severity. However, since prey species such as deer mice might be abundant, burned areas would offer foraging habitat (Hayward and Verner 1994).

Livestock grazing affects great gray owls primarily through impacts to aspen clones. Most aspen clones in the analysis area have been impacted by decades of livestock use (refer to Aspen section). Livestock use has changed plant community composition, triggered soil erosion and stream downcutting, lowered the water table, compacted soil, and reduced aspen regeneration. This in turn has reduced the value of the clones as nesting and foraging habitat for great gray owls.

Loss of large snags and down logs is recognized as a threat to great gray owls (Hayward and Verner 1994). A major human use of sound snags is for firewood. The constant removal of sound snags ultimately yields an overall reduction in dead wood from an area because the progression of decay from sound snags to soft snags to down logs is interrupted.

Firewood cutting is linked to open roads. High open road densities contribute to reduced snag densities and recruitment of large downed logs by opening up areas to firewood cutting. Firewood cutters often remove snags alongside roads or within easy reach of roads in the analysis area. For now this effect may be offset by the current insect outbreak in the analysis area, but duration and extent of the outbreak are unknown.

Mining activity in the Dump Creek drainage resulted in a loss of aspen clones, wet meadows, and wetlands at the head of Dump Creek. This habitat can never be fully recovered since the Dump Creek drainage now exists as a deep and unstable chasm. Current and future restoration projects to stabilize vegetation and watershed resources would benefit great gray owls.

Great gray owl habitat capability would be diminished for several decades as a result of treatments in aspen units (569 acres in Alternative 2, 537 acres in Alternative 3 and 509 acres under Alternative 4). About 1,062 acres of the lodgepole pine cover type would be affected under Alternative 2, and 977 acres under Alternative 3. Leaving adequate hunting perches, slash piles and woody debris would mitigate these effects. While the lodgepole pine and aspen units might no longer be available as nesting habitat, they would continue to provide foraging habitat.

Overall, implementation of any of the action alternatives could contribute to stable or slightly improved habitat capability for great gray owls. However, Alternative 2 would provide the greatest benefits in terms of improved foraging habitat, reduced road densities and improved travel management. Alternative 4 would provide the fewest benefits.

Threatened and Endangered Species

The three federally listed species discussed in this section - gray wolf, Canada lynx, and bald eagle - are specified by the USFWS as occurring on the S-CNF (USFWS Species List #1-4-05-SP-505). The Forest Service is required to manage habitat and activities to promote recovery for listed species that occur on National Forest System lands (FSM 2670.21 1995). The Forest Service is also required to avoid adverse effects to listed species and their habitats from Forest Service land management actions, unless such effects can be compensated or when a waiver is granted for exemption or incidental take (FSM 2670.31 1995).

The bald eagle is not analyzed because the project area does not contain or lie adjacent to nesting, perching, or roosting habitat for bald eagles. If there is any use of the project area by bald eagles, it most likely consists of occasional, opportunistic foraging on carrion. The gray wolf and Canada lynx are analyzed in the following two sections.

The USFWS species list for the S-CNF also displays one candidate species – the yellow-billed cuckoo (USFWS Species List #1-4-05-SP-505). Candidate species have no protection under ESA, although the USFWS recommends that potential effects be evaluated on a project-level basis when a candidate species occurs or may occur in the project area.

The yellow-billed cuckoo is not analyzed for the following reasons. The yellow-billed cuckoo does not occur on the S-CNF. The only populations of this species in Idaho occur along the Snake River in southern Idaho. The project area does not contain habitat for this species. Habitat containing those features described as necessary for the yellow-billed cuckoo only exists on the S-CNF in patches too small and isolated to support successfully reproducing populations. Project activities would not affect possible breeding habitat for the yellow-billed cuckoo along the Salmon River to the northeast of the project area.

Canada Lynx

Existing Condition

Habitat Requirements

In Idaho, the primary types of vegetation suitable as lynx habitat are lodgepole pine, subalpine fir, Engelmann spruce, and moist Douglas-fir communities at mid to higher elevations (Ruediger et al. 2000). Dense multi-storied stands of mature conifers and young regenerating conifer stands with a high density of trees provide excellent foraging habitat. Aspen clones, willow, and other deciduous scrublands, high elevation shrub steppe communities interspersed with conifer forest and riparian areas can also provide quality foraging habitat.

In addition to specific vegetation types, lynx also seem to prefer areas with gentle topography at mid-elevations (Ruediger et al. 2000). Lynx seem to occur more often in gentle terrain, favoring rolling ridges, swales, benches, toe-slopes, and U-shaped valley bottoms. Most lynx sightings in the western United States occur from about 5,000 to 7,000-feet elevation (Ruediger et al. 2000).

Snowshoe hares are the primary prey for lynx while red squirrels are the most important alternate prey species (Ruggiero and McKelvey 1999). Forest grouse, other hare species, tree squirrels, and a variety of rodents are also used as prey.

An important component of lynx habitat is the availability of suitable denning sites in close proximity to foraging areas (Ruediger et al. 2000). Stand structure is the most essential feature of a den site, with large downed logs a vital component (Ruediger et al. 2000). Substantial amounts of large woody debris are necessary to provide a high degree of overhead cover that protects kittens from predators and weather.

Regional Population and Trend

The S-CNF is located in the Northern Rocky Mountains Lynx Geographic Area, consisting of Idaho, western Montana, eastern Oregon, eastern Washington and western Wyoming. Idaho lays within the historical range of Canada lynx (Ruediger et al. 2000). Lynx were historically known to occur in the northern and central portions of the state, with occasional records of transient lynx in southern Idaho counties. There have been only two recent verified occurrences of lynx in Idaho since 1991; one from the Boise National Forest and another from the Clearwater National Forest (D. Wenger pers. comm.).

There are no reliable population estimates for lynx in the contiguous United States (Ruggiero and McKelvey 1999). The size of the lynx population in the Northern Rocky Mountains Geographic Area is unknown. However, lynx populations are believed to be small and often isolated (USFS 1994; USFS 1999). The trend of lynx populations throughout the contiguous United States and in the Northern Rocky Mountains Geographic Area is likewise unknown.

The distribution of lynx coincides with the distribution of snowshoe hare (USFS 1994; 1999). In the northern part of lynx range, when snowshoe hare numbers are low, more lynx die of starvation, fewer kittens are born and fewer survive to adulthood. Presently, it is not known whether snowshoe hare and lynx populations in the southern part of their range are as cyclic as they are in northern areas (USFS 1999). If snowshoe hares do have measurable periodic cycles in the southern portions of lynx range, then lynx numbers may be expected to fluctuate as well in response to snowshoe hare numbers (Ruggiero and McKelvey 1999).

Moreover, it is possible that lynx populations at southern latitudes are population sinks that require constant replenishment from lynx migrating from northerly populations to maintain lynx numbers (D. Wenger pers. comm.). Habitat for lynx at southern latitudes is often naturally fragmented. The naturally fragmented and isolated nature of southern lynx habitat may not possess the energetics needed to sustain southern populations without continual input from northern lynx migrating southward.

Other risk factors are related to human uses and influences on lynx habitat (Ruediger et al. 2000; Wisdom et al. 2000). Lynx are vulnerable to human-caused mortality from trapping or shooting. Timber management, fire exclusion, road construction, livestock grazing and other human uses can indirectly influence lynx populations by altering habitat or increasing mortality. Habitat fragmentation and invasion of noxious weed species into lynx habitat are likewise recognized as threats.

Local Habitat Condition, Population, and Trend

There are no current data to determine if there is a breeding population of lynx on the S-CNF. There are occasional recorded observations of lynx on the S-CRD (NRIS Fauna database 12/2003). The project area contains mapped suitable lynx habitat (Ruediger et al. 2000) and lynx are thought to be present at least occasionally based on unverified lynx observations in adjacent watersheds. [A verified lynx observation is supported by DNA evidence; all other sightings are considered unverified.]

The project area is located within portions of the Moose Creek and Salmon City Lynx Analysis Units (LAU's). The Moose Creek LAU includes the Moose Creek and Dump Creek subwatersheds northwest of Salmon. The Salmon City LAU covers the west Salmon River face from Henry Creek north to Bird Creek. Table 1 displays the acres of habitat by cover type for each LAU.

Table 1 Cover Types within Moose Creek and Salmon City LAU's

Cover Type	Moose Creek (acres)	Salmon City (acres)
Aspen	Unknown	308
Engelmann Spruce/Subalpine fir	7,182	2,014
Grass/Forb	1,141	1,945
Lodgepole Pine	19,841	13,823
Mesic Douglas-fir	8,303	6,686
Moist Upland/Riparian Shrub	64	138
Other Miscellaneous Cover Types	117	2,042
Upland Grass/Shrub	N/A	1,470
Whitebark Pine	72	331
Acres of Suitable Lynx Habitat	36,720	28,757
Non-Lynx Habitat	11,257	16,005
Total Acres in LAU	47,977	44,762

Direct and Indirect Effects

Alternative 1 - No Action

The two LAU's in which the project area is located comprise the area of analysis for Canada lynx. Aspen clones in the project area would continue to decline without some event to set back forest succession and stimulate sprouting. The acreage occupied by aspen would further decrease.

There would be no harvest of lodgepole pine, which would create new foraging opportunities for lynx in the future.

There would be no reclamation of roads through aspen clones and wet meadows. Motor vehicle travel through these sites would continue, contributing to further resource degradation. This would undermine ongoing restoration efforts. There would be no

reduction in overall road densities and open road densities or improvements in travel management. The current effects of roads and road densities would continue to affect habitat security and the recruitment of large down logs.

Alternative 2

LAU's were delineated to represent, as a minimum, areas containing sufficient habitat to support resident lynx year-round (Ruediger et al. 2000). While they are not intended to depict actual lynx territories, LAU's are to be used as the smallest scale for the evaluation of effects of management actions on lynx (Ruediger et al. 2000).

A total of 529 acres of lynx habitat is proposed for harvest in the Moose Creek LAU under Alternative 2. A total of 457 acres are proposed for harvest in the Salmon City LAU.

The proposed lodgepole pine treatments would temporarily eliminate cover for snowshoe hare and for lynx. However, the clearcuts would, in time, provide excellent foraging opportunities for snowshoe hares and therefore, for lynx. These new clearcuts would then replace existing clearcuts in which the conifer regeneration will soon grow to the point where its value to snowshoe hares has lessened, providing a continuum of foraging habitat over time. This is consistent with direction in the *Canada Lynx Conservation Assessment and Strategy* (Ruediger et al. 2000).

The proposed aspen treatments are intended to establish self-sustaining regenerating stands of aspen. This is consistent with direction in the *Canada Lynx Conservation Assessment and Strategy* that recognizes the value of regenerating aspen stands to snowshoes hare and other lynx prey species (Ruediger et al. 2000). These treatments would benefit lynx prey species and contribute to stable prey bases for lynx.

There are over 5,000 acres of multi-storied lodgepole pine, subalpine fir, mesic Douglas-fir, and mixed conifer stands in the project area. Research in progress indicates that mature, multi-storied subalpine fir, mesic Douglas-fir, and mixed conifer stands may be more important to snowshoe hares and, thus to lynx, than previously thought and may even be more important than early seral stands (D.Wenger pers. comm.). The research suggests that hares retreat into multi-storied stands that serve as refugia under marginal conditions or at the low end of the snowshoe hare population cycle. Multi-storied stands can be used by snowshoe hares year-round while early seral stands may only be occupied on a seasonal basis. The forest is currently remapping lynx habitat to more accurately reflect the emerging finds of the most recent research. There is no harvest proposed in these 5,000 acres of multi-storied stands.

The proposed lodgepole pine treatments would temporarily eliminate cover for snowshoe hare and for lynx. However, the units would, in time, provide excellent foraging opportunities for snowshoe hares and therefore, for lynx. These new units would then replace existing units in which the conifer regeneration will soon grow to the point where its value to snowshoe hares has lessened, providing a continuum of foraging habitat over time. This is consistent with direction in the Canada Lynx Conservation Assessment and Strategy (Ruediger et al. 2000).

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Assessment and Strategy, which recognizes the value of regenerating aspen stands to snowshoes hare and other lynx prey species (Ruediger et al. 2000). These treatments would benefit lynx prey species and contribute to stable prey bases for lynx.

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With the exception of units 52-M, 53-S and 54-S, the proposed aspen treatment units are not located in stands of subalpine fir, mesic Douglas-fir, or mixed conifers. Harvest of conifers in the other aspen treatment units would consist mostly of lodgepole pine and smaller Douglas-fir. These treatments would not affect mature, multi-storied stands of subalpine fir, mesic Douglas-fir, or mixed conifers.

The *Canada Lynx Conservation Assessment and Strategy* requires that adequate denning be present and well-distributed within each lynx analysis area. Denning habitat for lynx is defined as unharvested stands of mature conifers, conifer/deciduous types, or unthinned regenerating stands older than twenty years (Ruediger et al. 2000). Patches of denning habitat should be larger than five acres and must be within daily travel distance of quality foraging habitat. The total acres of denning habitat within a LAU must comprise at least 10 percent of the lynx habitat with the LAU.

Table 2 displays acres and percentages of denning habitat within the Moose Creek and Salmon City LAU's. For this analysis, only unharvested stands of mature conifers were considered as denning habitat. Deciduous cover types are represented primarily by aspen, which constitutes a miniscule portion of the LAU's. The majority of aspen clones in the LAU's are currently in a degraded condition and do not contain features associated with quality lynx denning habitat. Regenerating stands of conifers older than 20 years of age were not considered denning habitat. Harvested stands in these LAU's typically do not have much woody debris remaining after harvest due to slash disposal treatments. Burned areas can provide denning habitat, however, in these LAU's there are very few acres of regenerating conifers in stands more than 20-years old that resulted from fire.

Table 2 Old Forest Multi-Strata Denning Habitat in Moose Creek and Salmon City LAU's

Cover Type	Alternative 1		Alternative 2		Alternatives 3 & 4	
	Moose Creek	Salmon City	Moose Creek	Salmon City	Moose Creek	Salmon City
Subalpine fir & Engelmann Spruce	4,974	1,244	4,974	1,244	4,974	1,244
Lodgepole Pine	2,155	1,167	2,037	1,007	2,040	1,032
Mesic Douglas-fir	4,659	2,497	4,659	2,497	4,659	2,497
Total Denning Habitat Acres	11,788	4,908	11,670	4,748	11,673	4,773
Total LAU Acres	36,720	28,757				
Percent Denning Habitat in LAU	32.1	17.1	31.8	16.5	31.8	16.6

Implementation of Alternative 2 would not substantially decrease the amount of denning habitat currently available in either LAU and would meet the standard for greater than or equal to 10 percent denning habitat. Only one of the proposed aspen regeneration units is in the Moose Creek LAU, and 14 lodgepole pine treatment units have lynx denning habitat structure features. Eight of the proposed lodgepole pine units are in the Moose LAU; 6 are in the Salmon City LAU. Table 2 depicts changes that would occur to lynx denning habitat in each LAU as a result of project implementation.

Alternative 2 would have a net increase of 30 miles of closed or decommissioned road compared to the current condition. The closures and decommissioning would increase lynx and lynx prey security, decrease the risk of lynx and prey road-related mortality, and decrease the risk of noxious weed proliferation.

Alternatives 3 and 4

The effects of implementing Alternatives 3 and 4 would be the same as Alternative 2, except as listed below.

A total of 512 acres of lynx habitat is proposed for harvest in the Moose Creek LAU under Alternatives 3 and 4, 17 acres less than Alternative 2. This includes all 24 proposed lodgepole pine units and portions of 4 others (21-M, 25-S, 27-S, 30-S), and 1 aspen unit (53-M).

A total of 412 acres are proposed for harvest in the Salmon City LAU under Alternatives 3 and 4, 45 acres less than Alternative 2. This includes all of 12 proposed units (10 lodgepole pine and 2 aspen) and portions of 13 other units 9 lodgepole pine and 4 aspen).

Thirteen proposed treatment units (1-S, 5-S, 11-S, 18-S, 20-S, 22-S, 29-S, 56-S, 58-S, 59-S, 61-S, 63-S and 700-S) are not located in lynx habitat and would not affect lynx habitat.

Implementation of Alternatives 3 and 4 would not substantially decrease the amount of denning habitat currently available in either LAU and would meet the standard for greater

than or equal to 10 percent denning habitat, the same as Alternative 2. Table 2 depicts changes that would occur to lynx denning habitat in each LAU as a result of project implementation.

Alternatives 3 and 4 would close and decommission fewer miles of road in the LAU's than Alternative 2 (a net change of 14 miles from current condition), but would still provide increase lynx and lynx prey security and reduce the risk of road-related mortalities compared to Alternative 1.

Cumulative Effects

Cumulative effects to lynx are evaluated at the LAU level (Ruediger et al. 2000). Activities that may cumulatively affect lynx in the project area include past timber harvest, associated road construction, and livestock grazing.

The *Canada Lynx Conservation Assessment and Strategy* limits the amount of vegetative disturbance to lynx habitat that can take place in a LAU to ensure that vegetation types necessary to lynx survival and reproduction are present (Ruediger et al. 2000). Table 3 displays the acres and percent of lynx habitat in each LAU that are currently in an unsuitable condition and the amount that has been converted to an unsuitable condition within the last ten years. "Unsuitable" is defined as vegetation in an early successional stage due to timber harvest or wildfire, in which vegetation has not sufficiently re-established to support snowshoe hares year-round (Ruediger et al. 2000).

Implementation of Alternative 2 would increase the percentage of habitat converted to unsuitable within the last 10 years slightly. Post-project, the LAU's would still meet the standard for less than or equal to 15 percent of habitat converted to unsuitable within the last 10 years (Table 3).

Table 3 Lynx Habitat Converted to Unsuitable Within the Last 10 Years

Disturbance Within Last 10 Years[1]	Alternative 1		Alternative 2		Alternatives 3 & 4	
	Moose Creek	Salmon City	Moose Creek	Salmon City	Moose Creek	Salmon City
Past Timber Harvest (acres)	93	222				
Thinning (acres)	441	132				
Wildfire (acres)	<1	15				
Proposed Timber Harvest (acres)			529	457	512	412
Total LAU Acres	36,720	28,757				
Total acres converted to unsuitable lynx habitat	1,978	959	2,507	1,416	2,490	1,371
Percent of lynx habitat converted to unsuitable	1.5	1.3	2.9	2.9	2.8	2.7
Total percent of lynx habitat in unsuitable condition	5.4	3.3	6.8	4.9	6.8	4.8

[1]Does not include aspen acres

The cumulative effects analysis does not include the proposed aspen clone treatment units, almost all of which are already in unsuitable condition due to grazing impacts and forest succession (see Aspen). Nonetheless, adding estimated aspen acreage to unsuitable habitat would change the percentages of unsuitable habitat less than one percent.

Lynx appear to be able to survive with some degree of human presence, although some human activities are detrimental to lynx. For example, trapping is recognized as a significant source of mortality for lynx (Ruediger et al. 2000). Even incidental take of lynx during coyote and bobcat seasons can result in mortality levels that affect low-density lynx populations (Wisdom et al. 2000). Den site disturbance can impact lynx production, a concern in small, isolated low-density populations (Ruediger et al. 2000). Road density is one factor determining lynx vulnerability to trapping and other forms of human disturbance, including mortality from vehicle collisions (Ruediger et al. 2000). The degree of human presence and motor vehicle traffic rises as road densities rise, resulting in an even higher likelihood of negative encounters. However, the threshold at which human presence and activities negatively affect lynx are unknown (Ruediger et al. 2000).

Road densities in the project area are presently high to very high (see Roads/Travel Management). Current research suggests that lynx may do best in areas with low levels of human presence and activity (Ruediger et al. 2000; Wisdom et al. 2000). The proposed roads and travel management actions would provide a modest decrease in total road miles and open road densities (see Roads/Travel Management). The benefits would be greatest in the Daly Creek in the Moose Creek Subwatershed that contains high quality habitat lynx habitat.

The action alternatives would very slightly increase open road densities, temporarily during project activities. However, implementation of the proposed travel management improvements would contribute to decreased open road densities and increased habitat security long-term.

Aspen clones, riparian areas, and willow clones at upland seeps, springs and bogs can provide productive foraging habitat for lynx (Ruediger et al. 2000). Livestock grazing has affected these cover types in the Moose and Salmon City LAU's (see Aspen and Spotted Frog sections for more information). These impacts reduce forage values for snowshoe hare and therefore, for lynx.

Other factors recognized as contributing to cumulative effects for lynx include winter recreation activities and noxious weed invasion. Winter recreation is suspected to negatively affect lynx populations through disturbance and by providing access along packed snowmobile trails to bobcats and coyotes into areas where they typically could not go due to deep snow (Ruediger et al. 2000; Wisdom et al. 2000). These species are believed to be potential competitors with lynx for winter prey.

The project area is heavily used for snowmobile recreation. Any roads open to motorized vehicles may be traveled by snowmobiles during the winter. There are a number of regularly groomed snowmobile trails in the Moose and Salmon City LAU's as well. There are about 30 miles of groomed snowmobile trails in or along the boundaries of the Moose LAU and up to 55 miles of groomed snowmobile trails in or along the boundaries of the Salmon City LAU.

Ruediger et al. (2000) recognize the potential impacts of noxious weed invasion to lynx habitat. Management actions are recommended to control existing infestations and prevent new weeds from establishing. Currently, there are few weed infestations in lynx habitat in the Moose or Salmon City LAU's. However, the risk of weeds establishing in these LAU's is high due to the high road densities, and the log hauling would heighten this risk. Most of the haul routes are high use roads, so any risk of increased weed proliferation on these routes would be negligible.

Implementation of the action alternatives would create future foraging habitat for lynx, offsetting a loss of current foraging habitat as older clearcuts regenerate. The very high road densities in the Daly Creek drainage would be substantially reduced, providing better retention of dead wood resources and improved habitat security. However, there would also be an increased risk of noxious weeds establishing in lynx habitat resulting from the proposed timber harvest. The degree of risk associated with the action alternatives would depend on the District's ability to rapidly detect and eradicate new infestations resulting from implementation. In turn, this ability is dependent on the success of prevention measures, such as equipment washing, and on adequate funding for weed management.

All lynx management standards contained in the *Canada Lynx Conservation Assessment and Strategy* (Ruediger et al. 2000) would be met in either action alternative, with the possible exception of the aspen regeneration standard. This standard requires that harvest prescriptions favor regeneration of aspen and the grazing in aspen clones would be managed to ensure successful sprouting sufficient to perpetuate the clones. With the current management of the Diamond-Moose Allotment, this standard would be difficult to meet. However, the proposed aspen regeneration monitoring and the mitigation measures to protect aspen regeneration from livestock grazing (based on regeneration success), this standard could be achieved.

Overall, implementation of the action alternatives would maintain or improve habitat capability for lynx in the Moose and Salmon City. Road management changes appear unlikely to affect lynx. Ruediger et al. (2000) acknowledged there is no compelling evidence at present to recommend management of road density to conserve lynx. Preliminary information suggests that lynx may not avoid roads, except at high traffic volumes. Nonetheless, Ruediger et al. (2000) suggested that a conservative approach to road densities might be warranted and recommended guidelines to reduce high road densities.

Gray Wolf

Existing Condition

Habitat Requirements

Gray wolf uses a variety of habitats, but use primarily coincides with wild ungulate ranges, including winter range, summer range, and calving/fawning areas (USFWS 1987). Important wolf habitat components for reproduction are denning sites and rendezvous sites.

Regional Population and Trend

Historically, the gray wolf occurred in suitable habitat throughout the northern Rocky Mountains, including the state of Idaho (USFWS 1987). The gray wolf was largely extirpated from Idaho by the 1930s. Gray wolves were re-introduced to Idaho in 1995 and 1996 by the USFWS. The USFWS, in cooperation with the IDFG is responsible for monitoring wolf population numbers and trend (USFWS et al. 2005).

Since 1995, wolf numbers have risen rapidly and steadily. By the end of 2004, the USFWS estimated that the Northern Rocky Mountain wolf population (Idaho, Montana, and Wyoming) contained an estimated 835 wolves and 110 packs. Of these 110 packs, 66 packs met the definition for breeding pairs (USFWS et al. 2005).

The Northern Rocky Mountain wolf population contains three recovery areas, including the Central Idaho recovery area. At the end of calendar year 2004, the Central Idaho recovery area wolf population was estimated at 452 wolves and up to 44 packs. Last year (2004) marks the fifth consecutive year in which biological recovery goals for the Northern Rocky Mountain wolf population were met (USFWS et al. 2005).

The primary risk factor influencing gray wolf population size and distribution is human-caused mortality (Wisdom et al. 2000). The major conflicts involve wolf predation on domestic livestock and the effects wolves have on wild ungulate populations (Mack and Laudon 1998). Wolves seem most likely to thrive long-term in more remote areas where they do not come into continual contact and conflict with humans (Wisdom et al. 2000).

Local Habitat Condition, Population, and Trend

The area of analysis for wolves is confined to the project area, which is located within the Central Idaho recovery area. Radio telemetry monitoring of wolves in central Idaho shows that wolf packs and individual wolves can roam very widely (Mack and Laudon 1998). However, the project area contains a core portion of the Jureano wolf pack's territory. Members of the Jureano pack are present in the project area at least occasionally, based on monitoring flights.

The quality of wolf habitat may be predicted in part by the quality of habitat for primary prey species. In central Idaho, the primary prey species for wolves are elk and mule deer. Population levels of these species are dependent on the amount and quality of winter ranges, an array of cover types and successional stages (both forested and non-forested) for cover and foraging throughout the year, and escapement areas during hunting season (Ralphs et al. 1981). Mule deer are present in or near the project area year-round, while elk typically are present seasonally. Winter range within the project area is presently little used by elk, which tend to move north and west of the project area during the winter months. The project area consists of approximately 37,000 acres, of which about 31,000 acres are forested plant communities, and 6,000 acres are rangeland or wetland plant communities. These plant communities are represented by a variety of cover types and structural stages. This array provides for the various seasonal needs of wild ungulates throughout the year, but is especially valuable during the spring and summer months.

Approximately 1,645 acres in the eastern portion of the project area between Wallace Creek and Diamond Creek burned in 2000. Plant communities in the burned areas have been set back to an earlier successional stage due to the fire. There will be increased grass, forb, and shrub (both deciduous and sprouting species) forage production for

ungulates in the burned areas for up to several decades. This increase will then gradually taper off as conifers or non-sprouting sagebrush species regenerate in the burned areas Fire Effects Information System (FEIS 2005).

Direct and Indirect Effects

Alternative 1 - No Action

There would be no regeneration of aspen. Aspen clones in the project area would continue to decline without some event to set back forest succession and stimulate sprouting. As the acreage occupied by aspen would further decreased so would forage production for wolf prey species.

There would be no increase of transitory forage created from clearcutting approximately 1,000 acres of lodgepole pine, which would benefit elk and deer, the gray wolf's primary prey species.

No action would be taken to reduce road densities through road closure or decommissioning. There would be no improvement in habitat security for wolves or for elk and deer. The current effects of roads and road densities would continue.

Alternative 2

There are no proposed harvest units located in or near a known wolf den site or rendezvous site. Sustained direct effects to wolves from Alternative 2 would be improbable since wolves typically travel miles in a day. If there were any contact, it would likely be only short, chance encounters between harvest personnel and wolves.

Beneficial indirect effects to wolves would be related to indirect effects to elk and deer. The proposed vegetation treatments would provide improved foraging habitat for elk and deer soon after treatment. Grass production would improve in some units to benefit elk, while deciduous shrubs would release and regenerate in other units to benefit deer. Quaking aspen is recognized as prime habitat for elk and deer (DeByle and Winokur 1985). Aspen bark, stems, green leaves, and fallen leaves are all highly palatable and nutritious, providing wild ungulates with quality year-round foraging opportunities. Understory forage production in healthy aspen clones is generally quite high compared to adjacent upland habitats. Since the proposed harvest would benefit elk and deer by improving foraging habitat, it would also indirectly benefit wolves.

Detrimental indirect effects to gray wolves would be connected to: (1) the risk of introducing and spreading noxious weeds and (2) road densities and travel management. Noxious weeds threaten prey species' habitat, while high open road densities affect wolves and ungulates through disturbance and an increased risk of mortality.

The heavy equipment and support vehicles used in timber harvest operations, along with the increase in soil disturbance in harvest units and along roads, amplify the risk of weed establishment and spread. An increased spread of noxious weeds in the project area would be deleterious to elk and deer (Sheley and Petroff 1999), and therefore detrimental to gray wolves as well. At present, this is particularly a concern for winter and transitional ranges. However, riparian areas and forested plant communities are increasingly at risk as noxious weed species new to the area (e.g. houndstongue or hawkweed) establish and spread. Weed prevention measures (e.g. mandatory harvest

equipment washing and inspection and minimizing the amount of soil disturbance when re-opening or maintaining roads to be used during timber harvest) are included in Alternative 2 to mitigate the risk of transmitting noxious weeds.

Approximately 10 miles of currently closed roads would be temporarily re-opened for timber harvest. These roads would remain open for up to five years until timber harvest operations were complete and would then be re-closed. This indirect effect would be temporary.

Proposed roads management changes, including approximately 30-mile net increase of closures and decommissioning compared to Alternative 1, would benefit wolves directly and indirectly. The number of encounters between wolves and humans would decrease in areas where there was less motor vehicle traffic. This could reduce human-caused mortality; the major factor limiting wolf recovery (Wisdom et al. 2000). Lower road densities and fewer year-round open roads would improve habitat security for wolves in the project area and would also increase the security of existing habitat in the project area for wolves' primary prey species. The rate of noxious weed transmission and spread would also be greatly slowed, since motor vehicles are a major vector of noxious weed seeds and other reproductive propagules.

Alternatives 3 and 4

Direct and indirect impacts to gray wolves would be the same as stated above for Alternative 2, with the following differences. Fewer acres of vegetation treatment would occur (1,553 acres under Alternative 3 and 1,493 acres under Alternative 4 versus 1,670 acres under Alternative 2, respectively), so there would be proportionately less of an increase in post-project forage for deer and elk in the project area.

Alternatives 3 and 4 would also implement fewer miles of road closures or decommissioning - approximately 14 miles net increase from the current condition compared to 30 miles net increase under Alternative 2, with commensurately fewer benefits in terms of habitat security and capability for wolves and prey species alike. However, the risk of noxious weed spread (with appropriate weed control measures) and motor vehicle related wolf mortality would be reduced along the miles of road that are identified for year-long closure or decommissioning.

Cumulative Effects

Activities that cumulatively affect wolves in the project area include road densities, livestock grazing, wildfires, and noxious weeds invasion and management.

Human-caused mortality is recognized as the major factor determining the success of wolf recovery efforts (Wisdom et al. 2000). Road density is recognized as a factor that limits wolf recovery and yields underutilization of suitable habitat (Wisdom et al. 2000). The degree of human presence and motor vehicle traffic rises as road densities rise, resulting in an even higher likelihood of negative encounters. Road densities in the project area are presently high to very high.

Implementation of any of the action alternatives would temporarily increase open road densities to a negligible extent (as a result of re-opening haul roads for up to five years), slightly decreasing habitat security for that timeframe. However, implementation of the proposed roads management actions would contribute to increased habitat security over

the long-term. The proposed roads actions would provide a 14 and 7 percent decrease in open road miles under Alternatives 2 and 3/4, respectively.

Livestock grazing likewise increases the probability of human-caused mortality as a response to wolf predation on cattle (Wisdom et al. 2000). Regular trail rides conducted by local outfitters could increase the number of human/wolf encounters if a focus of the trail rides were to locate wolves, and could potentially result in disturbance of den sites or rendezvous sites.

Livestock grazing has affected wolves indirectly, by affecting elk and deer habitat. Livestock grazing has impacted aspen clones and riparian areas, habitats that historically provided excellent and abundant forage for elk and deer (DeByle and Winokur 1985). These habitats are preferentially selected by wild ungulates greatly in excess to their availability. Most aspen clones and many riparian ares in the project area have been moderately to severely impacted by decades of livestock use (refer to Aspen section). Years of livestock use have reduced habitat capability for elk and deer through changes in plant community composition, lowering of the water table, soil erosion and compaction, stream downcutting, and a cessation of successful aspen regeneration.

Wildfires can benefit wolves by enhancing habitat for elk and deer (FEIS 2005). The 2000 Fenster fire changed plant community succession on more than 1,000 acres within the project area. Elk and deer were observed in the burned area as soon as vegetation began resprouting after the fire. The burned areas could provide increased forage for elk and deer for several decades.

The proposed vegetation treatments would create new transitory forage for elk and deer, offsetting a loss of current forage as older harvest units regenerate. However, the transmission of noxious weeds into currently un-infested areas or establishment of new weed species in the project area could quickly offset these gains in forage. Wild ungulate winter range, aspen clones, and riparian areas are especially vulnerable to the rapid spread of noxious weeds. The likelihood of new invaders (e.g. hounds'-tongue, hawkweed, or blue weed) establishing, increases this threat to wild ungulate populations. Prevention measures are included in Alternatives 2 and 3 to mitigate the threat of new invaders and infestations.

Current noxious weed management in the project area is aimed at preventing new invaders and new infestations, as well as controlling large existing infestations of spotted knapweed. Although elk and deer use a wide variety of cover types and structural stages, the amount and condition of winter ranges can often be a limiting factor for wild ungulate herds (Ralphs et al. 1981). Plant communities comprising wild ungulate winter range in the project area are those most threatened by noxious weeds.

Implementation of any of the action alternatives would create new transitory forage for the gray wolf's primary prey species, offsetting a loss of current forage as older clearcuts regenerate. Habitat security in the project area is presently limited for wild ungulates during the general rifle elk and deer hunting seasons. The proposed road management actions could improve habitat security for wolves and their prey species and reduce the risk of noxious weed invasion in those portions of the project area where road closures or decommissioning occur. Overall, Alternative 2 would offer the most benefits to wolves and wolf prey species while Alternative 4 would offer the fewest.

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Threatened, Endangered and Sensitive Plants

Pink Agoseris

Existing Condition

Habitat Requirements

Pink agoseris is a species that was encountered and described only twenty years ago (Henderson et al. 1990). Relatively little is known about the species as of yet. Its full range, distribution within its range, and habitat associations are still uncertain.

Pink agoseris occurs in mid-montane to subalpine meadows and wetlands that are open and saturated with water during the growing season (Elzinga 2003). It may also occur in open ecotones between wet meadows and conifer forest, including Engelmann spruce, subalpine fir, Douglas-fir, and whitebark pine cover types (Janovsky-Jones 1999).

Regional Population and Trend

The current range of pink agoseris extends from western Montana to central Idaho (Janovsky-Jones 1999). The known range of pink agoseris has expanded over the past few years with the discovery of a number of sites in southwestern Montana (Elzinga 2003). Lemhi County is on the western edge of the known distribution. Although few sites are known to occur in Lemhi County, the Forest may contain many more unlocated pink agoseris sites.

Most known occurrences of pink agoseris on the Forest are small and appear to be isolated (IDFG Conservation Data Center records). This is at least partially a function of the difficulty of inventorying for and locating pink agoseris. Inventory for pink agoseris is challenging because the species must be in bloom for positive identification. Since plants at different sites often bloom at varying times, potential sites must be visited repeatedly at close intervals each summer. Connectivity between occurrences will be better demonstrated as more sites are found.

Pink agoseris appears to be stable across its range (Elzinga, 2003). The Idaho Native Plant Society ranks the species as "Sensitive." This designation is applied to taxa with small populations or localized distributions that are not in danger of extirpation, but whose populations and habitats may be jeopardized without active management or removal of threats.

Local Habitat Condition, Population, and Trend

The area of analysis for pink agoseris is confined to the project area. The project area contains apparently suitable habitat for pink agoseris, although the species has not been observed there to date. Although there have been no specific inventories for pink agoseris in the project area, the species has not been found during multiple site visits for other purposes. Since the species is known to occur in an adjacent sub-watershed with very similar site conditions, it is assumed that pink agoseris is present in the project area as well.

At least one hundred acres of wet meadow complexes in the Moose Creek, Daly Creek, and Dump Creek drainages in the Moose Creek sub-watershed contain apparently suitable habitat for pink agoseris. There are also numerous smaller wetlands that may contain pink agoseris as well. The majority of apparently suitable habitat in the project area has been impacted by domestic livestock in the past. Impacts include soil compaction, reduced water holding capacity, lowered

water tables, and changes in plant community composition. These impacts may limit pink agoseris to more isolated, less impacted sites and will make finding the species more difficult.

Direct and Indirect Effects

Alternative 1 - No Action

The District would seek to improve allotment management and cattle movements on the Diamond-Moose allotment, including use of moist or wet meadows where pink agoseris is most likely to occur.

There would be no reclamation of roads through aspen clones and wet meadows. Motor vehicle travel through these sites would continue to contribute to resource degradation. This would undermine ongoing restoration efforts and degrade habitat conditions for pink agoseris.

The threat of noxious weeds establishing in pink agoseris habitat would still exist since no open roads would be closed or decommissioned (refer to cumulative effects to pink agoseris below).

Alternative 1 would not implement any fuels reduction treatments; therefore, there would be no change in the risk of wildfires. As an obligate wetland species, pink agoseris would not likely experience adverse effects from wildfire. Lethal wildfire in the lodgepole pine or subalpine fir stands surrounding wetlands where pink agoseris might occur would probably be beneficial to the species. Lethal fire would reduce conifer basal area for several decades, providing additional water to the wetlands. Additionally, lethal fire that burned over the wetlands would kill conifer trees that have become or are establishing in these wetlands, thereby retaining the wetland attributes needed by pink agoseris.

Alternative 2

Based on habitat attributes of known pink agoseris sites, this species is most likely to occur in or near proposed aspen unit 53-M (in the Moose Creek sub-watershed), which contains apparently suitable habitat. Unit 53-M is located near an eastern extension of the Dump Creek meadow complex. This site has experienced annual livestock use for decades and presently has reduced habitat capability for pink agoseris.

Pink agoseris is less likely to occur in proposed aspen units in the Salmon-Fenster and Salmon-Wallace sub-watersheds, as site conditions are different from those in the Moose Creek sub-watershed. Most of these units occur at lower elevations and tend to dry out by mid-summer, although unit 54-S contains small amounts of apparently suitable habitat. With the exception of proposed unit 52-M (adjoining unit 53-M), none of the lodgepole pine units contain habitat for pink agoseris.

Timber harvest is not recognized as a threat to pink agoseris (Spahr et al. 1991). The proposed timber harvest activities would be unlikely to directly affect pink agoseris. Those units where pink agoseris is most likely to occur would be harvested during the dry season or under frozen ground conditions. This would result in very low amounts of ground disturbance and no soil compaction, based on results from implementation of the Moccasin Aspen timber sale (Moccasin Aspen Timber Sale project record correspondence 2/21/2002).

This project proposes to restore selected aspen stands. Implementation of these proposed restoration activities would indirectly benefit pink agoseris, if the species is present in suitable habitat near the treated aspen stands. These indirect benefits would include increased sunlight at

ground level, improved soil water holding capacity, increased surface water for longer periods of time, and improved soil friability (Karen Gallogly, personal communication, 11/2003).

The roads actions proposed in Alternative 2 could also improve habitat for pink agoseris. There would be immediate benefits where current motor vehicle impacts to wet meadows are halted through changes in travel management at the Dump Creek Meadows and Racetrack Meadow. This would prevent further degradation of these meadows and allow the healing process to begin. However, these benefits would not be fully realized without concurrent improvements in livestock management (B. Rieffenberger, personal communication, 2/11/2004).

Alternative 3

The effects would be the same as Alternative 2, except an additional segment of road would be re-routed under Alternative 3 to avoid motor vehicle impacts to Racetrack Meadow, a wet meadow with potential suitable habitat for pink agoseris.

Alternative 4

With regard to travel management and road densities, the effects of Alternative 4 would be the same as those for Alternative 3. The effects of the proposed timber harvest under Alternative 4 would be less beneficial to pink agoseris than Alternatives 2 or 3 because Alternative 4 would not harvest in the RHCA's of proposed unit 53-M where pink agoseris is most likely to occur. Pink agoseris would indirectly benefit from the treatment in the RHCA of unit 52-M and unit 53-M (see Alternative 2 above).

Cumulative Effects

Activities that may have cumulatively affected pink agoseris in the project area are livestock grazing, motor vehicle use of meadows potentially occupied by pink agoseris, and the Dump Creek historical mining district and restoration projects.

Livestock grazing is acknowledged as the greatest potential threat to pink agoseris (Spahr et al. 1991). Livestock grazing has severely impacted apparently suitable habitat for pink agoseris in the project area. If present in the project area, pink agoseris may exist only at very low levels or may have been extirpated from these sites due to grazing impacts. The implementation of recent watershed restoration projects in the Moose and Dump Creek drainages, improved cattle management practices, and roads restrictions in wet meadows should contribute to an upward trend in hydrologic function, and soil and vegetation resources. In turn, these measures could improve the distribution of pink agoseris across the District and Forest by strengthening metapopulation connectivity. However, continued unauthorized off-road motor vehicle use could offset these improvements.

Mining activity in the Dump Creek drainage resulted in a loss of wet meadows and wetlands at the head of Dump Creek. This habitat can never be fully recovered since the Dump Creek drainage now exists as a deep and unstable chasm. Current and future restoration projects to stabilize vegetation and watershed resources would benefit apparently suitable habitat for pink agoseris.

Noxious weed invasion is an emerging threat to pink agoseris habitat. Several weed species thrive in meadows and forested environments, including Canada thistle, leafy spurge, and yellow toadflax. Small infestations of each of these species occur in or near the project area. The hawkweeds, a group of highly invasive weed species that thrives in mesic meadows, now occur

in adjacent counties in Idaho. The risk of transmitting invasive hawkweed species is of serious concern to weed managers. The establishment of any of these species in pink agoseris habitat could pose a serious threat to pink agoseris.

Until the distribution and density of pink agoseris sub-populations in the project area are known, the cumulative effect of these threats to the viability of pink agoseris will remain unknown. Improving the condition of apparently suitable habitat and preventing the establishment of noxious weeds would greatly ameliorate these threats.

Implementation of the action alternatives would reduce cumulative effects to pink agoseris in the project area by reducing motor vehicle impacts to wet meadows. Proposed grazing mitigations to promote aspen stand regeneration may also reverse the trend of livestock impacts to potential pink agoseris habitat. These improvements would contribute to enhanced habitat capability for pink agoseris in the project area.

Lemhi Penstemon

Existing Condition

Habitat Requirements

Lemhi penstemon is endemic to Lemhi County and adjacent counties in Montana (Moseley et al. 1990). Although this species was described by botanists more than sixty years ago, very little was known about it and there were only a very few known populations up until the late 1980s (Moseley et al. 1990). Extensive surveys have been conducted since then to determine the range and habitat associations of Lemhi penstemon. There are now well more than a hundred known occurrences, and additional sites are frequently found (Elzinga 1997).

Lemhi penstemon occurs in a variety of xeric non-forested cover types and xeric conifer forest cover types (Elzinga 1997). It is most commonly found in sage/grass cover types, often with an overstory of scattered conifers. Most occurrences on the Forest occur in the mountain big sagebrush/bluebunch wheatgrass community, with or without a conifer overstory. The sites are usually characterized by a southerly aspect, shallow soils with a high percentage of surface rock fragments, and often frequent natural disturbances, such as surface soil movement due to unstable slopes, rain events, or wildfire (Elzinga 1997).

Lemhi penstemon does not appear to be limited by elevation. Known occurrences span a range of almost 5,000 feet in elevation, from 3,200 feet to over 8,000 feet (Moseley et al. 1990).

Regional Population and Trend

The population of this species is stable across its range, although individual sub-populations often change over time (Elzinga 2003). Lemhi penstemon has been assigned a rank of G3 by the Idaho Native Plant Society (INPS 2003). This ranking indicates that while a species may be rare or uncommon, it is not imperiled. The Idaho Native Plant Society has assigned the following threat priority to Lemhi Penstemon: Threat Magnitude - low and Threat Immediacy - non-imminent.

The size of individual Lemhi penstemon populations is variable, ranging from only a few plants to many hundreds (Moseley et al. 1990). These are estimates based on the number of plants visible at the time of survey. Plants in the genus *Penstemon* are typically short-lived and

Penstemon populations are often highly cyclic, so that the number of individuals in a population is never constant.

Population size probably depends on factors such as anthropogenic threats, time since the last landscape disturbance, and climatic conditions, as well as other unknown factors (Moseley et al. 1990, Elzinga 1997). Lemhi penstemon responds negatively to factors such as drought, herbivory, and competition with noxious weeds (Elzinga 1997). It often responds very positively to disturbance such as wildfire. Large numbers of plants have been observed in several locations in Lemhi County a few years after wildfire (Dick Wenger and Pat Hurt, personal communication, 4/17/2001, Caryl Elzinga, personal communication, 10/9/2003).

Lemhi penstemon, as is typical of the *Penstemon* genus, is cyclic in nature. Unless there are anthropogenic threats that have not been managed, the dramatic fluctuations in individual populations are part of a normal pattern and do not indicate that the viability of the species is in question (Elzinga 1997, Caryl Elzinga, personal communication, 10/9/2003).

Local Habitat Condition, Population, and Trend

The area of analysis for Lemhi penstemon is confined to the project area. Lemhi penstemon occurs in the project area in sage/grass communities and in the conifer/sagebrush interface where there is an open conifer overstory above a sagebrush understory. It also occurs as roadside sites along the Stormy Peak and Diamond Creek roads (Moseley et al. 1990).

There are approximately 8,000 acres of potential Lemhi penstemon habitat within the project area. Table 1 below depicts the breakdown of forested (harvested and unharvested) and non-forested cover types that provide apparently suitable habitat for Lemhi penstemon. Lemhi penstemon is a rare species that seldom occurs in large numbers except after wildfire (Dick Wenger and Pat Hurt, personal communication, 4/17/2001, Caryl Elzinga, personal communication, 10/9/2003) and then usually only locally. Although the total acreage represents potential occupation by Lemhi penstemon within the project area, the species is not present across all 8,000 acres. Total frequency in a plant community is typically very, very low.

Table 1 Potential Lemhi Penstemon Habitat by Cover Type (acres)

	Non-forested	Forested/ Harvested	Forested/Unharvested
Bunchgrass	1,243	0	0
Grass/Forb	653	0	0
Mountain Big Sage	3,146	0	0
Wyoming Big Sage	701	0	0
Conifer/Mtn Big Sage	0	315	375
Douglas-fir	0	170	784
Ponderosa Pine	0	0	668
Totals	**5,743**	**485**	**1,827**
Grand Total = 8,055 acres			

Direct and Indirect Effects

No Action

There would be no potential effects to Lemhi penstemon associated with road maintenance and improvement activities for timber harvest. The increased risk of transmitting new invaders and establishing new infestations of noxious weeds would be avoided. There would be fewer miles

of re-opened road for which weed inventory and control actions would be necessary. No miles of road would be closed or decommissioned to help reduce the future invasion and spread of noxious weeds.

Alternative 1 would not implement any fuels reduction treatments; therefore, there would be no change in the risk of wildfire. The effects of fire to Lemhi penstemon are dual. Lemhi penstemon is a fire-adapted species that typically benefits directly from fire (Elzinga 1997). However, fire also often promotes vigorous post-fire weed invasion and spread. The sagebrush, sage/grass and dry conifer plant communities where Lemhi penstemon occurs are the most vulnerable. The risk of high severity wildfire and positive post-fire response of invasive species under Alternative 1 would remain high.

Alternative 2

Lemhi penstemon would not occur in any of the proposed lodgepole harvest units, as lodgepole pine communities do not provide suitable habitat for Lemhi penstemon. Aspen unit 700-S does not provide habitat for Lemhi penstemon either. This site is vegetated with small, densely grown Douglas-fir with a very high level of mistletoe infestation. The stand is too overgrown and dense to support Lemhi penstemon. Lemhi penstemon is known to occur within the boundaries of two of the proposed aspen units: 53-M and 53-S. These Lemhi penstemon sites are not located in areas targeted for aspen restoration. There would be no direct effects to Lemhi penstemon from timber harvest activities in the proposed harvest units.

The sole direct effect to Lemhi penstemon would be associated with road maintenance and improvement activities necessary to access the timber to be harvested. Only those occurrences of Lemhi penstemon alongside or on the road surface of roads to be maintained or improved would be affected.

Roadside occurrences of Lemhi penstemon are frequently threatened with eradication by road maintenance activities (Elzinga 1997). However, when plants at these sites are not eradicated by human action, they often continue to occupy the site for years, remaining vigorous and reproductive even when nearby sub-populations in native habitat have vanished (Elzinga 1997). These sites can be important in helping maintain the presence of Lemhi penstemon in a particular locale. Some roadside occurrences of Lemhi penstemon along the Stormy Peak road system in the Wallace 7th-field sub-watershed have persisted for more than twenty years.

Most roadside occurrences of Lemhi penstemon along the primary roads in the project area would not be threatened by road maintenance or improvement activities related to this project. Small, scattered Lemhi penstemon sites or single plants located along currently closed roads in the Wallace Creek drainage (the Wallace, Scarecrow and Deriar 7th –field sub-watersheds) could be removed by these activities. Lemhi penstemon does not occur alongside roads in the Moose Creek portion of the project area (the Dump and Moose sub-watersheds) since this area does not contain habitat for Lemhi penstemon.

Indirect effects to Lemhi penstemon would most likely be connected to the risk of introducing and spreading noxious weeds. Noxious weed mitigations stated in both action alternatives are intended to reduce the risk of noxious weed invasion or spread as a result of project implementation. However, the heavy equipment and support vehicles used in timber harvest operations, along with the increase in soil disturbance in harvest units and along roads, increase the risk of weed establishment and spread.

The potential effects of noxious weeds associated with timber harvest and associated road maintenance and improvement activities are myriad. None of these effects can be ruled out completely, although they can be mitigated to minimize the risk. Logging and road equipment can carry weed seeds from one area to another (Ferguson et al. 2003). This increases the potential for introduction of new noxious weed species into an area. Improved access resulting from timber harvest also increases the amount of other vehicle traffic along roads and contributes to noxious weed spread along re-opened roads (Gelbard and Belnap 2003). Soil disturbance creates favorable conditions for establishment and rapid spread of noxious weeds by providing fresh seed beds, increased nutrient levels from microbial activity, and reduced competition from native plants (Ferguson et al. 2003). It also contributes to an increase in the density of existing infestations of noxious weeds by providing optimal conditions for seedling germination and soil banking of seeds (Ferguson et al. 2003). Timber harvest decreases canopy closure and exposes the soil surface to more sunlight, further encouraging expansion of weed infestations, particularly on disturbed sites (Elzinga 1997, Ferguson et al. 2003).

The Forest Service requires that heavy equipment (such as mechanized harvesters, skidders, bulldozers, etc.) be thoroughly washed and pass a post-wash inspection before it can be moved onto National Forest lands (WO-CT6.36 7/2000). The purpose of the washing and inspection is to remove noxious weed seeds and caked mud that could contain weed seeds from the equipment. Only heavy equipment that is intended to operate off-road must be washed and inspected. Pickups and other support vehicles are not subject to this requirement. Washing heavy equipment can reduce the likelihood of new weeds or new infestations occurring, but it does not eliminate the risk.

Additional spread or increased density of spotted knapweed in Lemhi penstemon habitat might be the most likely consequence of project implementation. However, new invaders are found in Lemhi County each year and are becoming an increasing threat. Blueweed, rush skeletonweed, and sulfur cinquefoil can each thrive and spread very rapidly in Lemhi penstemon habitat. Several infestations of sulfur cinquefoil and one infestation of rush skeletonweed have been discovered by noxious weed inventory crews in the project area in the last two years (S-CNF noxious weeds inventory database 1/2004).

For more information, refer to the section on noxious weeds.

Alternative 3

Effects to Lemhi penstemon would be the same as Alternative 2, except for the following differences: The amount of haul road used to access the Alternative 3 harvest units would differ from those used in Alternative 2 by less than one mile (77.6 miles, *versus* 78.5 miles under Alternative 2). Fewer miles of road would be closed or decommissioned (–13.8 miles *vs.* –31.5 miles under Alternative 2), with the associated potential to disturb Lemhi penstemon sites within the roadbed during road treatment activities.

Alternative 4

Effects to Lemhi penstemon would the same as those for Alternative 3. The reduction in harvest acres under Alternative 4 applies only to RHCA's, which is not habitat for Lemhi penstemon.

Cumulative Effects

Activities in the project area that contribute to cumulative effects to Lemhi penstemon include past timber harvest and associated road construction, insect and disease outbreaks, livestock grazing, special uses, mining, wildfire, noxious weed invasion, and noxious weed treatments.

Approximately 400 acres of timber harvest has occurred in xeric Douglas-fir and Douglas-fir/ponderosa pine communities that contain suitable habitat for Lemhi penstemon. Lemhi penstemon is known to occur in a number of previously harvested areas. Timber harvest has variable effects on Lemhi penstemon. Timber harvest can benefit Lemhi penstemon by reducing conifer cover on sites occupied by Lemhi penstemon (Elzinga 1997). Conversely, there are a number of detrimental effects to Lemhi penstemon from timber harvest (Elzinga 1997). Even minimal scarification from skidding can result in mortality to Lemhi penstemon. It is difficult to know exactly the nature of effects from logging to Lemhi penstemon populations in the project area due to this variability.

The effects of road construction are much more definite (Elzinga 1997). Road construction has impacted Lemhi penstemon populations through destruction of plants, fragmentation of habitat, and introduction of noxious weeds into Lemhi penstemon habitat. Lemhi penstemon occurrences alongside roads receive no protection.

The effects of timber harvest and road construction in the project area have not threatened the distribution or viability of Lemhi penstemon sub-populations. The species is well distributed throughout the project area in sagebrush/grass plant communities. However, the continuing invasion of noxious weeds in the project area may affect the distribution and density of Lemhi penstemon based on interactions of spotted knapweed and Lemhi penstemon at other sites on the District (Elzinga 1997).

The potential effects of timber harvest traffic and road maintenance activities combined with routine road maintenance activities (e.g. grading, resurfacing, cleaning roadside ditches, using gravel pits, etc.) compound the risk of establishment and spread of new infestations of existing noxious weeds and increase the risk of new noxious weed species being established in the project area. Once weeds are present, off-road vehicles, livestock, and wildlife accelerate the spread of noxious weeds by carrying seeds into more remote areas away from roads. The degree of risk of these effects can be reduced with preventive mitigation, but cannot completely be eliminated.

Similar to timber harvest, insect and disease outbreaks can benefit Lemhi penstemon by opening up the forest canopy in areas where forest succession has increased conifer cover in areas occupied by Lemhi penstemon (Elzinga 1997).

The effects of livestock grazing, special uses, and mining in relation to Lemhi penstemon are all associated with the spread of noxious weeds in Lemhi penstemon habitat. Each of these activities has impacted Lemhi penstemon habitat in the project area.

Domestic livestock are recognized vectors of noxious weeds, carrying weed seeds from one site to another in their hooves, coats, and intestinal tracts (Sheley and Petroff 1999). Overuse of a particular site by cattle causes soil and vegetation degradation that creates seedbeds for noxious

weed seeds and encourages the establishment of noxious weeds. The spread of spotted knapweed and other weeds from cattle in the project area is apparent as weeds spread from water troughs, salt grounds, and loafing areas along trails traveled daily by cattle.

Special use road construction to access private inholdings in the project area has affected Lemhi penstemon habitat through the spread of spotted knapweed. Spotted knapweed is prevalent on private lands east of the project area and is now established on roads that access the private inholdings.

Many abandoned mines occur in sagebrush/bunchgrass plant communities that provide habitat for Lemhi penstemon. All abandoned mines in the project area that have been inspected to date are infested with spotted knapweed and cheatgrass, an invasive non-native annual grass. Cattle often congregate at the mine sites on leveled ground. The heavy grazing in these areas combined with the soil disturbance from mining has promoted rapid weed establishment. Weeds then spread outward from these sources into undisturbed sites.

Lemhi penstemon occurs within the boundaries of the 2000 Fenster Fire wildfire located in the eastern portion of the project area. Lemhi penstemon typically responds positively to fire (Elzinga 1997). However, burned areas are vulnerable to invasion by noxious weeds (Techline 12/2000). A five-year monitoring study to determine the effects of the Fire on soil and vegetation resources is in progress in the Fenster Fire area. Initial data suggest an increase in cheatgrass representation (Salmon Cobalt Ranger District unpublished data). Spotted knapweed has been found scattered throughout the fire area in isolated sites far from roads.

Spotted knapweed is recognized as a threat to the viability of Lemhi penstemon populations (Elzinga 1997). Spotted knapweed is allelopathic and strongly competitive against native vegetation (Elzinga 1997, Bais et al. 2003). Lemhi penstemon populations have been observed to decline drastically as spotted knapweed infestations increased in density (Elzinga 1997). Herbicide application to control noxious weeds can impact Lemhi penstemon sub-populations, particularly roadside occurrences since roads are often boom sprayed. However, the spread of spotted knapweed is considered a greater threat to the viability of Lemhi penstemon than herbicide applications to control spotted knapweed (Elzinga 1997).

Implementation of the action alternatives would contribute to cumulative effects through the potential eradication of roadside Lemhi penstemon occurrences and an increased risk of spreading noxious weeds. The spread of noxious weeds is the greater threat. As a whole, Lemhi penstemon is secure across the Forest, but its habitat is very vulnerable to the rapid spread of spotted knapweed. The likelihood of new invaders, such as blueweed, establishing increases the threat.

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04-08 04-06 #1

Noxious Weeds

Introduction

This section characterizes the impacts of noxious weed invasion at a landscape level; the current extent of noxious weed infestations in the analysis area; current weed management actions; and the potential effects of continued noxious weed invasion. The impacts of noxious weeds have assumed crisis proportions throughout much of the United States, including national forest system lands (USFS 1998; ISDA 1999). Noxious weeds are usually defined as invasive, non-native plants (Sheley and Petroff 1999). These species are considered injurious (EO 13112 2/1999). Noxious weeds arrive in this country without the array of insect and disease organisms that control their density and distribution in their native countries (Asher et al. 2002). As a result, these species become unusually aggressive in their new environment; they are able to establish monocultures and crowd out native plants. At a landscape level, this translates into a cascading set of changes in complex ecological interactions and ecosystem processes. These changes include loss of plant and animal biodiversity, loss of soil stability, increased erosion, changes in water quality, alterations in hydrologic regimes and nutrient cycles and increased disturbance cycles (Sheley and Petroff 1999; Asher et al. 2002; Harrod and Reichard 2002).

Noxious weeds can affect fish and wildlife species at local and range-wide levels. Plant community changes and watershed degradation resulting from weed infestations affect habitat carrying capacity and the number of individuals that the habitat can support declines (ISDA 1999). Unchecked noxious weed invasion eventually creates major changes in plant community structure and composition (Sheley and Petroff 1999), ultimately resulting in a loss of habitat for aquatic and terrestrial species (Asher et al. 2002).

The primary vectors of noxious weeds are motorized vehicles and roads, domestic livestock, wildlife species and waterways (ISDA 1999). Existing weed infestations provide a seed source that can be spread by these and other vectors.

Consistency with the Forest Plan

Forest Plan long-range goals and objectives state that noxious weeds are to be controlled using integrated pest management techniques to protect and enhance other resources and to comply with Idaho state law. Weed infestations are to be treated to ensure the eradication of new infestations, prevent the spread of existing infestations and gradually eliminate existing infestations (FLRMP III-4). Per Forest Service policy, the functional activity proposing the project and creating conditions conducive to weed encroachment is to be responsible for funding noxious weed control in the project area (FLRMP II-85).

Existing Condition

There are 36 invasive, non-native plants designated as noxious weeds by Idaho state law (Idaho Statutes Title 22, Chapter 24). Eleven of these species occur in Lemhi County in considerable or increasing amounts. Some are confined to specific locations; others are widely distributed throughout the county.

In addition, Lemhi County has designated three other invasive, non-native plants as noxious weeds: hoary alyssum, sulfur cinquefoil, and hound's-tongue. These species are designated as

noxious in other counties in Idaho, as well as other states. They are not listed by the State of Idaho because they do not occur throughout the state in substantial amounts. Lemhi County has designated them as noxious weeds because they have recently appeared in the county and the number and size of infestations are rapidly increasing.

To date, most noxious weed infestations on the S-CNF occur in rangeland plant communities. Spotted knapweed is the primary noxious weed infesting the Forest (approximately 85,000 inventoried acres). Hundreds of thousands of acres more are threatened by the potential spread of this weed. New invaders that have become strongly established at various locales across the Forest include leafy spurge (over 1,500 acres of inventoried infestations), musk thistle (more than 1,500 acres of inventoried infestations), and rush skeletonweed (more than 3,700 acres inventoried). A number of other new noxious weeds have also appeared including: Dalmatian and yellow toadflax, sulfur cinquefoil, hoary alyssum, hound's-tongue, and several other knapweed species. Current infestations of these weeds are small and isolated, but there is potential for rapid growth and spread.

The Forest noxious weed situation is mirrored in the analysis area. There are approximately 2,500 acres of inventoried noxious weeds in the analysis area (Table 22) based on a 2003 Forest-wide weed inventory. Other project area weed infestations have not been inventoried, and the acreages of these infestations are unknown. Project area noxious weeds occur primarily in rangeland plant communities along the Salmon River face in the eastern portion of the analysis area. Spotted knapweed is the most common noxious weed. Increasing numbers of leafy spurge infestations are found every year as seeds are vectored from large leafy spurge infestations in the Carmen Creek Subwatershed east of the Salmon River, opposite the analysis area. Small infestations of hoary alyssum, rush skeletonweed, sulfur cinquefoil, and yellow toadflax have also been found in the project area. Table 1 displays the total known and inventoried acreage of noxious weeds in the analysis area by species.

Table 1 Project Area Noxious Weeds

Noxious Weed	Approximate Acres
Black Henbane	3
Canada Thistle	4
Hoary Alyssum	7
Hound's-tongue	< 0.1
Leafy Spurge	15
Musk Thistle	146
Rush Skeletonweed	< 0.1
Spotted Knapweed	2,324
Sulfur Cinquefoil	1
Yellow Toadflax	5
Total Acres in Analysis Area	**2,500**

The Fenster and Wallace subwatersheds contain the most weeds in the project area. Over 1,500 acres of land in the Wallace Subwatershed are infested; primarily with spotted knapweed (more than 1,300 acres). Substantial infestations of spotted knapweed have also been inventoried in the Fenster Subwatershed.

The Wagonhammer Subwatershed is vegetatively similar to the Fenster and Wallace subwatersheds, and contains many acres of inventoried and un-inventoried weeds but only a small portion is in the analysis area. The section of Wagonhammer Subwatershed in the analysis area contains several small, mostly intermittent, tributaries to the Salmon River. These drainages are all similar: timbered at the head with large south-facing ridgelines vegetated in sagebrush or bunchgrass covertypes. Initial noxious weed inventories have found small infestations of spotted knapweed, hoary alyssum, hound's-tongue, leafy spurge, and rush skeletonweed.

The Dump and Moose subwatersheds contain very few weeds, currently. These subwatersheds have several roadless areas and consist mainly of forested plant communities. The primary focus in these subwatersheds is to eradicate existing small infestations, and to monitor roads and trails and eradicate any new infestations in a timely manner. Table 2 displays acres of noxious weeds within each analysis area subwatershed.

Table 2 Acres of Inventoried Weeds in Project Subwatersheds

Noxious Weeds	Dump	Fenster	Moose	Wagonhammer	Wallace
Black Henbane	UI[1]	UI	UI	UI	3
Canada Thistle	0.9	UI	UI	2.7	2.7
Hoary Alyssum	0.1	UI	UI	0.4	5.9
Hound's-tongue	UI	UI	UI	0.1	0.1
Leafy Spurge	UI	0.3	UI	13.6	0.7
Musk Thistle	UI	UI	UI	UI	145.8
Rush Skeletonweed	UI	UI	UI	0.1	UI
Spotted Knapweed	91.7	757.7	18.3	95.3	1,361.3
Sulfur Cinquefoil	UI	UI	UI	UI	0.8
Yellow Toadflax	UI	3	UI	2.3	UI
Total Acres	92.7	761	18.3	114.5	1,520.3

[1]Uninventoried

Table 24 displays the inventoried acres of other weeds that have invaded forested and rangeland plant communities in analysis area subwatersheds. These weeds are not currently listed as noxious by the state of Idaho or Lemhi County. However, these weeds have established large infestations elsewhere, and the increasing representation of these weeds on the Forest has prompted weed managers to begin tracking infestations.

Table 3 Acres of Other Inventoried Weeds in Analysis Area Subwatersheds

Noxious Weeds	Dump	Fenster	Moose	Wagonhammer	Wallace
Bull Thistle	UI[1]	UI	UI	UI	262.4
Bur Buttercup	UI	28.8	UI	UI	194.2
Common Tansy	UI	UI	UI	0.1	0.1
Total Acres	**0 to date**	**28.8**	**0 to date**	**0.1**	**456.7**

[1]Uninventoried

Direct and Indirect Effects

The project area subwatersheds are the noxious weeds analysis area. This analysis area was chosen for three reasons. The impacts of noxious weeds are far-reaching; however, a manageable analysis area must be selected to appropriately display project level effects. Subwatershed delineations provide convenient boundaries of manageable size, and roads, which are a major vector of noxious weeds, are quantified by density at the subwatershed scale. Road densities and travel management decisions affect the establishment and rate of spread of noxious weeds, and noxious weed invasions impact subwatersheds by altering native plant communities, and decreasing soil stability and water quality.

An integrated noxious weed management program to halt the spread of existing noxious weeds and to eradicate new infestations of noxious weeds in the analysis area was initiated several years ago. Crucial components of this program include prevention and control measures. Prevention incorporates practices such as the use of "weedseed-free" stock feed and cleaning heavy equipment before it is used on national forest system lands. Control measures include the use of herbicides and biocontrol agents, as well as mechanical methods such as grazing with goats under carefully managed conditions. When applied in an integrated approach, these program elements are successful in minimizing the spread of noxious weeds. If an integrated weed management program is initiated in areas before they become heavily infested with noxious weeds, large, expensive landscape-level control efforts are not needed. Land productivity, wildlife habitat capability, watershed function, and water quality can be more easily maintained or improved without the ecological burden imposed by noxious weeds.

However, with declining budgets on the Forest, it is unlikely that the District will be able to continue the present level of early detection and rapid response eradication measures for new noxious weeds. Nor will the District be able to maintain current control efforts on existing weed infestations to prevent their continued expansion.

Alternative 1 - No Action

There would be no harvest, and therefore no need to reopen currently closed roads to access harvest units in Alternatives 2 and 3 (Appendices B and D). Unless these roads were used for other activities, such as fire suppression, there would be no surface disturbance and no loss of existing native vegetation or erosion control vegetation on these roads. Existing weed infestations on these roads would not be disseminated by road maintenance and harvest activity. There would be no increased risk of additional establishment and spread of noxious weeds.

There would be no timber harvest traffic or associated road maintenance on more than 70 miles of haul roads that would be used for timber harvest related activities under Alternatives 2 and 3 (Appendices B & D). There would be no surface disturbance and loss of vegetation along the road cutslopes and fillslopes, particularly on roads currently closed to motor vehicle traffic. Barring other activities, such as fire suppression, there would be no increase over current traffic levels. There would be less risk of additional establishment and spread of noxious weeds compared to Alternatives 2 and 3.

There would be no reduction in overall road densities and open road densities, or improvements in travel management as proposed under Alternatives 2 and 3 (Appendices B and D). The present contribution of roads and road densities to the establishment and spread of noxious weeds in the analysis area would continue.

There would be no decommissioning/reclamation of roads through aspen clones and wet meadows as proposed in Alternative 2 and 3 (Appendices B and D). Motor vehicle travel through these sites would continue, contributing to further resource degradation and undermining ongoing restoration efforts. Continuance of this current situation greatly increases the potential for the establishment of noxious weeds at these sites.

Wildfire can contribute to the establishment and spread of noxious weeds, even in areas that had healthy native plant communities and few weeds prior to the fire (Goodwin et al. 2002). On degraded sites or those with existing noxious weed infestations, fire often promotes invasive plant species by creating an ideal seedbed, providing a flush of nutrients and reducing competition from native plants (Asher et al. 2002). The 2000 Fenster wildfire which burned 2,864 acres, primarily in rangeland plant communities where a number of noxious weed species were already well established prior to the fire, overlaps a portion of the project area. In 2001, 59 permanent transects were established to monitor post-fire soil and vegetation recovery (Salmon-Cobalt Ranger District, 2001 and 2003, unpublished data). The data depicts a heavy post-fire flush of invasive species, including noxious weeds and other species such as downy brome and annual mustards. Type conversion to invasive species can alter natural fire regimes, sometimes permanently (Harrod and Reichard, 2002). Fire research indicates that landscape level approaches, such as the proposed action, to reducing stem density and fuel loading in overstocked conifer stands can lessen the probability of large, lethal fire occurrence (Graham et al. 2004, Peterson et al. 2004).

Alternative 1 would not implement any fuels reduction treatments; therefore, there would be no change in the risk of high severity wildfire and the resultant potential for vigorous post-fire weed invasion and spread. Approximately 60% of the project area is at moderate to high risk of post-fire weed invasion. Sagebrush, sage/grass and dry conifer plant communities are the most vulnerable. There are about 10,000 acres highly susceptible to post-fire invasion of noxious weeds, mostly in the bunchgrass, grass/sage and conifer/sage cover types. Another 14,000 acres, primarily in the Douglas-fir cover type, are moderately susceptible to post-fire invasion of noxious weeds. The risk of high severity wildfire and positive post-fire response of invasive species under Alternative 1 would remain high.

Alternative 2

Alternative 2 would treat 1,670 vegetated acres. A noxious weed risk assessment to gage the likelihood of promoting establishment and spread of noxious weeds as a result of project

activities and the consequences to resources was applied to each action alternative. Based on the risk analysis, the potential of introducing new weeds and establishing new infestations of weeds in the analysis area from timber harvest and road use would be high because infestations of noxious weeds are present in the analysis area, and the proposed activities, even with preventative mitigation measures, would be likely to result in the further establishment and spread of noxious weeds. The probable expansion of noxious weeds in the analysis area would have adverse effects on native plant communities, soil and water resources, and fish and wildlife inhabiting the analysis area.

Timber harvest decreases canopy closure and exposes the soil surface to more sunlight, further encouraging expansion of weed infestations, particularly on disturbed sites (Elzinga 1997, Ferguson et al. 2003). Soil disturbance creates favorable conditions for establishment and rapid spread of noxious weeds by providing fresh seed beds, increased nutrient levels from microbial activity and reduced competition from native plants (Ferguson et al. 2003). It also contributes to an increase in the density of existing infestations of noxious weeds by providing optimal conditions for seedling germination and soil banking of seeds (Ferguson et al. 2003). Increased solar exposure on the forest floor increases the probability that noxious weeds will successfully establish (Parendes and Jones 2000).

The timber harvest portion of Alternative 2 would contribute to establishment of these conditions in 68 units distributed across 1,670 acres throughout the project area. The Forest Service has developed best management practices for preventing the introduction and spread of noxious weeds. Successful application of prevention measures and mitigation measures are necessary to reduce the probability of weed infestation and establishment that can result from timber harvest activities. These prevention and mitigation measures include: (1) treating existing weed infestations in and around treatment units and haul routes prior to project implementation, (2) encouraging logging operators to maintain weed-free equipment yards and staging areas, (3) using standard timber sale contract provisions to ensure that harvest equipment is cleaned and inspected prior to mobilization onto national forest system lands, (4) designating landings and skid trails, using existing sites wherever possible, (5) minimizing areas of soil disturbance to no more than that needed to meet project objectives, (6) minimizing soil disturbance and off-site transfer of soil and road surfacing material when maintaining or re-opening roads and (7) inspecting areas of ground disturbance in the project area for at least three years after project completion and eradicating any new weed infestations found (USDA Forest Service, 2001). Implementation of these measures would greatly reduce the transmission of noxious weeds into the project area as a result of project implementation.

Increased levels of road maintenance and motor vehicle traffic also heighten the risk of noxious weed establishment and spread (Parendes and Jones 2000; Gelbard and Belnap 2003). Road maintenance activities can spread noxious weeds by moving road surface material up and down a road system, creating fresh seedbeds for weed germination or removing competing vegetation (Ferguson et al. 2003).

Alternative 2 would use approximately 78.5 miles of road in the analysis area to support the proposed timber harvest. Traffic, soil and vegetation disturbance would increase on these roads. Ten miles of currently closed road would be reopened. Re-opening closed roads would generate soil disturbance, vegetation removal, and grading through existing infestations and spreading soil contaminated with noxious weed seeds along a road or through a unit. To minimize disturbance to soil and vegetation on roadways, high-blading to remove rocks and debris would be required,

existing vegetation would be maintained on the driving surface to the extent possible, and conifers and brush would be removed by hand-felling instead of bulldozing.

The heavy equipment used for timber harvest would create soil and vegetation disturbance in harvest units, and amplify the risk of weed establishment and spread. To reduce the probability of introducing noxious weeds into harvest units, Alternative 2 requires that heavy equipment such as mechanized harvesters, skidders, bulldozers be thoroughly washed and pass a post-wash inspection before it can be moved onto national forest system lands (WO-CT6.36 7/2000). The purpose of the washing and inspection is to remove noxious weed seeds and caked mud that could contain weed seeds from the equipment. Only heavy equipment that is intended to operate off-road must be washed and inspected. Pickups and other support vehicles are not subject to this requirement. Washing heavy equipment would reduce the likelihood of new weeds or new infestations being transmitted into the proposed harvest units, but it would not eliminate the risk.

Alternative 2 would include harvest of conifers in aspen clones in and around riparian areas and wet meadows. The proposed harvest could compound the existing effects of motor vehicle and cattle use on clones through additional soil and vegetation disturbance and large reductions in canopy cover. Timber harvest could also create access that would encourage additional vehicle use by improving roads that are currently impassable or difficult to travel.

Alternative 2 would have 29.5 fewer miles of open road including seasonal road closures than Alternative 1 (196.8 versus 226.5 miles, respectively). There are more miles of seasonal closures in Alternative 1 than Alternative 2; however, wet weather, seasonal road closures do not inhibit noxious weed proliferation and are considered "open roads" in terms of weed management.

Alternative 2 would actively or passively decommission about 31.5 miles of road in the analysis area, primarily in the Dump and Moose subwatersheds, that are no longer needed as part of the Forest road system. Normally, these roads would be inspected and any noxious weeds found would be treated with herbicides prior to reclamation. Roads and motor vehicle traffic are recognized as a primary vector of noxious weeds (Gelbard and Belnap 2003). Reducing road densities and the amount of motor vehicle travel on roads in the analysis area would reduce the establishment and rate of spread of weeds. In the future, this would also decrease the cost and time required for annual weed control activities along these roads.

As part of the decommissioning, motorized vehicle routes through aspen clones and wet meadow complexes, primarily in the Daly Creek and Dump Creek subwatersheds would be eliminated under Alternative 2. This would greatly reduce the likelihood of introducing weeds that thrive in forested communities and wetlands, such as Canada thistle, yellow toadflax, hound's-tongue, or the highly aggressive, non-native hawkweeds.

Alternative 2 would have 1.8 fewer miles closed to year-round motor vehicle travel than Alternative 1 (81.2 versus 83.1 miles, respectively). Most of the closed roads are unclassified roads that were used as skid trails during past timber harvest, abandoned mining roads, or user-built roads.

The degree of risk of the effects described above can be reduced with mitigation, but cannot be prevented completely. Preventing the transmission of noxious weed into a harvest area is the best and least expensive practice. Prevention measures to reduce the potential for introducing and spreading noxious weeds under Alternative 2 include mandatory harvest equipment washing

and inspection, and minimizing the amount of soil disturbance when re-opening or maintaining roads to be used during timber harvest.

Cumulative Effects

Activities in the analysis area that cumulatively contribute to noxious weed spread and establishment in the analysis area include timber harvest and associated road construction and maintenance, livestock grazing, special uses, mining, wildfire, and noxious weed treatments. The potential effects of noxious weeds associated with timber harvest and associated road maintenance and improvement activities are myriad because logging and road equipment carry weed seeds from one area to another (Ferguson et al. 2003). This increases the potential for introduction of new noxious weed species into an area. Improved access resulting from timber harvest also increases the amount of other vehicle traffic along roads and contributes to noxious weed spread along roads (Gelbard and Belnap 2003). Soil disturbance creates favorable conditions for establishment and rapid spread of noxious weeds by providing fresh seedbeds, increased nutrient levels from microbial activity, and reduced competition from native plants (Ferguson et al. 2003). It also contributes to an increase in the density of existing infestations of noxious weeds by providing optimal conditions for seedling germination and soil-banking of seeds (Ferguson et al. 2003). Timber harvest decreases canopy closure and exposes the soil surface to more sunlight, further encouraging expansion of weed infestations, particularly on disturbed sites (Elzinga 1997; Ferguson et al. 2003).

Past timber harvest and road construction have contributed cumulatively to weed establishment and spread in the analysis area. There has been extensive timber harvest in the past forty years and current road densities are high to very high (Table 12). The proposed harvest would also contribute to noxious weed invasion. The degree of risk can be reduced with mitigation, but cannot completely be eliminated.

The potential effects of timber harvest traffic and road maintenance activities combined with routine road maintenance activities by Forest Service crews (e.g. grading, resurfacing, cleaning roadside ditches, using gravel pits, etc.) compound the risk of establishment and spread of new infestations of existing noxious weeds, and increase the risk of new noxious weed species being established in the analysis area. Once weeds are present, off-road vehicles, livestock, and wildlife accelerate the spread of noxious weeds by carrying seeds into more remote areas away from roads.

Domestic livestock are recognized major vectors of noxious weeds, carrying weed seeds from private land or other infested lands to uninfested areas in their hooves, coats, and intestinal tracts (Sheley and Petroff 1999). Concentrated use of a particular site by cattle causes soil and vegetation degradation that creates seedbeds for noxious weed seeds and encourages the establishment of noxious weeds (USFS 1994). The spread of spotted knapweed and other weeds from cattle in the analysis area is apparent as weeds spread from water troughs, salt grounds, and loafing areas along trails traveled daily by cattle. Once weed infestations establish at livestock loafing areas, water troughs, or along trails, weeds are further dispersed by livestock, big game animals, small mammals, and birds.

Noxious weeds are often highly invasive and competitive in wetlands and riparian areas (USFS 1994). Domestic livestock are recognized as an important vector of noxious weeds into riparian areas (USFS 1994). Wet meadows and aspen clones in the analysis area are at risk of noxious weeds vectored by cattle. For example, many of the cattle pastured on the allotment during the

summer months are wintered in the Carmen Creek Subwatershed, which is heavily infested with leafy spurge and spotted knapweed.

Many abandoned mines occur in or near sagebrush/bunchgrass plant communities within the analysis area. All abandoned mines in the analysis area that have been inspected to date are infested with spotted knapweed and cheatgrass, an invasive non-native annual grass. Cattle often congregate at the mine sites on leveled ground. The heavy grazing in these areas combined with the soil disturbance from mining have promoted rapid weed establishment. Weeds then spread outward from these sources into undisturbed sites.

Special use road construction to access private in-holdings in the analysis area has contributed to the spread of spotted knapweed. Spotted knapweed is prevalent on private lands east of the proposed harvest units and is now established on roads that access the private in-holdings. Spotted knapweed is spreading unchecked across these private lands. If control measures are not initiated, these infestations will eventually impact private and federal land that presently are un-infested.

Wildfire often fosters the establishment and spread of noxious weeds. Fire creates an ideal seedbed, provides a flush of nutrients, and reduces competition from native plants (Asher et al. 2002). Fire suppression activities also promote the proliferation of noxious weed infestations. For example, firelines created by bulldozers can spread seeds and soil contaminated with weed seeds far from the infestation from which they originated. The 2000 Fenster Fire burned 2,864 acres, primarily in rangeland plant communities, and a number of noxious weed species were already well established in the area prior to the wildfire. Therefore, the risk of enhanced weed spread in the fire area is very high (Techline 2000).

An emerging issue is the potential introduction of new noxious weed species that thrive in forested and wetland plant communities, including Canada thistle, hound's-tongue, and yellow toadflax. Small infestations of each of these species occur in or near the project area. The hawkweeds, a group of highly invasive weed species that thrives in mesic meadows, now occur in adjacent counties in Idaho. The risk of transmitting invasive hawkweed species is a serious concern to weed managers. It would be easy for these very aggressive weeds to establish a foothold in already disturbed areas.

Off-road vehicles are also weed vectors. The proliferation of recreational off-road vehicle use has resulted in inappropriate motor vehicle travel. Poorly regulated off-road motor vehicle travel greatly expands the area of land where noxious weeds may be spread.

Alternative 3

Existing Condition

The area of analysis and the existing condition are the same as those described for Alternatives 1 and 2. Alternative 3 would treat 1,553 acres; 117 acres less than Alternative 2. Alternative 3 would have approximately the same number of haul road miles as Alternative 2, although the haul routes would differ slightly.

Direct and Indirect Effects

The direct and indirect effects from implementing the timber harvest portion of Alternative 3 would essentially be the same as those for Alternative 2. Other than the changes presented

below, all direct and indirect effects would remain the same as those discussed under Alternative 2.

Under Alternative 3, proposed units 13-S, 16-S, 17-S, 19-S, and portions of units 31-S and 53-S would not be harvested; RHCA buffers would be increased in units 04-M, 05-M, 06-M, 13-M, and 22-M. This would result in approximately 117 fewer acres treated than Alternative 2, mostly in the Wallace Creek Subwatershed. There would be no off-road use of timber harvest equipment or ground-disturbing activities in these areas; decreasing the degree of risk of introducing and establishing noxious weed infestations.

There would be about 3.8 fewer miles of road used for timber harvest in Alternative 3 as compared to Alternative 2, all on the southern section of FS Road 60174 in upper Wallace Creek. There would be no vehicle traffic associated with timber harvest on this section of FS Road #60174; reducing the degree of risk of introducing and establishing noxious weed infestations along the road.

The direct and indirect effects from implementing the road management portion of Alternative 3 would be less beneficial to weed management, native plant communities, and wildlife than Alternative 2 because there would be 18.2 fewer miles of road decommissioned than Alternative 2. Alternative 3 would have more long-term potential for the spread of noxious weeds than Alternative 2 because there would be 21.7 more miles of open road. This potential would be somewhat reduced because there would be an additional 2.6 miles of long-term, year-round road closures in Alternative 3. Wet weather, seasonal road closures do not inhibit noxious weed proliferation and are considered "open roads" in terms of weed management. Therefore, the difference between the post-project open road miles in Alternatives 3 and 2 is 7 percent (211.6 versus 196.9 miles, respectively).

In Alternative 3, FS Road U232036-B (Racetrack Meadow) in Moose Creek Subwatershed would be restored to the original alignment along the northwest edge of the meadow, and approximately 600 feet of an existing two-track in the middle of the meadow would be abandoned. The only anticipated site disturbance would be for culvert installation. No excavation or surface blading would be necessary to establish the route's travel surface, and only one to two mature-size trees would need to be cut. A jackleg pole fence would be constructed between the meadow and the re-located route to direct vehicle traffic toward the higher elevation route (approximately 700-feet). The realignment would eliminate the direct noxious weed impacts caused by the pioneered road across Racetrack Meadow. As with other district roads open to motorized vehicle travel, the realigned section of road would be routinely patrolled to detect and eradicate new infestations of weeds.

Cumulative Effects

Non-project related cumulative effects would be the same as Alternatives 1 and 2.

The cumulative effects associated with Alternative 3 timber harvest activities would be similar to, but slightly less than Alternative 2 due to fewer (117) treatment acres.

Alternative 3 would also have a somewhat higher long-term risk of weed invasion compared to Alternative 2 due to a 7 percent increase in open roads and a reduction in road decommissioning (18.5 miles). Prevention measures to reduce this higher risk of introducing and spreading noxious weeds include mandatory harvest equipment washing and inspection and minimizing the amount of soil disturbance when re-opening or maintaining roads to be used during timber

harvest. While these measures reduce the risk of transmitting noxious weeds, they cannot eliminate it.

Alternative 4

Existing Condition

The area of analysis and the existing condition are the same as those described for Alternatives 1, 2 and 3. Alternative 4 would treat 1,486 acres; 67 acres less than Alternative 3. Alternative 4 would have approximately the same number of haul road miles as Alternative 3.

Direct and Indirect Effects

The direct and indirect effects of implementing Alternative 4 would essentially be the same as those for Alternative 3. The only difference between Alternatives 3 and 4 is that the RHCA's within units 52-M, 53-M, 52-S, 53-S (totaling 67 acres) would not be harvested under Alternative 4. Other than those changes presented below, all direct and indirect effects would remain the same as those discussed under Alternative 3.

There would be no off-road use of timber harvest equipment or ground-disturbing activities in the RHCA's of four units, thereby decreasing the degree of risk of introducing and establishing noxious weed infestations in these areas

Cumulative Effects

Non-project related cumulative effects would be the same as Alternatives 1, 2 and 3. The cumulative effects associated with Alternative 4 would be the same as those for Alternative 3, except that 67 fewer acres would be harvested.

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