Motorized Travel Management Project

Draft Wildlife Report

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For
Okanogan-Wenatchee National Forest

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Travel management proposed actions include:

- Road closures- (Maintenance level 1 roads (ML1) closed to all motorized use, unauthorized closed): Forest roads considered in this document are generally narrower, lower traffic volume roads compared to the highways and large roads in the literature, thus road effects will be less intense. Also, no new roads are proposed as a result of the travel management alternative. The proposed action closes the forest to cross-country travel and closes maintenance level 1 (ML1) roads and unauthorized roads to *all* motorized traffic. Therefore, the proposed action will result in improved conditions for wildlife compared to the current condition.
- Closure of areas to cross-country travel: Another action being analyzed is the closure to cross-country motorized use across the Forest. The only exceptions are the two existing motorized use areas- Moon Rocks and Fun Rocks on the Naches District, where off-road motorized use would be allowed to continue.
- Corridors to access dispersed camping: Designating motorized access to dispersed camping is another action being analyzed. Currently, public motor vehicle travel is not prohibited off designated routes, except where prohibited by temporary restrictions or by the Okanogan National Forest Travel Plan Map (April, 2005), which identifies the current road, trail and area management for motor vehicles, identifies specific areas where seasonal and other restrictions for motorized use are in place for resource protection. However, on the Okanogan portion of the Forest, direct access to temporary campsites within 300' of designated routes is permitted, even where off-route travel is prohibited. In the alternatives, access for dispersed camping will be by designation of corridors for motorized access to dispersed camping along open system roads, using **existing** non-system routes only.
- Authorization of WATV use on 350 miles of National Forest System Roads that are currently open to motorized use.

These actions do not involve any ground disturbance or vegetation management

Overall, the effects of the travel management proposals are beneficial to wildlife, because they result in a reduction in access.

Assumptions

- Enforcement will occur, and recreationists will generally be law-abiding.
- Removal of snags as hazard trees would not occur within corridors.
- Corridors for access to dispersed camping are already in use, and would not receive significant additional use. Mitigation measures would be implemented if monitoring finds this assumption is incorrect.
- Maintenance level 1 roads are managed as open to motorized use on the Methow Valley and Tonasket Ranger Districts, and managed as closed on the rest of the forest. This analysis assumes that all ML 1 roads receive some level of motorized use, which overstates the effects of closing them.
- Seasonal restrictions would be in place as designated in the Okanogan Forest Plan (1989) and the Wenatchee Forest Plan (1990).
- Authorizing WATV use on 350 miles of NFS roads would not change the traffic volume measurably, and therefore would not change animal response to the roads. Additional disturbance, displacement, avoidance of suitable habitat, hunting, trapping, poaching, mortality from collisions, firewood gathering or other negative effects due to road use is not expected to occur as a result of authorization of WATV use. This component of the project will not be discussed further.

Mitigation

- Presence of a listed species may require mitigation such as timing restrictions or corridor closure, and possibly reinitiation of consultation with USFWS.

Regulatory Framework

General Guidelines- (see individual sections below in this report for guidelines applicable to single species).

National Forest Management Act (NFMA)

NFMA requires the Forest Service to manage fish and wildlife habitat to maintain viable populations of all native and desirable non-native wildlife species and conserve all listed threatened or endangered species populations (36CFR219.19). Sensitive species and Management Indicator Species (MIS) are identified to meet requirements of this act.

The Wenatchee Forest Plan requires that sensitive species be identified and managed in cooperation with the Washington Department of Wildlife (now Washington Department of Fish and Wildlife) and that inventories be completed where proposed projects may disturb habitat. The Okanogan Forest Plan directs the forest to protect sensitive species.

Endangered Species Act (ESA)

ESA requires the Forest Service to manage for the recovery of threatened and endangered species and the ecosystems upon which they depend. Forests are required to consult with the US Fish and Wildlife Service if a proposed activity may affect the population or habitat of a listed species. This includes any activities funded, authorized or carried out by the agency.

Migratory Bird Treaty Act (MBTA) MBTA established an international framework for the protection and conservation of migratory birds. This Act makes it illegal, unless permitted by regulations, to pursue, hunt, take, capture, purchase, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird . Under the provisions of the MBTA, the unauthorized take of migratory birds is a criminal offense, even if it is unintentional.

Okanogan and Wenatchee National Forest Land and Resource Management Plans establish standards, guidelines and priorities for each forest and for individual management areas.

Dead and Defective Tree Habitat

Forest-wide guidance for dead and defective tree habitat is included in both plans. The Okanogan Forest Land and Resource Management Plan requires that dead tree habitat be managed to maintain primary excavator population to at least 60%-100% of biological potential, depending on management area. The Wenatchee Land and Resource Management Plan requires that all decay classes of dead and down trees are provided for (an average of not less than two dead and down tree segments per acre well distributed over the area) and that the same level of soft dead trees and large down trees as would be naturally created by the population goal for dead trees be maintained. In Management Area SI-2 (classified areas, other), the Plan requires that primary cavity excavators be managed at 100 percent of the potential population level where snags do not pose threats to historical structures, features, facilities, or visitors.

Wenatchee Forest Plan Standards and Guidelines that apply to this project and wildlife species include:

- maintain or enhance limited habitats to provide the habitat characteristics for dependent species and
- road related activities need to be sensitive to changes in the aquatic environment;

The current Wenatchee and Okanogan Land and Resource Management Plans were amended to include additional direction to maintain the quality of aquatic and riparian habitats. The Aquatic Conservation Strategy (ACS), as part of the Northwest Forest Plan (NWFP; USDA 1994) was applied to the Wenatchee and a portion of the Okanogan National

Forests. The Pacific Salmon Fisheries Strategy (PACFISH; USDA 1994) was added to the portion of the Okanogan that supports anadromous fisheries. The remainder of the Okanogan Forest was amended by the Inland Native Fish Strategy (INFISH; USDA 1995), which provided similar direction for native non-anadromous fisheries. These are discussed below.

Raptor Nests
6-11 The Okanogan National Forest and the Wenatchee National Forest Land and Resource Management Plans protect raptor nests from some site-disturbing activities.

Special and Unique Habitats
Wenatchee Forest Plan recognizes the need to protect special habitats including, cliffs and rims, ponds, marshes, caves, and springs.

Threatened and Endangered Species
For the Okanogan National Forest Land and Resource Management Plan:

6-17: Threatened and endangered species shall be managed according to recovery plans and coordinated with U.S. Fish and Wildlife Service and Washington State Department of Fish and Wildlife.

6-18: Consultation with U.S. Fish and Wildlife Service will occur when threatened and endangered species may be affected by resource proposals.

The Wenatchee National Forest Land and Resource Management Plan direction is to manage critical wildlife habitat to improve status of threatened and endangered species. Where a species or suitable habitat is present, the Biological Assessment Process and Consultation Procedures must be followed. Species shall be managed to achieve recovery plan objectives.

Old Growth Habitats
Objectives of the Wenatchee National Forest Land and Resource Management Plan are to conserve enough old growth habitat to provide adequate distribution for biological diversity, plant and animal habitats and aesthetic values. Non-compatible activities should be relocated outside the old growth prescription.

The goal for management prescription OG-2 (mature habitats) is to manage for mature to old growth habitat for wildlife and plant species dependent on this habitat. Indicator species for this habitat are martens, northern three-toed woodpeckers, and pileated woodpeckers.

The Northwest Forest Plan amended both these documents, and established Late-Successional Reserves in areas of areas of late/old forest.

Northwest Forest Plan Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl, 1994 (NWFP).

Land allocations: The NWFP establishes late-successional reserves (LSRs) that are managed to protect and enhance late-successional and old growth conditions, adaptive management areas (AMAs) (managed to develop and test management approaches for ecological and economic health), and managed late-successional areas (MLSAs)(managed for northern spotted owls in the drier provinces). Road construction is generally not recommended in late-successional reserves. Recreational uses may be consistent with the late-successional reserves allocation.

Survey and Manage Species: The NWFP amended forest plans to include surveys for “survey and manage” species and established direction for riparian reserves and other land allocations including LSRs (late-successional reserves) and MLSA (managed late-successional areas).

Pre-disturbance surveys are required for species designated as "survey and manage" in all land allocations, if a project within the range of the species would negatively affect the species' habitat. Known sites (locations) for these species are protected.

Snags in matrix lands: The NWFP provides additional protection measures for the white-headed woodpecker, black-backed woodpecker, pygmy nuthatch and flammulated owl, outside designated areas (LSRs, AMAs, MLSAs) for the Northern spotted owl and marbled murrelets, and riparian habitat protection measures, in forest matrix lands. These regulations concern the retention of snags and green tree replacements to provide for the 100% population potential for these species.

Riparian and Aquatic Habitats: The NWFP sets standards and guidelines for protection of riparian and aquatic ecosystems, and establishes riparian reserves and key watersheds. Riparian reserves have prescribed widths based on stream or waterbody category. The only standard and guideline pertinent to the proposed action addresses managing dispersed camping activities to attain Aquatic Conservation Strategy objectives. Existing recreation facilities within Riparian Reserves should be evaluated and impacts mitigated to ensure that these do not prevent, and to the extent practicable contribute to, attainment of Aquatic Conservation Strategy objectives. Dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives should be adjusted or eliminated.

Migratory Bird Treaty Act (MBTA)

MBTA established an international framework for the protection and conservation of migratory birds. This Act makes it illegal, unless permitted by regulations, to pursue, hunt, take, capture, purchase, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird. Under the provisions of the MBTA, the unauthorized take of migratory birds is a criminal offense, even if it is unintentional.

Executive Order 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds (2001)*

This order directed agencies whose activities could have a measurable negative effect on migratory bird populations to develop a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) to promote the conservation of migratory bird populations. It further directed agencies, to the extent permitted by law and subject to the availability of appropriations and within Administration budgetary limits, and in harmony with agency missions, to (1) support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions; (2) to restore and enhance the habitat of migratory birds, as practicable; and (3) to prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable.

INFISH and PACFISH

INFISH (Inland Native Fish Strategy for the intermountain, Northern, and Pacific Northwest Regions, USDA 1995) and PACFISH (Interim Strategies for Managing Anadromous Fish Producing watersheds on Federal lands in Eastern Oregon and Washington, Idaho, and Portions of California, USDA and USDI, 1995) amended portions of the Okanogan National Forest Land and Resource Management Plan (LRMP) not addressed by the Northwest Forest Plan. Both documents established stream, wetland, and landslide-prone area protection zones called riparian habitat conservation areas (RHCAs), setting standards and guidelines for managing activities that potentially affect conditions within RHCAs. These include managing vehicles and motor vehicle use in a manner that does not retard or prevent attainment of Riparian Management Objectives (RMOs).

Best Available Science

General information- see also individual sections, below in this report.

Roads are generally associated with negative effects on both terrestrial and aquatic ecosystems (Trombulak and Frissell, 2000). Trombulak and Frissell list 7 general effects of roads on wildlife species:

- Mortality from road construction
- Mortality from collision with vehicles
- Modification of animal behavior
- Alteration of the physical environment
- Alteration of the chemical environment
- Spread of invasive plants and animals.
- Increased use of areas by humans.

Wisdom et al. (2000, pp 112-123) summarized road-associated factors that negatively affect habitats or populations of terrestrial vertebrates:

- Habitat Loss and Fragmentation including negative edge effects – roads can have the direct impact of converting large areas of habitat into non-habitat, while the indirect impacts of noise and exhaust can further reduce habitat quality and create avoidance of additional habitat in the surrounding area. In addition, species that respond negatively to openings or linear edges, such as habitat-interior species, avoid areas near roads.
- Disturbance (including noise and human presence), Displacement, Avoidance, Harassment (i.e., chronic negative interactions with humans) – Roads can directly interfere with life functions at specific use sites (e.g., increased disturbance of nest sites, breeding leks, or communal roost sites). This can result in spatial shifts of individuals and populations away from a road in relation to human activities on or near a road.
- Collisions – Death or injury resulting from a motorized vehicle running over or hitting an animal on a road.
- Over-hunting, Over-trapping, Poaching, and Collection – Roads can facilitate greater access into areas used for hunting and trapping and result in legal and illegal over-harvest of wildlife resources.
- Snag and Downed Log Reduction – Roads facilitate firewood collection which can result in a loss of snags and downed logs. Larger snags are typically desired by woodcutters and are also the most beneficial to many wildlife species such as flammulated owls and pileated woodpeckers.
- Barriers to Travel or Movement – Preclusion of dispersal, migration, or other movements as posed by a road itself or by human activities on or near a road or road network. Roads act as barriers, either partial or complete, for a variety of species including frogs (Hels and Buchwald 2001), turtles (Aresco 2005, Steen and Gibbs 2004), salamanders (Marsh et al. 2004), European badgers (Clarke et al. 1998), ground beetles (Keller and Largiader 2003), bumblebees (Bhattacharya et al. 2003), badgers (Clarke et al. 1998), small mammals (Oxley et al. 1974), bobcats and coyotes (Riley et al. 2006), roe deer (Kuehn et al. 2007), bighorn sheep (Epps et al. 2005) and grizzly bears (Mace et al. 1996).

Highways are likely to act as major barriers to movement for many if not most terrestrial animals, either due to avoidance of the road or due to very high mortality rates when crossings are attempted (Eigenbrod 2008). However, even minor roads such as many forest roads may be a barrier to movement for salamanders (deMaynadier and Hunter 2000), invertebrates (Mader, 1984), small mammals (Swihart and Slade 1984), and some snakes (Shine et al. 2004), due to the behavioral response of these species to the road surface (Eigenbrod 2008).

Roads and their use may result in effects to populations, particularly in the case of larger roads and road networks with heavy traffic. Roads may alter animal communities, reduce biological diversity, increase the threat of extinction (Alexander and Waters, 2000) and result in genetic divergence of subpopulations (Selander and Kaufman, 1975). By acting as barriers to dispersal movements, roads can lead to a reduction in gene flow and population persistence (Patrick and Gibbs, 2010, Gerlach and Musolf, 2000, Keller and Largiader, 2003). Greenwald et al. (2009) demonstrated that roads and associated development may disrupt natural dispersal processes, and therefore gene flow in ambystomatid salamanders. The isolating effects of roads are more severe for species with small populations, rare species (Spielman et al. 2004) and for populations with limited mobility.

While fewer wildlife species have been studied relative to interactions with motorized trails compared to roads (Gaines et al. 2003), studies have documented similar effects of motorized trail use on wildlife species. Motorized trails have been associated with disturbance to nest sites (Barton and Holmes, 2007), modification of animal behavior (Brattstrom and Bondello, 1983), and can result in habitat loss and fragmentation (Luckenbach and Bury, 1983).

Travel management-related impacts on wildlife vary with the volume, timing, and type of travel; the species of wildlife in the area; the habitats involved; time of day or season of year; and many other factors. Not all species respond negatively to an increase in roads. Roads may increase prey for aerial predators such as hawks and corvids (Forman and Alexander 1998). Caribou and deer are known to use roads during winter movements, presumably to conserve energy. Frey and Conover (2006) found that the use of roads and levees within a refuge study area increased the travel distance and penetration of predators into the wetlands, increasing their hunting efficiency. Bissonette and Rosa (2009) detected no clear abundance, density, or diversity effects relative to distance from roads for a small animal community in a desert landscape, and concluded that although roads may act as barriers and possible sources of mortality, adjacent zones of vegetation may provide favorable microhabitat in the desert landscape for many small mammals.

Threatened, Endangered and Proposed Species

The following listed and proposed wildlife species are considered in this assessment:

Table *. Listed and Proposed Wildlife Species Considered in Assessment

Wildlife		**Designation**
Gray wolf	*Canis lupus*	Endangered
Canada lynx	*Lynx canadensis*	Threatened
Grizzly bear	*Ursus arctos*	Threatened
Marbled murrelet	*Branchyramphus marmoratus*	Threatened
Northern spotted owl	*Strix occidentalis caurina*	Threatened
Critical habitat for the Northern spotted owl		Designated
Critical Habitat for Canada lynx		Designated
Fisher	*Pekania pennanti*	Sensitive

Gray Wolf

Introduction

The gray wolf is federally listed as endangered across most of the Okanogan-Wenatchee National Forest. The species was delisted as a federally endangered species on the eastern portion of the Tonasket district in 2011, and is now managed as a Regional Forester’s sensitive species in that area. Gray wolves remain protected under the Washington State Endangered Species Act as an endangered species throughout the rest of the state.

Regulatory Framework- see above

Best Available Science

Gray wolves historically occurred throughout the Cascade Mountains in Washington and Oregon (Anderson 1943, Goldman 1944, Young and Goldman 1944, Hall and Kelson 1959, Nowak 1979, Pisano 1979). Aggressive predator control efforts in the early 1900s nearly extirpated wolves from Washington by the 1940s (Laufer and Jenkins 1989, Gaines et al. 2000a). In the 1980s Laufer and Jenkins (1989) documented several reports of gray wolves in the Washington Cascades, and in the 1990s gray wolves were documented at several sites, including two sites with pups (Fritts 1992, Gaines et al. 1995). Currently there are 8 breeding pairs, and 18 confirmed wolf packs within Washington State (WDFW, 2016). Wolf populations in Washington are steadily increasing. Annual surveys by the Washington Department of Fish and Wildlife showed the number of wolves growing by 32% in 2015 (WDFW, 2016). Three packs are known to inhabit the Okanogan-Wenatchee National Forest.

Wolves are habitat generalists, but in the western United States occur most frequently in forests (USFWS 2009). Diet consists mainly of ungulates, with elk, deer and moose expected to be the main prey in Washington. Some food is obtained through scavenging. Packs establish territories and defend them from trespassing wolves. Territory sizes usually average about 200 to 400 square miles in the western United States (WDFW, 2009). Monitoring of the Lookout Pack showed that their territory was about 350 square miles (Gaines et al. 2008).

Wolves are fairly tolerant of moderate amounts of human disturbance, and often tolerate some limited human disturbance of dens, especially when pups are younger than six weeks of age, regularly re-using disturbed den sites in subsequent years (Thiel et al.1998, Frame et al. 2007, Person and Russell 2009). However, wolves sometimes respond to human disturbance near active dens by abandoning the location and moving their pups to other sites (Mech et al. 1991, Frame et al. 2007).

Wolves generally den from late-April until early-July, staying at the natal den until the pups are about 8 weeks old. They then use a series of rendezvous sites (resting and gathering areas) occupied after the natal den has been abandoned) throughout the summer (WDFW 2009).

In the northwestern United States, most wolves die from human causes such as control efforts to stop livestock depredation or illegal hunting. However, in areas where wolves are fully protected, such as large national parks, most wolves die from territorial conflicts with wolves in neighboring packs, starvation, or disease (WDFW 2011).

Gray wolves are sensitive to road-associated factors but are not particularly affected by summer recreation trails (de Vos 1948, Mech et al. 1988, Thurber et al. 1994, Paquet and Callahan 1996, Boyd and Pletscher 1999). However, Whittington et al. (2004) found that trails affected movement behavior of wolves equally, if not more, than roads in Jasper National Park. While roads are not a physical barrier, they usually increase human presence and the likelihood of negative contacts (Wisdom, et al 2000). A disproportionate number of human-caused mortalities and vehicle collisions (Bangs and Fritts 1996) occur near roads (Mech 1970). Both Mech et al. (1988) and Thiel (1985) found that when road densities exceed about 1.6 km/0.9 km radius circle (1 mile/square mile$^{2)}$, wolves avoided or were displaced from areas. Mladenoff et al. (1995) found that road density was the major predictor of wolf pack location. Jensen et al. (1986) reported that road densities >0.6 km/km^2 were apparent barriers to wolf dispersal. Road access also increases the likelihood of habituation to humans. Individual wolves can become accustomed to human presence, leading to nuisance situations that can result in the death of the habituated animal (Meagher and Fowler 1989).

Wolves are capable of dispersing long distances rapidly through a variety of habitats, and select mates to maximize genetic diversity (USFWS 2008a). However, maintaining connectivity between blocks of potentially suitable habitat is important to wolf conservation in Washington because of the fragmented condition of habitats in the state (WDFW 2009). Factors influencing the ability of wolves and other large carnivores to move through a landscape to use resources within their territories or for dispersal and other long-distance movements, include land cover type, human population density, road density, elevation and slope. Singleton et al. (2002) assessed landscape permeability for wolves in

Washington State and portions of northern Idaho and southern British Columbia. They reported that landscapes in the Cascades, north-central and northeastern Washington, and parts of the interior lowlands of British Columbia were broadly conducive to dispersal by wolves. Habitat association models identified 3 habitat concentration areas across the Okanogan-Wenatchee National Forest for wolves (North Cascades, Central Cascades and South Cascades), separated by landscapes of varying permeability for animal movement. Three “fracture zones”, defined as areas of reduced landscape permeability between habitat concentrations for wolves, were identified within or near forest boundaries in the Okanogan Valley, Stevens Pass-Lake Chelan, and Snoqualmie Pass areas (Singleton et al. (2002). These zones generally represent developed valley bottoms with discontinuous forest cover, sizeable human populations, high road densities, or reservoirs (WDFW 2009).

Roads influence the effectiveness of habitat for ungulates (Mladenoff et al. 1995), which are the primary prey base for wolves in Washington (WDFW 2011). All alternatives increase security habitat for ungulates by closing ML 1 roads and increase habitat effectiveness by closing the forest to motorized cross-country travel. For a discussion of the effects on ungulates, see the ungulate section later in this chapter. Habitat effectiveness is defined as the degree to which a patch of habitat is able to support an animal or group of animals. Habitat effectiveness in an otherwise "good" patch of habitat can be reduced by high levels of human disturbance, long distances to other habitat patches or any other factors in the surrounding landscape that detract from the patch's ability to function as habitat.

Methods

A moving windows (GIS) road and motorized trail density analysis was used to compare the amount of security habitat for each alternative by subbasin (4th field HUC)(Gaines et al. 2003).

Analysis Area

Appropriate habitat and food sources for wolves are found across the Okanogan-Wenatchee National Forest, the analysis area will include the entire forest. Because wolves utilize large home ranges, the assessment areas must be large to assess effects. Fourth-field subbasins were used to address effects for wolves.

Existing Condition

Three packs were documented in the Okanogan-Wenatchee National Forest at the end of 2015- the Lookout and Loup Loup packs in the Methow Valley and the Teanaway Pack on the Cle Elum Ranger District. Deer and elk are common on the forest and provide a suitable prey base.

Maintenance Level 1 Roads

Use of road and motorized trails has reduced the amount of security habitat for wolves, which is defined as areas with open road and motorized trail densities less than 1 mile/square mile of habitat (Gaines et al. 2003). The ongoing use of maintenance level 1 roads is contributing to the reduction of security habitat. The current condition of security habitat for wolves was assessed for each subbasin (4th field HUC) and is shown in the table below.

Table *. Security Habitat by Subbasin (4th field HUCs)

Subbasin	*Acres within Forest Boundary*	*Security Habitat*	*Acres of Security Habitat*
Chief Joseph	18,101	13%	2,353
Kettle	73,568	28%	20,599
Lake Chelan	405,216	80%	324,173
Methow	1,001,016	63%	630,640
Naches	548,662	45%	246,898
Okanogan	145,887	21%	30,636

Sanpoil	89,350	11%	9,828
Similkameen	212,712	96%	204,203
Upper Columbia-Entiat	289,937	32%	92,780
Upper Skagit	198,832	92%	182,925
Upper Yakima	487,381	34%	165,710
Wenatchee	783,724	58%	454,560
Forest Totals	***4,255,860***	56%	2,383,281

Cross Country Motorized Travel

Cross-country motorized travel is currently allowed on the forest, and has been estimated at about 675,000 acres, using a GIS model that takes slope, access, vegetation and land allocation into account. This reduces the habitat effectiveness of the existing security habitat.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is currently occurring along some of the open roads across the Forest. This may have resulted in increased disturbance and displacement of wolves and their prey species in the areas where dispersed camping and motorized access for camping is concentrated.

Environmental Consequences

Direct/Indirect Effects

Alternative A

Maintenance Level 1 Roads

Alternative A would not close ML 1 roads to motorized use, and approximately 56% of the Forest would continue to provide security habitat for wolves. The potential for disturbance to wolves and their prey, avoidance or displacement from important habitats, and potential for collisions with vehicles would remain at the present level, likely increasing over time.

Current den and rendezvous sites were selected by wolves with the existing system of roads and trails in place. Alternative A would not change the road and trail system in the vicinity of known den and rendezvous sites.

Cross Country Motorized Travel

Alternative A would not close the forest to cross-country travel, and effectiveness of security habitat for wolves would remain unchanged. Over time, additional unauthorized routes would likely be created, and would further reduce habitat effectiveness. Implementation of Alternative A would allow continued cross-country travel, which could result in disturbance to unidentified or future den or rendezvous sites.

Motorized Access for Dispersed Camping

Corridors would not be designated with Alternative A, and access for dispersed camping would continue in a fairly unrestricted manner. It is likely that additional routes would be developed over time. This would potentially result in wolves increasingly being disturbed or displaced by the motorized access to dispersed camping, and reducing the habitat for wolf prey species along the access routes due to damage to vegetation and increased human activity. The continued motorized access for dispersed camping would have the potential to disturb an unidentified den or rendezvous site, continue human access for illegal hunting of wolves and their ungulate prey, and increase the potential for vehicle collisions which could result in mortality of wolves.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

All maintenance level 1 roads would be closed to motorized vehicles with implementation of Alternative B, C, or D. This would increase the amount of security habitat on the Forest by approximately 4%, resulting in approximately 60% of the Forest providing security habitat. Increased security habitat would result in more undisturbed habitat for wolves and their ungulate prey, decreased vehicle collisions with wolves, increased connectivity between populations and reduced human access that can result in illegal hunting, trapping and poaching. No changes to the road and trail system are proposed near known denning and rendezvous sites.

The increase in security habitat is displayed in the table below.

Table *. Security Habitat for Wolves by Alternative

Subbasin	Alternative A	Alternative B, C, or D	Increase from Alternative A to Alternative B, C, or D
Chief Joseph	13%	28%	*15%*
Kettle	28%	41%	*13%*
Lake Chelan	80%	81%	*1%*
Methow	63%	70%	*6%*
Naches	45%	48%	*3%*
Okanogan	21%	36%	*15%*
Sanpoil	11%	36%	*24%*
Similkameen	96%	97%	*1%*
Upper Columbia-Entiat	32%	36%	*4%*
Upper Skagit	92%	93%	*1%*
Upper Yakima	34%	38%	*4%*
Wenatchee	58%	61%	*3%*
forest totals	***56%***	***60%***	***4%***

Cross Country Motorized Travel

Alternatives B, C, or D would close the forest to cross-country travel off designated roads, trails, and areas on approximately 675,000 acres. This closure would result in improved effectiveness of security habitat in some locations, particularly in the flatter, less-forested areas where off-road vehicles are able to successfully leave the road prism. This closure would reduce human access for hunting, trapping and poaching and decrease the potential for disturbance to den and rendezvous sites.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternatives B, C, and D would designate corridors where motorized access for dispersed camping would be allowed on existing routes only, and not further than 300 feet from the road, and not closer than 100 feet to water. The following table displays the number of acres of wolf habitat within each alternative's corridors where the motorized use would be likely to occur within the corridors (slopes less than 20% with less than 50% vegetation cover).

Table *. Wolf Habitat Within Corridors Where Motorized Use Would Likely Occur, by Alternatives

	Alternative B	Alternative C	Alternative D
*Useable Acres within Corridors	43,124	37,408	92,611
Percent of Overall Forest in Corridors	6%	5%	14%

*These are the number of acres within designated corridors with slopes less than 20% and less than 50% vegetation cover.

Alternative B would designate corridors where access could occur on existing routes, on a total of 105,769 acres, although motorized access for dispersed camping would most likely occur on approximate 43,124 acres (43,124 / 675,000 = 0.06 or 6% of the Forest) within the corridors where the slope is less than 20% and there is less than 50% vegetation cover. Alternative C would include approximately 37,408 acres in corridors, covering approximately 0.9% of the overall forest (37,408 / 675,000 = 0.05, or 5%). Alternative D would include approximately 92,611 acres, or 14% of the overall forest (92,611 / 675,000 = 0.14, or 14%).

Although the number of usable acres within corridors would vary among the alternatives, the effects to wolves and their prey would be very similar, based on the small amount of overall forest land included in corridors. It is possible that motorized access within corridors could disturb wolves or their prey species. The overall impact would be expected to be slight, however, given that the area within the corridor where motorized vehicles could be driven is a small percentage of the total wolf habitat. All action alternatives would reduce motorized access in comparison to alternative A, which would not restrict vehicle access for the purpose of dispersed camping. This reduction in access would reduce the potential for disturbance to an unidentified den or rendezvous site, reduce human access for illegal hunting of wolves and their ungulate prey, and reduce potential for vehicle collisions which could result in mortality of wolves.

Cumulative Effects

Temporal boundary

The cumulative effects temporal boundary for wolves is from the early 1900s, when the road and recreational trail network for the forest was initiated, to approximately 10 years into the future. Starting in the early 1900's, the advent of a road and trail system facilitated access which allowed predator control. By the 1940s, predator control actions had almost eradicated the Washington wolf population (Laufer and Jenkins 1989, Gaines et al. 2000a). Motorized travel is expected to continue in perpetuity on the Forest. However, future decisions that affect travel management such as minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Spatial boundary

The geographical boundary is the 12 subbasins (4th field HUCs) that comprise the forest, plus the state and private lands that make up the remainder of the subbbasins. The subbasins were chosen to represent the large home range of a wolf pack. Considering all the subbasins together provides for connectivity between the home ranges. Since wolves are habitat generalists, it is assumed that the entire forest provides potential habitat for wolves.

Trends

Road densities in the Interior Columbia basin have substantially increased from historical levels and are estimated to be moderate to high in most Ecological Reporting Units (ERUs) (Hann and others 1997) including the units encompassing the Okanogan-Wenatchee National Forest. Moreover, the human population in the basin has increased. These increases in road densities and human population are believed responsible for the unoccupied state of many habitats of wolves in the Interior Columbia basin (Wisdom et al, 2000). Habitats are currently fragmented by human disturbances to a level where interchange within the entire regional population occurs rarely if at all (Noss et al. 1996 in Wisdom et al., 2000).

Past Actions

Past actions that have continuing effects on the wolf population on the forest today include:

1. Hunting, trapping, and predator control has resulted in an endangered population of wolves. These activities are no longer legal (except for predator control, in regulated situations), since gray wolves are now an endangered species over most of the forest.
2. Construction and use of roads and trails has facilitated access for killing of wolves and reduced security habitat.
3. Vegetation management projects (thinning, timber harvest, prescribed burning) have increased forage for prey species, potentially resulting in increases in prey populations. Effects of this type of project last 10-50 years, until the forest canopy has closed, and the forage species have been shaded out.
4. Grazing and allotment management may displace deer and elk, and result in livestock depredation by wolves and subsequent predator control actions.

On-going Actions

Use of the road and trail system is on-going, and expected to continue in perpetuity unless future decisions are made to decommission or close roads.

Livestock grazing is also continuing, although not over as much area, or with as many animals as occurred historically. This may result in predator control actions that may lead to killing of wolves, and may displace deer and elk from some areas. However, Forest Plan standards and guidelines limit the forage available for livestock use, which would allow adequate forage for prey species.

The Peshastin and Chumstick Road Decommissioning project will reduce the potential for disturbance, collisions and access for poaching.

Reasonably Foreseeable Future Actions

Actions that are planned in and around the Okanogan-Wenatchee National Forest that could act cumulatively to affect wolves are summarized in the table below, with more detail in the narrative that follows. See Reasonably Foreseeable Actions (in Appendix A of the EA) for locations of these projects and additional details.

Project type	***Potential negative* or beneficial effects***	***Possible effect to wolves?***
Restoration Projects that include vegetation management- timber harvest, thinning, fuels reduction projects	Beneficial	Reduction of canopy would increase forage for ungulate prey species. Burning stimulates growth of understory vegetation (grass, shrubs) for prey species. These projects are planned on each district.
Transportation System Management - road closures and decommissioning, and road construction	Beneficial and Negative	Road closures would reduce motorized access, leading to a reduced risk of poaching and collisions. Road construction, largely on private and DNR lands, increases or improves motorized access which can result in poaching and collisions, and may result in avoidance of travelway by prey species.

Grazing	Negative	Increases potential for predator control actions. Grazing occurs yearly on the Tonasket, Methow Valley, Entiat, Wenatchee River, Cle Elum and Naches.
Weed treatments	Beneficial	Reduces non-native species which compete with native species used by deer and elk. Occurring on all district and counties.

*Negative effects would be mitigated as needed.

The federal projects will undergo consultation with U.S. Fish and Wildlife Service if listed species would be negatively affected, and will include mitigation to reduce negative effects to threatened and endangered species. State actions go through a similar process.

Minimum Roads Analysis is currently being conducted in several watersheds across the forest, and decision documents stemming from these analyses would result in additional reductions of open roads. Proposals have been developed for the Chewuch Transportation Plan, which would decommission 118 miles of road in the Methow HUC. Decommissioning would further reduce the potential for disturbance, collisions and access for poaching. An additional 51.7 miles would be closed or decommissioned in the Peshastin-Chumstick Road Decommissioning project.

Several other projects would have a net effect of reducing road densities by decommissioning roads across the forest over the next decade. The ongoing and reasonably foreseeable future projects listed in Appendix A would close or decommission approximately 218.5 miles of road. Other projects would add motorized trails (Naches, Little Crow learner loops 3.4 miles) and allow cross-country access (Cle Elum, Ferris Hard Rock mining project). Many of these projects would also place roads into ML 1 status, providing additional areas where motorized use would not be allowed until roads are needed for project use.

Alternative A

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternative A would be a reduction in the net motorized access to the Forest, but to a lesser degree than with the implementation of Alternatives B, C, or D. Alternative A would not contribute to the reduction since cross country travel and motorized vehicle use on maintenance level 1 roads would continue. This would result in a slight increase in security habitat and habitat effectiveness for wolves and their prey, reduce mortality from collisions, and reduce access for poaching.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and alternatives B, C or D would be a reduction in the net motorized access to the Forest, which would increase security habitat and habitat effectiveness for wolves and their prey, reduce mortality from collisions, and reduce access for poaching. With the elimination of motorized traffic on the 2,557 miles of maintenance level 1 roads in alternatives B, C and D, in addition to the 218 miles that would be closed or decommissioned in the on-going and reasonably foreseeable actions, there would be approximately 2,775.5 fewer miles open to motorized vehicles across the forest. This cumulative benefit would be further enhanced with the closure of motorized cross-country travel in alternatives B, C and D.

Determination

Alternative A may affect, but is not likely to adversely affect gray wolves. Alternative A is the current baseline condition. However, it is expected that additional trails would develop over time due to continued cross-country motorized use, which would continue to be allowed in this alternative. Trail development would result in vegetation loss, reducing availability of forage for ungulate prey. This effect is expected to be minor.

For the portion of the Forest where wolves are a sensitive species, alternative A may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the populations or species.

Alternatives B, C, or D may affect, but are not likely to adversely affect gray wolves due to increases in security habitat and effectiveness of current security habitat, and improved conditions for ungulate prey. Closure of the forest to cross-country travel and closure of ML 1 roads would likely lead to beneficial effects for wolves.

For the portion of the Forest where wolves are a sensitive species, alternatives B, C, and D may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the populations or species.

Compliance with Laws and Regulations

Alternatives A, B, C, or D are consistent with the National Forest Management Act (conserved listed species), Endangered Species Act, and with Forest Plan standards and guidelines for road densities and for threatened and endangered species. Consultation with U.S. Fish and Wildlife Service has been initiated.

Alternative A does not contribute to wolf recovery objectives because it would not eliminate motorized cross-country travel, so it would not improve habitat for ungulate populations, which provide prey for wolves. Alternatives B, C and D would meet Washington State recovery objective #5 "manage ungulate populations and habitats in Washington to provide an adequate prey base for wolves…" by reducing off-road vehicle use. The recovery plan identifies reducing off-road vehicle use as a management practice to improve habitat for ungulates.

Grizzly Bear

Introduction

The grizzly bear was federally listed as a threatened species in 1975. In the North Cascades ecosystem grizzly bears are "warranted but precluded" from uplisting from threatened to endangered because of higher priority listings by the U.S. Fish and Wildlife Service (USFWS 2011).

Regulatory Framework- see above

Currently, Forest policy includes guidelines for reducing the potential for bears to become habituated to human foods and require "no net loss" of core areas, in order to provide effective habitat for bears. A recovery chapter specific to the North Cascades Grizzly Bear Ecosystem has been completed (USFWS 1997) and amended the overall recovery plan (USFWS 1993). On the Okanogan portion of the Okanogan-Wenatchee National Forest, management direction requires that recovery plans be followed.

Best Available Science

Historical records compiled by Sullivan (1983) and Almack et al. (1993) indicate that grizzly bears once occurred throughout the North Cascades. Their decline probably resulted from intensive killing for the fur trade followed by rapid human encroachment into grizzly bear habitat (Sullivan 1983, Almack et al.1993). Grizzly bears currently persist only in small, disjunct populations in the North Cascades (Almack et al. 1993, Gaines et al. 2001), northern Idaho, western Montana, and western Wyoming (USFWS 2011). It is estimated that there are less than 20 grizzly bears in the North Cascades Ecosystem (Almack et al. 1993, Gaines et al. 2001, USFWS 2011).

Grizzly bears are wide-ranging omnivores that use a variety of plant and animal foods, including roots, bulbs, tubers, fungi and tree cambium, ungulates, squirrels, carrion, fish and garbage. Habitat selection is affected by (1) abundance and quality of foods; (2) gender-specific orientation to different nutrients; (3) reproductive status of females and concerns about security of dependent young; (4) presence and identity of other bears, especially adult males; and (5) presence of humans and prior contact with humans (Wisdom et al. 2000, USFWS 2011). Grizzly home ranges encompass large areas and average 489 square kilometers (189 square miles) for males in the Northern Continental Divide Ecosystem (USFWS 2011). Important seasonal foraging areas for grizzlies include riparian areas, wetlands, berry fields, avalanche chutes and ungulate winter ranges.

Human-caused mortality from human-bear conflicts, vehicle collisions, and hunting/poaching are the major factors limiting the recovery of grizzly bears (Knight et al.1988; Mattson et al. 1996; U.S. Fish and Wildlife Service 1993). Human access facilitated by roads and trails increases the potential for poaching, collisions with vehicles, and chronic negative human interactions at campgrounds and campsites (Gaines et al. 2003). Mattson et al. (1996) concluded that many of the negative effects of roads and human activities could be reduced through changes in human attitudes and behavior. However, Noss et al. (1996) felt that a major shift in human values would be necessary, and that road closures, reserve establishment, and zoning would not be enough to ultimately protect large carnivores.

Excessive mortality to bears related to conflicts with humans and to the presence of roads have been listed as major issues for the conservation of these species (Wisdom et al. 2000). Roads and trails facilitate human access to bear habitat, and have negative effects on bears (Wisdom et al 2000). Roever et al. (2008) documented changes in plant communities along roadsides which attracted bears to areas where they experienced mortalities due to vehicle collisions and hunting/poaching. Roads reduce habitat quality for large carnivores as a result of noise, avoidance of humans and habitat fragmentation (McLellan and Shackleton, 1998, Clevenger, 1997) and convert areas to non-habitat (Forman 2000, Reed et al. 1996).

Bears may avoid roads (Mace et al 1996). Roever et al. (2008) concluded that road traffic volume was generally an important predictor of road avoidance by bears in North American and Europe. Waller and Servheen (2005) found that grizzly bears in Montana showed a strong avoidance of areas within 500 meters (0.3 miles) of a highway. Most of the bears observed crossed at night, when traffic volumes were much lower (Waller and Servheen 2005). Road avoidance leads to underutilization of habitats that are otherwise high quality (Wisdom et al, 2000). Mace et al. (1996) found that grizzly bears in Montana avoided roads with traffic levels greater than10 vehicles per day. In southeastern British Columbia, grizzly bears underutilized about 9 percent of available habitats by avoiding areas 100 meters (328 ft.) from roads, regardless of traffic volume (McLellan and Shackleton 1988).

At the landscape scale, larger roads such as multi-lane highways with high traffic volume may act as barriers or partial barriers to animal movement, resulting in reduced connectivity and decreased gene flow across landscapes (Alexander and Waters, 2000, Waller and Servheen, 2005, Epps et al 2005, Kaczensky, 2003). Loss of habitat connectivity is suspected to impede exchange of individuals among populations and to accelerate the loss of genetic diversity, which is likely to increase population extinction rates. Waller and Servheen (2005) hypothesized that a traffic volume threshold beyond which highways become substantial barriers to grizzly bear movement exists. Based on their research and other studies (Chruszcz et al. 2003, Kaczensky et al. 2003), it is estimated that this threshold occurs at about 100 vehicles/hour.

Singleton et al. (2002) modeled habitat for grizzly bear at a regional scale for Washington state, western Idaho and southern British Columbia, using land cover, human population density, and road density to assess habitat value. They found that habitat concentration areas were well connected within the north-central Cascade Range. Fracture zones of development within the potential habitat within the Okanogan-Wenatchee National Forest were identified by Singleton et al. (2002) as Stevens Pass, Okanogan Valley-Upper Columbia, and Snoqualmie Pass area.

Studies have documented displacement of grizzly bears from trails (motorized and non-motorized) and roads (Archibald et al. 1987; Mattson et al. 1987, McLellan and Shackleton 1988, 1989; Kasworm and Manley 1990; Mace and Waller 1996, 1998; Mace et al. 1996, 1999). Graves (2002) studied grizzly bear use of habitats in relation to motorized trails and found that grizzly bears used areas near ATV and motorcycle trails less than expected. Bears selected against areas within 250-900 meters (0.2-0.5 miles) of ATV trails and within 450-600 meters (0.3-0.4 miles) from single-track trails. Graves et al. (2003) concluded that bears were less likely to spend time near trails with high (~5 trips/day average) motorized use than trails with low motorized use.

Because of the potential affects that road and trails can have on grizzly bears, human access management remains one of the most powerful tools for protecting and recovering grizzly bear populations (McLellen et al. 1999, USFWS 2011).

Wisdom et al. (2000) assessed trends for terrestrial vertebrates and their source habitats within the interior Columbia Basin. In the ecological reporting units (ERUs) covered by the Okanogan-Wenatchee National Forest, source habitats (areas with the habitat requirements of a species that would allow the population to remain stable or increase in size) for grizzly bears have remained relatively stable from historical to the present time. However, a substantial increase in human population and road densities from historical levels has likely been the reason that many source habitats are not occupied by bears (Wisdom et al, 2000).

Methods

Two methods were used to evaluate effects to grizzly bears. The first measure was the amount of core area, calculated using a GIS analysis described in Gaines et. al (2003). This measure is intended to assess how much habitat is available to grizzly bears in areas that have relatively low levels of human use.

The second method measures the area that would be made more secure by the closure of cross-country travel. Cross-country motorized travel is not accounted for in the calculation of core areas, which consider only roads and motorized trails.

Analysis Area

The analysis area is the North Cascades Grizzly Bear Ecosystem (recovery zone) on the Okanogan-Wenatchee National Forest, which is north of Interstate 90 and west of the Okanogan and Columbia Rivers. Bear Management Units (BMUs) have been identified for this area, and are areas large enough to provide a variety of seasonal habitats.

Existing Condition

Threats to grizzly bears in this recovery zone include incomplete habitat protection measures (motorized access management), small population size, and population fragmentation resulting in genetic isolation (U.S. Fish and Wildlife Service, 2011). There are 3,294,740 acres within this recovery zone on the Okanogan-Wenatchee National Forest.

Maintenance Level 1 Roads

The current condition of core area, defined as areas with less than 500 meters of open roads[1], motorized trails or high-use non-motorized trails, by Bear Management Unit (BMU) is presented in the table below. Motorized vehicle traffic on maintenance level 1 roads contributes to the limitation of core area. Currently, more than half the Forest provides core areas greater than 500 meters from an open road, motorized trail or high-use non-motorized trail. Some of this core area may receive cross country motorized use and is not actually undisturbed habitat, so actual levels of core habitat may be less.

Table *. Grizzly Bear Core Area by Bear Management Unit (BMU)

BMU	***total Acres***	***Core Area***

[1] This includes maintenance level 1 roads since they are not officially closed to motorized vehicles.

		acres	% of bmu
Ashnola	177,945	163,876	92%
Chiwawa	152,726	81,763	53%
Cle Elum	195,702	70,363	36%
Granite Creek	155,160	135,177	87%
Icicle	134,947.	98,403	73%
Libby Creek	147,908	65,217	44%
Lower Chelan	216,120	121,135	56%
Lower Chewuch	194,880	79,040	41%
Lower Entiat	167,321	31,767	19%
Lower Wenatchee	218,254	71,075	33%
Middle Methow	142,635	22,733	16%
Pasayten	183,071	176,228	96%
Peshastin	130,454	48,087	37%
Salmon	73,976	21,719	29%
Swauk	159,962	38,387	24%
Upper Chelan	239,434	202,525	85%
Upper Chewuch	182,696	157,901	86%
Upper Entiat	110,646	49,692	45%
Upper Methow	227,353	138,595	61%
Upper Stehekin River	94,786	91,595	97%
Upper Twisp River	156,983	100,183	64%
Upper Wenatchee	149,010	87,862	59%
Forest totals	***3,611,969***	***1,965,147***	***54%***

Cross Country Motorized Travel

Across the recovery zone on the Forest, there are approximately 117,155 acres of core area that are potentially available for motorized cross-country travel based on vegetation, slope, access and land allocation. It is not known if or where use is occurring in these areas, or what level of use occurs. The use of these areas would reduce habitat effectiveness for grizzly bears.

Motorized Access for Dispersed Camping

Dispersed camping sites are common across the forest. The dispersed camping can provide the opportunity for food-conditioning of bears and habitation to humans. At this time, there is no requirement for forest users, other than permittees, contractors and employees, to store food and garbage in bear-proof containers and to practice good sanitation while camping.

There are currently no limitations on where people can drive motorized vehicles off roads to access dispersed campsites within areas not currently closed to motorized vehicles. An estimated 1,115 unauthorized routes (that are longer than 30') to dispersed sites occur on the forest, and approximately 685 are within the recovery zone. Approximately 212 of these are within 100 feet of a wetland or riparian area, which are important foraging areas for bears, thus increasing the potential for bear-human encounters.

Environmental Consequences

Direct/Indirect Effects

Alternative A

Maintenance Level 1 Roads

The road and trail system would remain in the current condition if Alternative A is implemented, and no changes to core area would occur. The relative rating of human influence on the habitat would continue to be "high" (Gaines et al. 2003). The amount of habitat with little human influence that would provide security habitat would not be changed with Alternative A. On the Okanogan portion of the forest (Methow Valley and Tonasket Ranger Districts), the Travel Plan Map would specifically state that unlicensed OHVs are allowed on roads closed with berms. On the Wenatchee portion of the Forest (Chelan, Entiat, Wenatchee River, Cle Elum and Naches Ranger Districts), motorized vehicles would be allowed on maintenance level 1 roads by virtue of them being part of the cross-country landscape, which would remain open to motorized vehicles. The continued use of maintenance level 1 roads would potentially lead to displacement, poaching, negative interactions with humans and livestock, and vehicle collisions. Motorized vehicles would still be allowed on most maintenance level 1 roads.

Cross Country Motorized Travel

The current regulations allow off-road motorized travel anywhere not otherwise prohibited, as long as no resource damage occurs. If Alternative A is selected, this cross-country use would continue to be allowed, which would reduce the habitat effectiveness of core areas for bears by disturbing and displacing bears and their prey. Over time, additional cross-country routes would likely be created, which could further reduce the habitat effectiveness of the core area. The extent of this effect is unknown, since the locations where unauthorized routes would be created are not known, and may or may not occur in areas that are providing core area.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping would continue to be allowed in a largely unregulated pattern with implementation of Alternative A. Unmanaged motorized access for dispersed camping would continue to impact important bear foraging habitats, particularly riparian and wetland areas, where much of the dispersed camping is focused. This would reduce the effectiveness of these habitats and would increase potential for bear/human conflict due to poor sanitation practices and habituation of bears. These conflicts often lead to trapping or killing bears.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

Closure of ML 1 roads would increase core area for grizzly bear, by reducing the miles of open road. The overall level of human influence on grizzly bear would be reduced to "moderate". This would reduce the potential for poaching, collisions with vehicles, negative interactions with humans, disturbance to bears or their ungulate prey, and displacement or avoidance of important habitats. Increases in core area would occur in all but 4 BMUs. In the remaining four, core levels would remain at the current level. The table below displays core area by alternative.

Table *. Amount of Core Habitat by Alternative

	Alternative A	Alternatives B, C, and D	Increase from Alternative A

BMU	***Core Area***	***Core Area***	***Core Area***
	% of bmu	% of bmu	%
Ashnola	92%	92%	0%
Chiwawa	53%	55%	2%
Cle Elum	36%	40%	4%
Granite Creek	87%	88%	1%
Icicle	73%	74%	2%
Libby Creek	44%	51%	7%
Lower Chelan	56%	59%	3%
Lower Chewuch	41%	50%	10%
Lower Entiat	19%	25%	6%
Lower Wenatchee	33%	38%	6%
Middle Methow	16%	27%	10%
Pasayten	96%	96%	0%
Peshastin	37%	40%	5%
Salmon	29%	37%	7%
Swauk	24%	27%	3%
Upper Chelan	85%	85%	0%
Upper Chewuch	86%	88%	1%
Upper Entiat	45%	47%	2%
Upper Methow	61%	64%	3%
Upper Stehekin River	97%	97%	0%
Upper Twisp River	64%	69%	5%
Upper Wenatchee	59%	61%	2%
Forest totals	***54%***	***60%***	***6%***

The relative rating for level of human influence on the habitat is "moderate" for the Forest as a whole, with the increased core resulting from closure of the ML 1 roads.

Cross Country Motorized Travel

Closure of the forest to cross-country travel in Alternatives B, C, and D would result in increased habitat effectiveness of core areas across the forest. Potential for disturbance, poaching, and human-bear conflict would decrease.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate corridors that include approximately 16,636 acres, or 0.5% of the total acres within the Grizzly Bear Recovery Zone on the Forest. Alternative C corridors would include approximately 12,843 acres or 0.4% of the Grizzly Bear Recovery Zone, while Alternative D corridors would include 47,032 acres, or approximately 1% of the recovery zone on the Forest.

Table *. Acres and Percent of Corridors within Grizzly Bear Recovery Zone by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres Corridors in GBRZ	16,636	12,843	47,032

Percent of Total GBRZ	0.5%	0.4%	1%

Although the percentage of recovery zone within corridors would vary among the alternatives, the effects to grizzly bear and their prey would be very similar, based on the small amount of corridors within the recovery zone. All action alternatives reduce access in comparison to Alternative A, which would not restrict vehicle access for the purpose of dispersed camping. This reduction in access would reduce the potential for poaching, collisions with vehicles, negative interactions with humans, disturbance to bears or their ungulate prey, and displacement or avoidance of important habitats.

The restriction on motorized use of routes within 100' of water would result in less human access to important foraging habitats such as riparian areas and wet meadows in comparison to alternative A, the no change alternative, and would reduce the probability of negative human/bear encounters.

It is possible that motorized access within corridors could disturb grizzly bear or their prey species. The overall impact would be expected to be slight, however, given that the area within the corridor where motorized vehicles could be driven (based on slope and vegetation cover) is such a small portion of the total Grizzly Bear Recovery Zone.

Cumulative Effects

Analysis Area

Geographic boundary: The geographical boundary is the east half of the North Cascades Grizzly Bear Ecosystem (recovery zone), which is north of Interstate 90 and west of the Okanogan and Columbia Rivers.

Temporal boundary: The temporal boundary is the time since European settlement in Washington. Access for trapping and habitat loss and degradation affecting distribution of prey species are factors that have influenced grizzly bear populations since settlement of the western United States. Forest management activities began affecting grizzly bears and habitat in the early 1900s with the development of the road and trail network and fire suppression. However, future decisions that affect travel management such as minimum roads analysis and Forest Plan Revision are likely to change management direction within about 10 years.

Past Actions

The development of the road and motorized trail system on and off-forest in the recovery zone over the last century has led to human-caused mortality to bears through hunting and trapping, vehicle collisions, and human/bear conflicts. Grizzly bears have been a protected species in the lower 48 states since 1975, and there is no longer a legal hunting season for grizzly bears.

The road and trail network has reduced the amount of habitat, reduced habitat quality for bears and resulted in avoidance, displacement, and habitat fragmentation. Since 1997, the forest has operated under interim standards that require no net loss of existing core area in a BMU as a result of management activities. This standard has prevented loss of core habitat by authorized roads and motorized trails since that time. These standards also include guidelines for reducing the potential for bears to become conditioned to human foods, garbage and other attractants.

Forest restoration and fuel reduction activities such as timber sales, thinning and prescribed burning have had both positive and negative effects by increasing forage for bears and ungulates, reducing cover (used for hiding and energetic needs), and resulting in disturbance during activities.

Both cattle and sheep grazing have occurred on the forest over the last century. This has affected vegetation composition and structure, displaced ungulates, and resulted in bear/livestock conflicts. The Okanogan Forest Plan

(1989) requires that 85% of available browse be left for wildlife on winter ranges.   There have been no grizzly bear/livestock conflicts in the recovery zone (USFWS, 2011).

Recreation activities of many types have occurred on forest lands over the last century, and have resulted in habitat loss, displacement and avoidance, and disturbance in the recovery zone. Activities utilizing motorized recreation routes have been considered in the core tables for the current condition. Recreation activities will continue, and a 4% annual increase in recreation use of the National Forests within the recovery zone is expected (USFWS, 2011).

On-going Actions

Since 1989, management activities on the Okanogan National Forest have considered the cover:forage ratios in timber sale project planning and established maximum road density standards in some winter ranges and other important habitats, to reduce negative effects to ungulates and other wildlife. However, vegetation management areas are generally not in the more remote areas where grizzlies are most likely to persist but are more often in the low elevation dry forest. The Wenatchee National Forest Plan (1990) considers cover:forage ratios on projects in winter range and established timing restrictions for use of some roads on winter ranges for deer and elk.

Forest campground dumpsters are being replaced by bear-proof dumpsters, as funding allows, to avoid habituation of bears to human use areas in forest campgrounds.   Forest employees, contractors and permittees are required to store food and bear attractants in wildlife-resistant containers.

On-going actions adjacent to federal lands that affect grizzly bears include residential development, which does not undergo ESA section 7 consultation, unless a federal action is involved.   Development can impact bears through habitat loss and displacement, unsecured bear attractants, increased length of time of human presence, and increased human disturbance to surrounding areas (USFWS 2011).

The Peshastin and Chumstick project will decommission approximately 39 miles of road in the Peshastin BMU, 11 miles in the Lower Wenatchee BMU and less than one mile in the Icicle BMU. This will further reduce the potential for reduction of disturbance at sensitive sites, displacement, and mortality from collisions, crushing, hunting, and trapping.

Reasonably Foreseeable Future Actions

Actions that are planned or on-going in the Okanogan-Wenatchee National Forest that would act cumulatively to affect grizzly bears are summarized in the table below. See Reasonably Foreseeable Actions section for locations of these projects.

Table *. Reasonably Foreseeable Future Actions That Could Affect Grizzly Bear

Project type	***Potential negative* or beneficial effect***	***Possible effect to grizzly bears?***
Restoration and Fuel Reduction- timber harvest, thinning, fuels reduction projects	Beneficial	Reduction of canopy will increase forage for bears and ungulate prey species. Burning stimulates growth and palatability of forage. Generally not in remote areas. Projects are planned on each district in the Recovery Zone.
Road, trail construction, reconstruction, relocation and use.	Negative	Increases or improves access which can result in poaching and collisions, and may result in avoidance of travelway by bears and prey species. Would be mitigated if within core area.
Transportation System Management	Beneficial	Reduces access for illegal hunting and may increase core area for bears and their prey.

Grazing	Negative	Increases potential for predator control actions. Grazing occurs yearly on the Tonasket, Methow Valley, Entiat, Wenatchee River, Cle Elum and Naches.
Mining	Negative	May increase road densities and human access, and bear/human encounters.
Pack and Saddle Stock Outfitter-Guide Special Use Permit Issuance	None	Mitigations for sanitation are part of permit conditions .
Weed treatments	Beneficial	Reduces non-native plant species which compete with native plants used by deer and elk. Weed treatments occur yearly on each district, Chelan and Okanogan County,

*Negative effects would be mitigated as needed.

Projects that will improve fish habitat will potentially result in more fish over the long term, which would increase food for bears. Fish projects are planned in the Lower Entiat BMU, Lower Chewuch BMU, Swauk BMU, Peshastin BMU and Upper Methow BMU by a variety of agencies, organizations and tribes.

Other projects would have a net effect of reducing road densities by decommissioning roads across the recovery zone over the next decade. Swauk Pine (Cle Elum RD) and South Summit 2 (Methow Valley RD), would result in net road reduction of approximately 83 miles. The South Summit 2 project would also place 20 miles of road into ML 1 status, providing additional areas where motorized use would not be allowed until roads are needed for project use. The Ferris Hard Rock mining project (Cle Elum) would permit allow cross-country access to the mine area, which would increase disturbance and reduce habitat effectiveness for bears.

Minimum Roads Analysis is currently being conducted in several watersheds across the forest, and decision documents stemming from these analyses would result in additional reduction of open roads. The Chewuch Transportation Plan proposal would result in decommissioning 112 miles of road in the Lower Chewuch BMU and 6 miles in the Upper Chewuch BMU.

Overall, the net motorized access to the Forest would be reduced, which would be beneficial to grizzly bear and their prey.

All federal projects will undergo consultation with U.S. Fish and Wildlife Service if there are potential effects to threatened or endangered species, and will include mitigation to reduce negative effects to threatened and endangered species. State actions go through a similar process.

Human population in Washington counties where grizzlies bears may be present is expected to increase by roughly 1,117,000 people by 2030 (Washington Office of Financial Management 2007), resulting in continued development of private lands and increased humans recreating in grizzly bear habitat.

Cumulative Effects Summary

Alternative A

The cumulative effects of the past, present, and reasonably foreseeable future actions and Alternative A would be a reduction in net motorized access due to the transportation system management projects resulting in road decommissioning. Alternative A would not contribute to the reduction since cross country travel and motorized vehicle use on maintenance level 1 roads would continue. The cumulative effect would be an increase in core area for bears, but not as much as the cumulative effect of Alternatives B, C, or D. This would somewhat reduce access for hunting and trapping, reduce potential for disturbance, displacement and avoidance of habitats near roads and motorized trails and increase habitat effectiveness. Other forest road actions in the next 10 years are likely to result in an overall reduction in roads, when the Minimum Roads Analysis process is completed. Outside the forest boundaries, the trend is expected to be increased roads on private lands.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D would be a reduction in the net motorized access to the Forest, which would increase core area for bears, reduce access for hunting and trapping, reduce potential for disturbance, displacement and avoidance of habitats near roads and motorized trails and increase habitat effectiveness.

The threats to grizzly bears in this recovery zone from management actions stem primarily from access management, and bear recovery depends largely on limiting mortality by humans. Alternatives B, C, or D would counter the effects of past actions which increased human access to remote areas and partially reverse the trend occurring on private lands (increased development and access). The interim "no net loss" core policy would ensure that core will not be lost as a result of future activities on Federal lands.

Other forest road actions in the next 10 years are likely to result in an overall reduction in roads, when the Minimum Roads Analysis process is completed. Outside the forest boundaries, the trend is expected to be increased roads on private lands.

Determination

Alternative A may affect, but is not likely to adversely affect grizzly bears. Alternative A is the current baseline condition. However, it is expected that additional trails would develop over time due to continued cross-country motorized use, which would continue to be allowed in this alternative. Trail development would result in vegetation loss, reducing availability of forage for ungulate prey. This effect is expected to be minor.

Alternatives B, C, or D may affect, but are not likely to adversely affect grizzly bear due to increased core area (6%) and increased effectiveness of current core area, reduced access to riparian and lake foraging areas and closure of the forest to cross-country travel. This would be beneficial to grizzly bears.

Compliance with Laws and Regulations

Alternatives A, B, C, or D are consistent with the Endangered Species Act, and with the Forests Land and Resource Management Plans' direction for threatened species. Alternatives A, B, C and D are consistent with the recovery plan (USFWS, 1993 amended with North Cascades Ecosystem chapter 1997) and with forest policy of "no net loss" of core area.

Canada Lynx

Introduction

Canada lynx were federally listed as threatened in March, 2000 (U.S. Fish and Wildlife Service 2000). A conservation agreement between the Forest Service and the U.S. Fish and Wildlife Service was developed in 2000 (amended 2005) which requires, in part, the Forest Service to use the most current science, including the Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000) and the lynx science report (Ruggiero et al. 2000) to determine the effects of project proposals on lynx. Projects with an adverse effect determination will be deferred until land management plans are amended or revised to adequately conserve lynx.

Lynx are a Management Indicator Species (MIS) for lodgepole pine habitats, for the Okanogan portion of the forest. Viability outcome for the species is a "B"- which means that suitable environments are broadly distributed and of high abundance, but there are gaps where suitable environments are absent or only present in low abundance. However, the disjunct areas of suitable environments are typically large enough and close enough to permit dispersal among subpopulations and to allow the species to potentially interact as a metapopulation. Species with this outcome are likely well-distributed throughout most of the planning area (Youkey, 2011).

Regulatory Framework

The Okanogan National Forest Land and Resource Management Plan sets standards for MA12, which is managed to provide habitat to support a stable lynx population over the long term.

MA 12-17A (Lynx): Road density shall be limited to one mile of road open to motorized use per square mile of discrete individual management area.

The road density standard for MA-12 is 1 mile of open road per square mile. Since maintenance level 1 roads are not included in this calculation and no changes are proposed for maintenance level 2 through 5 roads, this standard and guideline does not apply to this project.

MA12-17D (Lynx): During winter months December-March, all motorized vehicles, including snowmobiles, shall be restricted by regulation to areas and routes designated open.

These timing restrictions are in the Okanogan Travel Plan, and will be continued in the travel management proposals.

The Wenatchee Forest Plan does not include any standards and guidelines specific to lynx habitat management.

Best Available Science

Lynx inhabit moist, coniferous forests that have cold, snowy winters and provide habitat for snowshoe hares (Koehler 1990, Koehler and Aubry 1994, Mowat et al. 2000, McKelvey et al. 2000, Ruggiero et al. 2000). The extent of this habitat type is northern Canada and Alaska and extending into the western U.S., Great Lakes, and northern New England. In the contiguous United States, the boreal forest landscape is naturally patchy and transitional because it is the southern edge of the boreal forest range (USFWS, 2009). In Washington, lynx are primarily found in high-elevation forests of northcentral and northeast Washington, including areas in Okanogan, Chelan, Ferry, Stevens, and Pend Oreille counties (Stinson, 2001).

Both snow conditions and vegetation type are important factors to consider in defining lynx habitat (Hoving et al. 2005). In the Western U.S., an evenly dispersed mosaic of mature multistory and a lesser component of young regenerating stands with increased horizontal cover and high snowshoe hare densities provide the habitat required to support lynx (Koehler et al. 2008, Maletzke et al. 2008, Squires et al. 2008, Squires et al. 2010). Mature multistory forests provide the structure and cover for snowshoe hares that sustain lynx through the winter (Koehler et al. 2008, Squires et al. 2010).

In northern Washington, the primary vegetation that contributes to lynx habitat is lodgepole pine, subalpine fir, and Engelmann spruce (Aubry et al. 2000). Secondary vegetation that, when interspersed within subalpine fir forests, may also contribute to lynx habitat, includes cool, moist Douglas-fir, grand fir, western larch, and aspen. Dry forest types (e.g., ponderosa pine, dry Douglas-fir) do not provide lynx habitat (Koehler et al. 2008, Maletzke et al. 2008, Squires et al. 2010). On the Okanogan-Wenatchee National Forest, lynx habitat is generally above 4,000 feet elevation (von Kienast 2003, Koehler et al. 2008).

Squires et al. (2010) found that forest stands with mature and large diameter trees were used less often during summer than during the winter. During summer, lynx broaden their selection to include younger regenerating stands of Engelmann spruce and subalpine fir species compositions with abundant small diameter, and pole-sized trees (8-18 cm dbh), abundant total shrubs, and high horizontal cover (Squires et al. 2010).

In the winter, lynx do not appear to hunt in openings, where lack of above-snow cover limits habitat for snowshoe hares (Mowat et al.2000, Maletzke et al. 2008, Squires et al. 2010). Consideration of size and shape of clearcuts in subalpine forests is important because the size of harvest units also increases distance to forest edge and can reduce density of seedling regeneration and stocking densities. Within about 10 to 30 years following disturbance (length of time varies, depending on site productivity, forest type and intensity of disturbance), lynx begin to forage for hares in vegetation that provides a high density of young conifer stems and/or branches that protrude above the snow (Sullivan and Sullivan 1988, Koehler 1990). In northcentral Washington, "high" density of stems and/or branches was quantified as >11,250/hectare (>4,500/acre; Koehler 1990). High snowshoe hare densities (>1.0 hares/hectare, 0.4 hares/acre) were associated with sapling (<3.9" dbh) densities of 2,784 ± 281 stems/ha (1127± 114 stems/acre) and medium-sized (3.9-11.0" dbh) tree densities of 712 ± 80 stems/ha (288± 32 stems/acre)(Walker 2005).

Lynx denning habitat is generally correlated with large wood, down logs, root wads, or live trees (Slough 1999, Koehler 1990, Mowat et al 2000, Squires and Laurion 2000, Apps 2007, Squires et al. 2007). These sites can be in regeneration forests (Slough 1999), or in mature conifer or mixed-conifer-deciduous forests (Koehler 1990, Squires et al. 2007). Stand structure appears to be of more importance than forest cover type (Mowat et al. 2000). Squires et al. (2007) found low den site fidelity in a western Montana study. Den sites for 13 female lynx averaged more than 2 kilometers (1.2 miles) from the previous year's site. They suggest that low reuse of den sites may mean that many suitable sites are present throughout female home ranges.

Squires et al. (2007) found that lynx denned farther from all forest roads, open or closed, in their study area compared to random expectation, but concluded that this was likely a function of fewer roads in mature forests where lynx mostly denned rather than active avoidance of human disturbance.

Snowshoe hares *(Lepus americanus)* are the primary prey of lynx, comprising 35-97% of the diet throughout the range of the lynx (Koehler and Aubry 1994). Research on lynx winter diets in the southern portion of its range demonstrates that snowshoe hares are the primary prey (Koehler 1990, Squires and Ruggiero 2005, Burdett 2008, Hanson and Moen 2008, Maletzke et al. 2008, Shenk 2009). Other prey species include red squirrel (*Tamiasciurus hudsonicus*), grouse (*Bonasa umbellus*, *Dendragopus* spp., *Lagopus* spp.), flying squirrel (*Glaucomys sabrinus*), ground squirrel (*Spermophilus parryii, S. richardsonii*), porcupine *(Erethrizon dorsatum*), beaver (*Castor canadensis*), mice (*Peromyscus* spp.), voles (*Microtus* spp.), shrews (*Sorex* spp.), weasel (*Mustela sp.*), fish, and ungulates as carrion or occasionally as prey (Saunders 1963*a,* van Zyll de Jong 1966, Nellis et al. 1972, Brand et al. 1976, Brand and Keith 1979, Koehler 1990, Staples 1995, O'Donoghue et al. 1998, Fuller 2004, Poszig et al. 2004, Squires and Ruggiero 2007).

Most research has focused on the winter diet, and diets in the summer are poorly understood throughout the range. Indications are that the summer diet may include a greater diversity of prey species (Quinn and Parker 1987, Koehler and Aubry 1994). Mowat et al. (2000) reported through their review of the literature that summer diets have less snowshoe hare and more alternative prey, possibly because of a greater availability of other species.

Most snowshoe hare occur within conifer forests; elevations range from 1,980 to 3,505m. Snowshoe hare habitat includes lodgepole pine and Engelmann spruce – subalpine fir forests (Hodges 2000, McKelvey and McDaniel 2001, Zahratka 2004, Zimmer 2004, Miller, 2005). Snow conditions, horizontal cover and vegetation type are considered three important factors in defining snowshoe hare habitat throughout their range. Snow conditions that favor hares across northern boreal forests in Canada are cold and dry, with depths relatively uniform and moderately deep (100-127 cm or

39-50 inches; Kelsall et al. 1977). In their southern range, snowshoe hare are more abundant within higher elevation forests where snow depth is deeper and duration of snow cover longer, which limits their exposure and vulnerability to predators (Buehler and Keith 1982, Sievert and Keith 1985, Murray and Boutin 1991). High horizontal cover also provides refuge from predators, which is perhaps the most important factor driving habitat selection (Murray 2003). Additional benefits of high horizontal cover include thermal protection and winter food (Belovsky 1984, Siervert and Keith 1985, Rohner and Krebs 1996, Wirsing et al. 2002, Murray 2003).

Landscapes with various age classes, primarily mid- to advanced-successional stages resulting from burns or clearcuts that support dense understory vegetation, may be more likely to support high snowshoe hare populations (Poole et al. 1996). Koehler (1990) suggested that snowshoe hares avoided openings and very young vegetation (especially in winter when vegetation is covered by snow) and Conroy et al. (1979) found areas with greater interspersion of habitats may receive greater use by hares. Snowshoe hare population densities and overwinter survival are positively correlated with understory densities, particularly of conifers that provide winter forage, thermal cover, and escape cover (Adams 1959, Pease et al 1979, Wolff 1980, Litvaitis et al. 1985). In a study of hare habitat on the Okanogan National Forest, Walker (2005) documented that at the landscape scale, snowshoe hare densities were best correlated with the amount of boreal forest, while at the stand level the density of saplings and medium-sized trees were the best predictors of hare density.

Studies in Montana, Wyoming and southern British Columbia have documented exploratory movements by resident lynx during the summer months (Apps 2000, Squires and Laurion 2000, Squires and Oakleaf 2005). Aubry et al. (2000) described this type of movement as long-distance movements beyond identified home range boundaries, but returning to the original home range. Exploratory movements were highest for males during the breeding season (March) when the majority of the long distance movements were observed most likely to maximize breeding opportunities (Burdett et al. 2007). Distances of exploratory movements in Montana ranged from about 15 km (9 miles) to 40 km (25 miles), and duration away from the home range was 1 week to several months (Squires and Laurion 2000). A resident lynx traveled a similar exploratory path (path distance of 728 km minimum distance) from its home range in the Wyoming Range to the Wind River and Teton Range in western Wyoming during three consecutive summers (Squires and Oakleaf 2005). This type of movement was not detected during the study in northcentral Washington (Koehler 1990). Aubry et al. (2000) speculated that these movements might be more likely to occur in areas with high spatial variation, especially montane systems.

Both adult and subadult lynx are known to make long-distance movements during periods of prey scarcity; recorded distances have been up to 1,000 km (600 miles) (Mech 1980, Slough and Mowat 1996, Poole 1997). In the Yukon, rates of emigration (lynx leaving their home ranges within the study area) increased as the peak in hare numbers started to decline to the low phases of the hare population cycle (O'Donoghue et al. 2001). Several of the lynx that had emigrated were recovered from fur-trappers and had traveled distances that ranged from 23 to 830 km.

There is little information available on the effects of roads and trails on lynx or its prey (Apps, 2000, 2007, McKelvey et al. 2000). Apps (2000) found that lynx in the southern Canadian Rockies crossed highways within their home ranges less than expected. Apps (2007) evaluated lynx response to 3 highway types and considered adjoining habitat quality. He determined that lynx will cross highways, but the highways may affect lynx movements depending on the highway type. A male lynx was documented crossing several two lane highways during exploratory movements in western Wyoming (Squires and Oakleaf 2005). Areas with high road densities, human activity and associated development appeared to be lower habitat quality based on the decreased rate of occupancy of lynx for areas on the Southern range edge in Alberta, Canada (Bayne et al. 2008).

Koehler and Brittell (1990) found that lynx used the road bed of less-traveled forest roads for travel and foraging. McKelvey et al. (2000) reported that lynx crossed roads in the Okanogan National Forest at frequencies that did not differ from random expectation. They found no evidence that habitat use by lynx was affected by narrow, forest roads at the relatively low densities that characterized their study area on the Okanogan National Forest. Squires et al. (2010) reported results similar to McKelvey et al. (2000), that lynx were not sensitive to forest roads, including roads used by snowmobiles during winter. No evidence of lynx avoiding graveled forest roads was observed in Montana through snow tracking or telemetry (Kolbe et al. 2006, Squires et al. 2010). Ruggiero et al (2000) found that preliminary information suggested that lynx do not avoid roads, except at high traffic volumes. Ruediger et al. (2000) concluded that, at that time, there was no compelling evidence to suggest that management of road densities was necessary to conserve lynx. The effects on lynx of road densities and traffic volumes on forest roads are unknown, and present a data gap.

Habitat connectivity is important for lynx conservation (Ruediger et al 2000). Lynx movements may be negatively influenced by highways due to habitat fragmentation and direct avoidance, an important consideration for their conservation (Ruediger 1996, in Ruggiero et al 2000). It is unknown at what traffic volume or number of lanes a highway becomes a barrier or impediment to movements.

Roads are a source of mortality for lynx (Ferreras et al. 1992, Kramer-Schadt et al 2004, Brocke et al 1990). Road mortalities resulted in isolation of habitat patches for Iberian lynx in a fragmented landscape in Germany (Kramer-Schadt et al. 2004). Lynx are also vulnerable to overexploitation from trapping (Bailey et al. 1986). Access for trapping is increased by the presence of roads and trails.

Roads and trails may facilitate snow compaction, allowing competitors to access lynx habitat, where their mobility would usually be limited. Competition for food may contribute to lynx starvation and reduced recruitment (Ruediger et al., 2000). Coyotes are the most likely carnivore to compete with lynx (Buskirk et al., 2000). Differences in snow column density due to freeze/thaw events across the range of lynx habitat may affect the amount of use of certain habitats for coyotes in the winter. Murray and Boutin (1991) reported that both lynx and coyotes used travel routes with shallow snow, but that coyotes traveled on harder snow more frequently. They also reported that the use of trails in the snow not only reduced the depth to which an animal sinks into the snow, but aided coyotes and lynx in obtaining additional food. Keith et al. (1977) suggested that during peak highs of hares, the density of trails in snow facilitates coyote movement. Murray and Boutin (1991) reported similar results with their study. Kolbe et al. (2007) found that although coyotes remained in their study area throughout the year, compacted snowmobile trails did not appear to facilitate coyote movements, nor did hares provide a large proportion of the coyote's winter diet. In contrast, the distribution of coyotes in Utah and Wyoming appeared to be influenced by proximity to compacted snowmobile trails in deep, powdery snow areas (Bunnell et al. 2006, Burghardt-Dowd 2010).

Recreational activities are facilitated by access to the forest provided by roads and trails (Stinson, 2001). Few studies have been conducted on the effects of recreational activities on lynx (Ruediger et al. 2000). Ruggiero et al. (2000) suggest that summer use of roads and trails through denning habitat may have negative effects, if lynx are forced to move kittens because of human disturbance.

Lynx are generally tolerant of humans (Staples 1995). Other anecdotal reports suggest lynx are not displaced by human presence (Mowat et al. 2000). Ruediger et al. (2000) list a variety of factors that may influence the effects of recreation on lynx including the type and quality of lynx habitat in which an activity occurs, the time of year, time of day, type of activity and pattern of activity, intensity and frequency of activity. Squires et al. (2010) reported lynx denned further from roads than random expectation, but did not think that was related to human disturbance, but rather related to fewer roads in the mature forests.

Methods

Alternatives were compared using GIS models that considered lynx habitat within the lynx analysis units (LAUs). Only LAUs within core and secondary areas were included in the analysis. The peripheral areas contain only periodic records of lynx over time, and lack evidence of reproducing populations (USFWS, 2009). Many are naturally disjunct, or have few historical records of lynx occurrence.

Analysis Area

The Okanogan-Wenatchee National Forest is occupied by lynx (Koehler et al. 2008). The Recovery Outline (USDI Fish and Wildlife Service, 2005) stratified lynx habitat into core, secondary and peripheral areas. On the Okanogan-Wenatchee National Forest, lynx habitat north of Lake Chelan and west of the Okanogan River is core, south of Lake Chelan and north of Highway 2 is secondary. The portion on the Tonasket Ranger District east of the Okanogan River is peripheral, but is specifically addressed in the Conservation Agreement as "…retained as potential linkage between the two populations, and due to proximity to Canada and likely recolonization by lynx." LAUs in the core and secondary areas are considered in this analysis.

Existing Condition

Singleton et al. (2002) identified 3 habitat concentration areas on the Forest, based on dispersal habitat suitability modeling- South Cascade, Central Cascade, and North Cascade range, which were fragmented by "fracture zones", defined as areas of reduced landscape permeability between habitat concentrations for lynx. They concluded that substantial landscapes surrounding the habitat concentration areas were available to lynx movement due to the high mobility of lynx and their relative resilience to human disturbance.

Maintenance Level 1 Roads

Lynx Analysis Units (LAUs) have been designated to incorporate all lynx habitat on the forest (Ruediger et al. 2000). Lynx habitat in LAUs (core and secondary areas only) on the Okanogan-Wenatchee National Forest is estimated at 1,430,512 acres. Currently, there are approximately 1,326 miles of forest roads, including maintenance 1 level roads, motorized trails, and non-motorized trails providing access in lynx habitat within core area and 606 miles in secondary area.

Currently, across the core and secondary areas of the forest, approximately 70% of the area has no roads or motorized trails, and 14% of the area has road/motorized trail densities of 2 miles per square mile or greater.

Cross Country Motorized Travel

Currently, cross-country motorized travel is allowed over most of the forest. An estimated 145,552 acres that are flat enough and open enough to receive cross-country use occurs in lynx habitat in the core and secondary areas, according to GIS analysis conducted for this report. Lynx habitat is forested habitat rather than the more open areas where cross-country off-road travel could easily occur. Denning habitats are associated with concentrations of down wood, root wads, or live trees in forested areas that would be difficult for off-road vehicles to access, particularly in the early denning season when roads and trails are often inaccessible due to snow and mud.

Motorized Access for Dispersed Camping

Current motorized access for dispersed camping is potentially displacing lynx, although since lynx are not particularly sensitive to forest roads (Squires et al. 2010, McKelvey et al., 2000, Kolbe et al. 2006, Squires et al. 2010), and tolerate humans (Staples, 1995), any impacts to lynx individuals is likely minor.

Environmental Consequences

Direct and Indirect Effects

Alternative A

Maintenance Level 1 Roads

Maintenance level 1 roads would not be closed to motorized use if Alternative A is selected. Motorized access could continue across the lynx habitat at existing levels on 302 miles of ML 1 roads. Access to most lynx habitat occurs later in the season, due to muddy and snowy road conditions, and would not be likely to affect a den site. However, the risk of poaching of lynx due to motorized access on roads would continue at its current level.

Cross Country Motorized Travel

The Forest is currently open for motorized cross-country travel, and Alternative A would not change that. Off-road use in lynx habitat would continue in the current condition in the short-term. Over time, it is expected that users would continue to build and use unauthorized trails, some of which may be in lynx habitat. With this increased access, some increased potential for illegal hunting and a small increased potential for disturbance to den sites could occur, and vegetation providing forage and cover for hares could be removed. However, disturbance to den sites by off-road use is not likely due to their location in forested areas with concentrations of down wood.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping would continue in the current largely unregulated pattern. The access is allowed along most roads and trails in the forest, and motorized cross-country travel would be allowed. If Alternative A is selected, more access routes for dispersed camping along roads and trails may be created, some of which could be in lynx habitat. This could result in some vegetation loss, but would generally be minor, and would not affect prey due to the small amounts that would likely be involved in comparison with the overall vegetation available. Lynx are tolerant of humans, and dispersed camping is unlikely to affect lynx.

Effects Common to Alternatives B, C, and D

Any effects to Canada Lynx from implementation of Alternative B, C, or D would be expected to be minor, as lynx are not particularly sensitive to forest roads (Squires et al. 2010, McKelvey et al., 2000, Kolbe et al. 2006, Squires et al. 2010), which receive much less use than highways, and lynx are tolerant of humans (Staples, 1995). Lynx management is more closely associated with prey management (hares), which is a vegetation management issue, than with management of roads and summer recreation. The action alternatives do not involve any vegetation management.

Maintenance Level 1 Roads

The closures of ML 1 roads in the alternatives would result in reduced human access, which could reduce potential for disturbance at den sites and illegal hunting. Squires et al. (2007) documented that lynx first occupied dens in early May when most forest roads in lynx habitat were impassible to wheeled traffic due to snow and muddy conditions.) Approximately 302 miles of ML 1 roads would be closed to motorized use in lynx habitat in the core and secondary zones.

Cross Country Motorized Travel

Cross-country travel would be prohibited in Alternatives B, C, and D. Closure of cross-country travel would not be expected to affect den sites for lynx. Den sites are generally in concentrations of down wood which would be avoided by cross-country riders. Closure to cross-country travel is not likely to reduce access to lynx habitat substantially, since the heavily forested conditions that are associated with lynx habitat are not as conducive to off-road use as more open habitat types.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Implementation of Alternative B would result in designation of approximately 2,548 acres of corridors extending 300' from roads for accessing dispersed camping in lynx habitat in the core and secondary zone (about 0.2% of the habitat). Alternative C would include approximately 2,426 acres in core and secondary lynx habitat (about 0.2% of the habitat). Alternative D corridors would include approximately 6,870 acres, or 0.5% of the core and secondary lynx habitat. This information is displayed in the following table.

Table *. Acres and Percent of Corridors Within Lynx Habitat by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Corridors in Lynx Habitat	2,548	2,426	6,870
Percent of Total Lynx Habitat	0.2%	0.2%	0.5%

This would be a reduction in access compared to alternative A, which would allow motorized access for camping across the forest. Motorized access within corridors is not likely to disturb lynx since lynx appear to be tolerant of human presence.

The slight differences in the amount of lynx habitat in corridors when comparing the alternatives would not change the effect to lynx. All action alternatives reduce access in comparison to Alternative A, which does not restrict vehicle access for the purpose of dispersed camping. It is not likely that use of the corridors would result in disturbance to a den site. Squires et al. (2007) found that lynx denned farther from all roads compared to random expectation, although it was assumed that was not because of active avoidance of human disturbance, but rather a function of the placement of roads. There are fewer roads in mature forest most used for denning, and more roads in the managed stands that are avoided by lynx and their prey. Also, many forest roads and trails would be closed by conditions during the early denning season due to mud and snow.

Cumulative Effects

Analysis Area Boundaries

Geographic: The geographical extent for cumulative effects is LAUs in core and secondary areas on the forest (roughly Highway 2 north, and west of the Okanogan River). These areas incorporate suitable habitat to support resident lynx and are an appropriate spatial scale to address cumulative effects.

Temporal Boundaries

Vegetation management activities, wildfire suppression, and the development of a NFS road and trail system began in the early 1900s and have affected lynx populations and habitat. These activities on Forest lands are expected to continue indefinitely, and will be assessed with future NEPA documents. Minimum roads analysis and forest planning will result in future decisions regarding motorized travel on the Forest within the next decade, and may provide changes to management direction.

Past and On-going Activities

Past and on-going activities that have affected lynx populations and habitat include:

Wildfire suppression

Fires are a significant disturbance process in boreal forests of North America, and large areas burned throughout Washington during the 19th and 20th centuries (Agee 2000). Lynx habitat in the Cascades was historically dominated by infrequent stand-replacing fires (Agee 2000). Fire suppression and exclusion over the last century has altered the vegetative mosaic and species composition and has resulted in increased susceptibility to severe fires, insects and diseases (Hann et al. 1997, Quigley et al. 1996). Fire suppression has not had as great an impact in lynx habitat as in high fire frequency forest types (e.g. ponderosa pine) because of the relatively long fire return intervals (100-250 years in the Cascades) of these higher elevations (Agee 2000).

Timber harvest and Precommercial Thinning

Regeneration harvests in lynx habitat have removed cover and forage for hares, an important prey item, and reduced potential for denning habitat by removing large trees and down logs. As these areas regenerate, high quality hare habitat may be produced. Precommercial thinning in lynx habitat has reduced cover and forage for hares. These effects are felt for approximately 15-40 years, until regenerating conifers and brush species grow above the snow level and provide winter cover and forage for hares. Lynx were listed in 2000, and management activities since that time incorporated mitigation to reduce adverse effects to lynx. Also in1995, the Wenatchee National Forest began implementation of a dry site strategy, which has focused management on the drier portions of the forest. The Okanogan National Forest did the same in 2000.

Recreation

Recreation use on the forest likely began with Forest establishment, and demand for outdoor recreation has grown rapidly since the end of World War II (Knight and Guzwiller 1995). To date, most investigations of lynx have not shown human presence to influence how lynx use the landscape (Aubry et al. 2000). Understanding of lynx response to human disturbance is described as rudimentary (Rudiger et al. 2000), but anecdotal information suggests that they may be tolerant of humans, except for near den sites. Den site disturbance may lead to abandonment of the site, possibly affecting kitten survival (Ruggiero et al 2000).

Roads and Trails on National Forest System Lands

Although road edges provide foraging opportunities, roads eliminate roughly 6 acres per mile of habitat, and increase recreational access to remote areas (Stinson, 2001). Naney (2009) estimates habitat loss from forest roads as about 2 acres per mile, and loss from trails as ½ acre per mile. However, road and trail clearing widths vary by road and trail type. An estimated 1,885 miles of roads and trails compose the forest system in lynx habitat (core and secondary areas) on the Okanogan-Wenatchee National Forest. This has likely removed several thousand acres of lynx habitat.

Lynx do not appear to avoid roads. Squires et al. (2007) observed lynx selection of den sites was likely not an avoidance of roads, but rather a function of how roads correlated to landscape pattern. Similar to McKelvey et al. (2000) findings, Squires et al. (2010) found no evidence that lynx were sensitive to use of forest roads, including those used by snowmobiles in winter. They concluded that the seasonal resource selection patterns of lynx were little affected by forest roads with low vehicular or snowmobile traffic.

Winter use of roads and trails for recreation has increased over the last 50 years, with the development of snowmobiles. Compaction of the road and trail system may allow some incursion of other predators into lynx habitats, resulting in competition for resources (Buskirk et al. 2000). However, Kolbe et al. 2007 suggests that coyote use of snowmobile trails into lynx habitat would be unlikely to affect lynx, due to restriction to the compacted areas.

Highways and larger non-Forest roads

Direct mortality to lynx has occurred as a result of higher volume, higher speed roads. Koehler and Aubrey (1994) suggest that lynx may also be more vulnerable to human-caused mortality near roads. The Okanogan-Wenatchee National Forest is bisected by one highway through lynx habitat in the core area, Highway 20 which passes through lynx habitat in 3 LAUs in the Cascades. Lynx have been documented on both sides of the highway.

Other factors that have affected lynx mortality have included trapping, hunting, poaching and predator control efforts. Factors that have affected lynx movements, which could result in restrictions of their range and ability to disperse to other areas, include large resorts and developments and fragmentation and degradation of lynx habitats.

Reasonably Foreseeable Future Actions

Foreseeable future actions in LAUs with core and secondary areas fall into 2 categories.

Other Forest activities

These are listed in the Reasonably Foreseeable Actions in Appendix A. Lynx are a threatened species, and projects in lynx habitat will be consulted on with U.S. Fish and Wildlife Service. Projects will be designed and mitigated to reduce adverse effects to lynx and lynx habitat, and be in compliance with the Lynx Conservation and Assessment Strategy (LCAS) until the Forest Plan is revised, which will include a new lynx conservation strategy.

Non-Forest Activities: These are also listed in the Reasonably Foreseeable Actions in Appendix A, to the extent that they are known. Projects planned by the DNR are subject to an agreement which directs them to avoid negative affects to lynx and lynx habitat.

Actions that are planned in and around the Okanogan-Wenatchee National Forest that would act cumulatively to affect lynx, when considered with the travel management effects, are summarized in the table below. See Reasonably Foreseeable Actions section for locations of these projects.

Table *. Reasonably Foreseeable Future Actions Affecting Lynx Habitat

Project type	***Potential negative or beneficial effect***	***Possible effect to lynx?***
Restoration and Fuel Reduction - timber harvest, thinning, fuels reduction projects (if they occur in lynx habitat)	Negative- would be mitigated if needed.	Reduces cover and forage for prey species until stands have regenerated to provide winter cover and forage.
Forest roads, trail and motorized area construction, reconstruction, relocation and use.	Negative (slight)	Increases or improves access which can result in poaching and collisions, May result in reduction of cover and forage for prey species. Winter use may facilitate encroachment by competitors.
Transportation System Management	Beneficial (slight)	Reduces access for illegal hunting and may increase unroaded habitat for lynx and their prey
Weed treatments	Beneficial	Reduces non-native species which compete with native species used by prey species.
Dispersed recreation	No effect, unless near den	Could cause abandonment of den, possibly affecting kitten survival.

Alternatives B, C, and D would all result in a reduction of motorized access compared to the existing condition. These alternatives, and future Minimum Road Analysis decisions which will likely result in additional reduction in roads, would partially counter the trend of the past actions, which increased roads and access.

Cumulative Effects Summary

Past management actions and natural events have had adverse effects to lynx populations and habitat. In particular, the construction of roads which have provided access for hunting and trapping, and regeneration harvests that have created large openings with limited cover and forage for prey. More recently, large, uncharacteristically severe wildfires have also resulted in reduced cover and forage for prey populations. The Tripod fire alone affected 13 of the 37 LAUs in core area on the forest.

Ongoing and future management actions in lynx habitat must consider lynx in their planning and design, and avoid or reduce negative effects to lynx populations and habitat. Current vegetation management activities on the forest emphasize restoration and are focused on the drier, lower elevation habitats, rather than the subalpine zone used by lynx.

Condition classes in lynx habitat are not as different from historic conditions as are the lower elevation classes, but this habitat is still at risk from severe fires. Fire may present the largest threat to lynx habitat.

Alternative A

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternative A would be reduction in the net motorized access to the Forest as a result of travel management actions decommissioning roads. This would slightly improve lynx habitat due to the reduced chance of illegal hunting and trapping, the reduction would be less than the cumulative effect of Alternatives B, C, or D, however, since Alternative A would not prohibit motorized access on maintenance level 1 roads.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D would be a reduction in the net motorized access to the Forest, which would reduce potential for disturbance to den sites and access for poaching.

The road and trail system managed by the forest consists largely of smaller, lower traffic volume and lower speed roads, not the large highway system that restricts ranges and poses potential barriers to long-range movements. Nor is it likely that these low-speed forest roads result in much road mortality to lynx. However, the forest roads and trails still provide access for illegal hunting and trapping, and the overall reduction of access in Alternatives B, C, and D would be a slight beneficial effect. Motorized access to the dispersed campsites and the camping are not likely to affect lynx, since lynx appear to be tolerant of human presence.

Determinations

Threatened Species

Alternative A would not change the current condition in the short term. Over time, more routes would be created by cross-country travel, which would reduce habitat by vegetation loss and would reduce habitat effectiveness through noise disturbance. It is unknown where the routes would be created, or what habitat types would be affected. Assuming no disturbance to reproductive sites, the determination for alternative A is "may affect, not likely to adversely affect", based on continued development of new routes.

Alternatives B, C, or D may affect, but are not likely to adversely affect lynx. Reduced access from closure of ML 1 roads, and to a lesser extent, cross-country motorized travel, would reduce the potential for disturbance to den sites and the potential for poaching.

MIS

Alternative A would not change the current conditions in the short-term, but could have a small negative impact over time, as new trails develop as a result of cross country motorized travel over the longer term. Trail development could reduce understory vegetation important to lynx prey. This effect would be minor, as it would impact a small portion of the habitat and is unlikely to affect den sites. The continued viability of lynx is expected on the Forest.

Alternatives B, C and D would improve conditions slightly, by closing forest to motorized cross country travel. The action alternatives will not contribute to a negative trend in viability on the forest.

Compliance with Laws and Regulations
Alternatives A, B, C, and D are consistent with the Okanogan and Wenatchee National Forest Land and Resource Management Plans' direction for threatened species. Consultation with the U.S. Fish and Wildlife Service has been initiated. The project is consistent with the Okanogan National Forest Land and Resource Management Plan because it does not increase road density in MA-12, in any alternative. Timing restrictions implemented with the Okanogan National Forest Travel are incorporated into the travel management proposals to meet Okanogan Forest Plan standard MA12-17D (During winter months December-March, all motorized vehicles, including snowmobiles, shall be restricted by regulation to areas and routes designated open.).

The Lynx Conservation Assessment and Strategy (LCAS, Interagency Lynx biology Team, 2013) provides additional guidelines for management of recreation, primarily dealing with winter use, which is not applicable to travel management actions. The LCAS also directs that federal recreational activities and facilities be located away from identified linkage areas and to avoid backcountry road upgrades that substantially increase traffic volume. Alternatives A, B, C, and D are consistent with the Lynx Conservation Assessment and Strategy standards and guidelines for recreation management and forest/backcountry roads and trails. Although some additional traffic is expected with addition of WATVs to some forest roads in alternatives B, C, and D, it is expected to be a minor increase. Alternative A does not allow WATV use on Forest roads.

The travel management alternatives would result in minor changes within lynx habitat, and comply with ESA regulations requiring that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of a listed species.

Critical Habitat for Lynx

Introduction
The U.S. Fish and Wildlife Service published a final rule on critical habitat in February, 2009 (Fed. Reg. 50CFR part 17) that listed lynx habitat east of the Cascade Crest, north of Lake Chelan and west of the Okanogan River as Critical Habitat.

The Fish and Wildlife Service designated Critical Habitat as boreal (northern, high-elevation moist forests) forest landscapes providing a mosaic of forest structures. The primary constituent elements (PCEs) for critical lynx habitat are:

- the presence of snowshoe hares and lynx preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface;
- winter snow conditions that are generally deep and fluffy for extended periods of time;
- sites for denning that have abundant coarse woody debris, such as downed trees and root wads;
- matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range (USFWS, 2009).

Regulatory Framework- see general wildlife section, above.

Best Available Science

Lynx are associated with boreal habitats that have cold, snowy winters and a good snowshoe hare prey base (Aubry et al. 2000, Ruggiero et al. 2000). In mountainous areas, these forests are interspersed with other non-boreal habitats that are used by lynx for travelling between the more suitable denning and foraging habitat patches (USFWS, 2009). Foraging activities generally occur where snowshoe hare densities are high. Snowshoe hares are most abundant where high horizontal cover near ground or snow level provides cover, forage and protection from the weather (Wolfe et al. 1982, Litvaitis et al. 1985, Hodges 2000, Squires et al. 2010). Den sites are located where coarse woody debris, such as downed logs and windfalls, provides security and thermal cover for lynx kittens (McCord and Cardoza 1982, Koehler 1990, Slough 1999, Squires and Laurion 2000, Squires, 2007).

Disturbance events such as blowdown and fire play an important role in shaping lynx habitats, producing patches of early-successional vegetation and woody debris. Post-fire stands in burns 15-30 years old appear to provide optimal lynx and hare habitat (Slough, 1999).

Climate change may be a concern for future lynx conservation, as lynx distribution and habitat is likely to shift upward in elevation within the occupied range as temperatures increase (Gonzalez et al. 2007). Critical habitat was revised in 2009 to include some higher-elevation habitats that lynx would be able to continue to use if distribution or habitat shifted upward in elevation (USFWS, 2009). Revisions to the critical habitat designation may be necessary in the future to accommodate shifts in the occupied range of the lynx.

Additional habitat information is found in the Lynx section, above.

Methods

Critical habitat for lynx was analyzed by comparing the effects of the alternatives on the components of the primary constituent elements of the boreal forest landscape, using GIS technology.

Analysis Area and Boundary

The analysis area boundary is Critical Habitat which includes all lynx habitat in core areas on national forest system lands north of Lake Chelan, east of the Cascade Crest, and west of the Okanogan River.

Existing Condition

There are approximately 1,298,393 acres of critical habitat for lynx on the forest in 44 Lynx Analysis Units (LAUs). A LAU is a land area approximately equal to a lynx home range.

Maintenance Level 1 Roads

The following table displays the LAUs that comprise critical habitat, and the trails and roads in lynx habitat (Naney, 2009) for these LAUs. Maintenance level 1 roads are included in the total miles of road since motorized use is permitted on these roads. This is the baseline condition that was consulted on for on-going activities and existing projects after critical habitat for lynx was designated in 2009. Road and trail information has been updated and corrected for this project, which may affect some road and trail lengths. Construction of these roads and trails removed lynx habitat.

Table *. Miles of Trail and Road Within Lynx Analysis Units Which Comprise Critical Habitat

LYNX ANALYSIS UNIT	TOTAL SIZE (AC)	LYNX HABITAT (AC)	MOTORIZED AND NON-MOTORIZED TRAILS IN LYNX HABITAT (MI)	ROADS IN LYNX HABITAT (MI)
ANDREWS CREEK[1]	21,850	17,502	28	0
APEX MOUNTAIN[1]	30,575	20,866	20	0
BALD MOUNTAIN[1]	35,775	28,053	33	0
BIG CRAGGY PEAK	26,021	13,390	8	41
BLUE BUCK RIDGE	26,847	12,734	11	25
BUCKSKIN RIDGE[1]	37,122	29,685	591	0
BUNKER HILL[1]	34,976	34,245	42	0

COOPER MOUNTAIN	28,382	19,691	2	29
CRESCENT MOUNTAIN	23,010	1,410	4	0
EUREKA LAKE	31,959	16,156	18	0
FAREWELL PEAK	41,226	25,888	9	33
FERRY PEAK	25,808	23,204	22	6
FRISCO MOUNTAIN[1]	54,321	150	12	0
FROSTY LAKE	19,939	14,661	132	0
HALFMOON LAKE	27,885	17,820	18	1
HANCOCK RIDGE	38,274	7,277	5	8
HORSESHOE CREEK	26,526	17,912	15	0
HUNGRY RIDGE	27,769	27,690	1	15
INDIANHEAD BASIN	31,710	21,189	40	0
LEASE CREEK	33,906	28,583	39	0
MANY TRAITS CREEK	21,595	13,061	13	0
MAZAMA	33,870	7,899	6	5
METHOW GOLD CREEK	29,583	19,778	38	6
MIDDLE FORK BOULDER CR.	27,681	21,989	7	28
MILTON MOUNTAIN	32,164	14,735	20	0
MONUMENT CREEK	28,115	9,340	7	0
NANNY GOAT MOUNTAIN	28,125	13,905	31	0
NORTH FORK BOULDER CREEK	15,594	10,570	6	13
NORTH FORK SALMON CREEK	24,299	14,245	13	32
PURPLE MOUNTAIN	24,810	8,449	0	0
SANDY BUTTE	27,751	12,904	6	0.
SF TOATS COULEE	32,889	28,831	27	18
SNOWSHOE RIDGE	25,965	14,439	29	0
SOUTH FORK BEAVER CREEK	19,872	12,819	4	74
SPIRIT MOUNTAIN	23,209	12,026	17	4
THIRTYMILE PEAK	27,866	21,236	11	18
TWISP	31,476	5,187	14	0
WEST FORK SALMON CREEK	27,935	20,535	14	35
WHITEFACE CREEK	27,650	16,272	5	57
YARROW CREEK	27,994	25,740	24	16

[1] Within North Cascades National Park and National Recreation Area, part is Okanogan-Wenatchee National Forest.

Large fires burned with varying intensities in 25 core LAUs since 2000, occurring on more than 400,000 acres, removing some lynx habitat.

Cross Country Motorized Travel

Motorized cross country travel is potentially affecting critical lynx habitat in areas where vegetation is damaged or destroyed, which could reduce the food for hares and other prey. This would be a very minor impact because there ground vegetation is relatively abundant across the critical habitat.

Motorized Access for Dispersed Camping

Motorized travel for dispersed camping is also potentially impacting critical lynx habitat in areas where vegetation is damaged or destroyed, therefore reducing the food for hare or other prey. As with cross country motorized travel, this would be a very minor impact because there ground vegetation is relatively abundant across the critical habitat.

Environmental Consequences

Direct and Indirect Effects:

Critical habitat for lynx is analyzed by comparing the effects of the alternatives on the components of the primary constituent elements of the boreal forest landscape. These components are:

- dense understories of young trees, shrubs or overhanging boughs that protrude above the snow,
- mature multistoried stands with conifer boughs touching the snow surface,
- abundant coarse woody debris,
- matrix habitat (other habitat types that do not support snowshoe hares)
- deep, fluffy winter snow conditions for extended periods of time. Travel management actions will not affect winter snow conditions, and this will not be considered further.

The only element that could be affected by any of the alternatives would be the understories of trees and shrubs which could be changed by continued cross country travel. None of the alternatives would affect the other elements.

Alternative A

Maintenance Level 1 Roads

Motorized access would continue across the Critical Habitat at existing levels. Continued motorized traffic on ML 1 roads could impede revegetation of the road beds. This would vary road to road, depending on amount of use that occurs, but overall, this could slightly reduce the amount of vegetation available for hare forage.

Cross Country Motorized Travel

An estimated 12% of the designated Critical Habitat could receive motorized cross-country use based on vegetation, topography and land allocation. Alternative A would not close the forest to cross-country travel. Cross-country travel would probably increase in time, as OHV use is predicted to grow, and could result in some loss of vegetation. The location and extent of this effect is impossible to predict. However, the opportunities for cross-country travel are limited in Critical Habitat due to the heavily forested character of lynx habitat.

Motorized Access for Dispersed Camping

Currently, motorized cross-country travel is allowed adjacent to roads in most areas of the forest, and corridors do not exist. If Alternative A is selected, it is expected that off-road access for camping would continue and new cross-country routes would develop. This could result in vegetation loss in Critical Habitat for lynx, which could result in some loss of cover and forage for hares. The extent and location of this effect is not known, but is likely to be minor compared to the amount of available forage.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

Since none of these alternatives remove vegetation, they would not negatively effect the PCEs. Closure of maintenance level 1 roads to motorized use would not remove vegetation so would not effect on Critical Habitat or the PCEs. If the roads are currently being used by motorized vehicles, closure may allow some vegetation to become established. However, these roads are being retained on the system because they are expected to be used within 20 years, so revegetation would be short-term if it did occur.

Cross Country Motorized Travel

Critical habitat for lynx would be slightly improved with alternatives B, C and D because the closure to cross-country motorized travel would eliminate vegetation loss caused by OHV use.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Approximately 2,453 acres of Critical Habitat (about 0.2% of Critical Habitat) would fall within corridors in Alternative B. The corridors in Alternative C would include 2,444 acres in critical habitat for lynx (about 0.2% of the Critical Habitat). Alternative D would increase the area in corridors to 7,599 acres (about 0.6% of the Critical Habitat).

Table *. Acres and Percent of Corridors Within Critical Lynx Habitat by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Corridors in Critical Habitat	2,453	2,444	7,599
Percent of Total Critical Habitat	0.2%	0.2%	0.6%

Motorized access within corridors would be restricted to existing routes, so no vegetation loss in Critical Habitat would be expected. Despite the variation in the number of Critical Habitat acres in corridors between alternatives, implementation of Alternative B, C, or D would have a minimal effect on the quality of the habitat simply because such a small amount of habitat would fall within the corridors. All action alternatives would result in a small reduction in potential impacts in comparison to Alternative A, which would restrict vehicle access for the purpose of dispersed camping, reducing the potential for vegetation loss in critical habitat. Vegetation provides cover and forage for snowshoe hare, an important prey item for lynx.

Cumulative Effects

Analysis Area Boundaries

Geographic: The geographical extent for cumulative effects is the designated Critical Habitat for lynx on the forest (higher elevation habitats from Lake Chelan north to the Canadian border on the Chelan, Methow Valley and Tonasket (west portion) districts). These areas incorporate suitable habitat to support resident lynx and are an appropriate spatial scale to address cumulative effects.

Temporal boundaries

Vegetation management activities, wildfire suppression, and the development of a NFS road and trail system began in the early 1900s and has affected lynx habitat. These activities on Forest lands are expected to continue indefinitely, and will be assessed with future NEPA documents. Minimum roads analysis and forest planning will result in future decisions regarding motorized travel on the Forest within the next decade, and may provide changes to management direction.

Past and On-going Activities

Past and on-going activities that have affected lynx critical habitat include:

Wildfire suppression.

Fires are a significant disturbance process in boreal forests of North America, and large areas burned throughout Washington during the 19th and 20th centuries (Agee 2000). Lynx habitat in the Cascades was historically dominated by infrequent stand-replacing fires (Agee 2000). Fire suppression and exclusion over the last century has altered the vegetative mosaic and species composition and has resulted in increased susceptibility to severe fires, insects and diseases (Hann et al. 1997, Quigley et al. 1996). Fire suppression has not had as great an impact in lynx habitat as in high fire frequency forest types (e.g. ponderosa pine) because of the relatively long fire return intervals (100-250 years in the Cascades) of these higher elevations (Agee 2000).

Timber harvest and precommercial thinning.
Regeneration harvests in lynx habitat have removed cover and forage for hares, an important prey item, and reduced potential for denning habitat by removing large trees and down logs. As these areas regenerate, high quality hare habitat may be produced. Pre-commercial thinning in lynx habitat has reduced cover and forage for hares. These effects are felt for approximately 15-40 years, until regenerating conifers and brush species grow above the snow level and provide winter cover and forage for hares. Lynx were listed in 2000, and management activities since that time incorporated mitigation to reduce adverse effects to lynx and habitat. Also in1995, the Wenatchee National Forest began implementation of a dry site strategy, which has focused management on the drier portions of the forest. The Okanogan National Forest did the same in 2000.

Recreation.
Recreation use on the forest likely began with Forest establishment, and demand for outdoor recreation has grown rapidly since the end of World War II (Knight and Guzwiller 1995). Recreational trails and sites have removed vegetation in Critical Habitat.

Roads and trails on Forest lands.
Although road edges provide foraging opportunities, roads eliminate roughly 6 acres per mile of habitat, and increase recreational access to remote areas (Stinson, 2001). Naney (2009) estimates habitat loss from forest roads as about 2 acres per mile, and loss from trails as ½ acre per mile. However, road and trail clearing widths vary by road and trail type. An estimated 1,012 miles of roads and motorized trails compose the forest system in Critical Habitat for lynx on the Okanogan-Wenatchee National Forest. This has likely removed several thousand acres of lynx habitat.

Reasonably Foreseeable Future Actions

Actions that are planned in and around the Okanogan-Wenatchee National Forest that would act cumulatively to affect Critical Habitat for lynx, when considered with the travel management effects, are summarized in the table below. See Reasonably Foreseeable Actions in Appendix A for locations of these projects.

Project type	*Potential negative or beneficial effect*	*Possible effect to Critical Habitat for lynx?*
Restoration and Fuel Reduction - timber harvest, thinning, fuels reduction projects	Negative- would be mitigated if needed.	Reduces cover and forage for prey species until stands have regenerated to provide winter cover and forage.
Forest roads, trail and motorized area construction, reconstruction, relocation and use.	Negative (slight)	May result in reduction of cover and forage for prey species.
Transportation System Management	Beneficial (slight)	Decommissioning may result in regrowth of vegetation. Closures are short-term and may not result in revegetation.
Weed treatments	Beneficial	Reduces non-native species which compete with native species used by prey species.

Federal projects with potential negative effects would be mitigated to reduce or eliminate adverse effects to Critical Habitat and to comply with the LCAS. State projects have similar requirements. Projects planned by the DNR are subject to an agreement which directs them to avoid negative affects to lynx and lynx habitat.

The Chewuch Transportation Plan proposes 46 miles of decommissioning in Critical Habitat for lynx. These decommissionings, future Minimum Road Analysis decisions which will likely result in additional reduction in roads, and the cross-country closures to motorized use that would occur as part of the travel management action alternatives would partially counter the trend of the past actions of increased roads and reduced habitat.

Cumulative Effects Summary

Alternative A

The cumulative effects of the past, present, and reasonably foreseeable future actions and Alternative A would be a reduction of motorized access on the Forest as a result of road decommissioning in other projects, which would reduce vegetation loss and slightly improve Critical Habitat for lynx, however to a lesser degree than the cumulative effects of Alternatives B, C, or D.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D on Critical Habitat for lynx would be a reduction of motorized access and cross-county motorized travel on the Forest, which would reduce vegetation loss and slightly improve Critical Habitat for lynx.

Determination

Alternative A, the current baseline condition, may affect, but is not likely to adversely affect Critical Habitat for lynx. With implementation of this alternative, it is expected that over time, additional trails would develop, and would result in some vegetation loss in lynx habitat, which would slightly reduce forage for snowshoe hares and other prey items.

Alternatives B, C, and D may affect, but are not likely to adversely affect Critical Habitat for lynx. These alternatives would close the forest to motorized cross-country travel, reducing loss of vegetation from cross-country motorized use.

Compliance with Laws and Regulations

There are no Forest Plan standards and guidelines applicable to Critical Habitat for lynx. Alternatives A, B, C, and D are consistent with the Endangered Species Act and the LCAS.

Marbled Murrelet

Introduction

Marbled murrelets are small diving seabirds that travel long distances inland for nesting. On the Okanogan-Wenatchee National Forest, habitat within the flight distance from marine habitat in Puget Sound is found primarily on the Naches, Cle Elum and Wenatchee River Ranger Districts. The marbled murrelet was listed as a threatened species under the Endangered Species Act in 1992, due to the loss of nesting habitat from logging and urbanization, and mortality associated with gill-net fisheries and oil pollution to its marine habitat (McShane et al. 2004).

Regulatory Framework (also see general introduction at beginning of wildlife section)

The Northwest Forest Plan Record of Decision (1994) requires pre-project surveys in the marbled murrelet zones in areas planned for timber harvest. If behavior indicating occupation by murrelets is documented, all contiguous existing and recruitment habitat within a 0.5 mile radius will be protected (Northwest Forest Plan ROD, C-10).

Murrelets are also protected from "take" by the Migratory Bird Treaty Act. A recovery plan for marbled murrelets was signed in 1997. Recovery actions include protection of habitats on National Forest land by implementation of the Northwest Forest Plan late-successional reserve network and minimizing disturbances at nest sites.

Best Available Science

Marbled murrelets are small seabirds which depend on marine conditions for resting and foraging on fish and crustaceans, and on inland forests for nesting. Both marine and forest conditions affect murrelet numbers. Based on current estimates, about 91% of murrelet suitable habitat is located on Federal land, with about 47% of the suitable habitat occurring in Washington (McShane et al. 2004).

Marbled murrelet nesting begins in mid-late March and extends until the end of August (Hamer and Nelson 1995). In California, Oregon, Washington, and British Columbia, murrelets nest in low elevation old-growth and mature coniferous forests with multi-layered canopies, on the lower two-thirds of forested slopes with moderate gradients (Hamer and Nelson, 1995). Recent telemetry research in British Columbia by Manley et al. (2001), Bradley (2002), Burger (2002), Huettmann et al. (2003a,b) has shown that murrelets will nest on steep slopes at high elevation (McShane et al. 2004). Stand canopy closure was often low, suggesting use of canopy openings for access to nest platforms (Hamer and Nelson 1995). Nests in the Pacific Northwest were typically in the largest diameter old-growth trees available in a stand, and many nest trees were in declining condition and had multiple defects (Hamer and Nelson 1995).

Terrestrial threats to the marbled murrelet are primarily the loss and fragmentation of nesting habitat (McShane et al. 2004). Other threats include habitat loss from fires and stand-replacing events, timber harvest on non-federal lands, low reproductive rates, nest predation, disease, oil spills, and gill net fishing. Since listing as a threatened species in 1992, threats have decreased (McShane et al. 2004). The rate of annual habitat loss has declined due to protection of Federal land. New gill-netting regulations in northern California and Washington have reduced the threat to murrelets.

Roads and motorized trails may affect murrelets directly through collisions with vehicles (Nelson 1997). Nelson reports at least 5 documented instances of marbled murrelet mortality resulting from vehicular collision. Nesting adults are thought to be especially susceptible to vehicular traffic risk where nests are located in the vicinity of roads as birds typically approach nests from below to allow for a controlled stall on the nest limb (Nelson 1997).

Removal of hazard trees along roads and campgrounds may result in loss of available nest sites for murrelets. Endangered Species Act consultations with U.S. Fish and Wildlife Service for Washington and Oregon for the 5-year status review period anticipated the loss or degradation of 10,525 large, potential nest trees.

The Five-Year Status Review (McShane, 2004) lists two indirect effects of roads to murrelets- fragmentation and edge effects on forest habitat; and the effects of noise from recreational activity, human development, and other disturbances on adults and chicks.

Murrelets are thought to be highly sensitive to forest fragmentation (Hansen and Urban 1992), and changes in their distribution and abundance have occurred in association with habitat loss and forest fragmentation (US Fish and Wildlife Service 1997). However, a study in British Columbia found a positive correlation between nest site selection and forest edges (Zharikov et al. 2006), and concluded that murrelet distribution could be explained by proximity of nests to landscape features producing edge effects.

Murrelets may also be highly vulnerable to increased levels of nest predation associated with forest edges (US Fish and Wildlife Service 1997). The main reason for nest failure in the marbled murrelet is predation by birds and possibly mammals (Nelson 1997; Raphael et al. 2002). Fragmentation of old-growth habitat will increase the risk of nest failure due to predation if the newly altered habitat allows for a better detectability of nests (Friesen et al. 1999) or supports a greater population of potential predators (Marzluff and Restani 1999).

Response to vehicular noise at nest sites has been noted to be minimal for both murrelet chicks and nesting adults (Nelson 1997, Hamer and Nelson 1998, Long and Ralph 1998). Singer et al. (1995) reported observing no visible response by murrelets to vehicles on a “well-traveled park road” located within 230 feet (70 meters) of nests monitored in Big

Basin State Park in California from 1992 to 1994. Another researcher noted little response by murrelets to vehicles driving on a "lightly used" logging road located 230 feet (70 meters) from a nest in Humboldt County, California (McShane, 2004). The status review concludes that though noise disturbance at nest sites is generally thought to minimally affect individual birds and nesting pairs, large-scale effects of increased energy expenditure at the population level may be significant.

Methods

The potential for collisions and disturbance resulting from access at nest sites was assessed by using the late-successional non-winter security habitat index (Gaines, 2003).

Analysis Area

The analysis area is the late-successional habitat within a daily flight distance from marine environments in the Puget Sound area for murrelets on the Okanogan-Wenatchee National Forest, approximately 320,594 acres on the Wenatchee River, Cle Elum and Naches Ranger Districts for murrelets on the Okanogan-Wenatchee National Forest.

Existing Condition

There are no confirmed marbled murrelet nest sites on the Okanogan-Wenatchee National Forest, and no murrelets have been detected (Jo Ellen Richards, personal communication). However, few surveys have been conducted. About 321,000 acres of the Forest are located within daily flying distances (50 miles) of marine environments in Puget Sound. This area is located within the western portions of the Cle Elum, Wenatchee River, and Naches Ranger Districts. Within the 50 mile zone, about 113,000 acres are late-successional habitat that is potentially suitable for nesting. Most of this habitat has not been surveyed.

Table *. Acres of Marbled Murrelet Zone and Late Successional Habitat Within Zone

	Marbled Murrelet Zone	Late-successional Habitat in the Marbled Murrelet Zone	
subbasin	acres	acres	%
Naches	88,209	45,916	52%
Upper Yakima	154,943	41,125	27%
Wenatchee	77,442	25,919	33%
forest totals:	320,594	112,959	35%

<u>Maintenance Level 1 Roads</u>

Traffic on the current road and motorized trail system is reducing the habitat quality in approximately 30% of the murrelet habitat, leaving 70% of the habitat providing security habitat away from roads. Roads can affect murrelet habitat due to the risk of collisions with vehicles, and disturbance to nest sites. Motorized use on maintenance level 1 roads contributes to this risk. The potential for collisions and disturbance at nest sites was measured using the late-successional non-winter security habitat index (Gaines et al. 2003) for the area of the forest that could potentially be used by marbled murrelets. This index buffers roads and motorized trails by 200 meters, and determines the amount of late-successional security habitat that is outside the influence of the roads and trails. Results are displayed in the table below.

Table *. Late-successional Security Habitat Estimate for Marbled Murrelet

Subbasin	*Marbled Murrelet Zone (acres)*	*% of Habitat that is security habitat*
Naches	88,209	74%

Upper Yakima	154,942	57%
Wenatchee	77,442	86%
forest totals:	***320,594***	***71%***

*security habitat is defined as the area outside of a road or trail buffer.

Cross Country Motorized Travel

Approximately 15,802 acres of late successional habitat (marbled murrelet habitat) within the marbled murrelet zone are potentially available for motorized cross-country travel, based on vegetation, topography, access, and land allocation. This is about 14% of the total late successional habitat within the zone. Current cross country motorized travel is likely having a minor effect on the habitat simply because such a small amount is being used for this activity.

Motorized Access for Dispersed Camping

Motorized access to dispersed camping is potentially reducing the habitat quality due to noise from vehicles, however most of the established dispersed camping and motorized access to these sites is outside of murrelet habitat, so the overall impact is very slight.

Environmental Consequences

Direct and Indirect Effects

Alternative A

Maintenance Level 1 Roads

Alternative A would not change motorized access to the marbled murrelet zone. The potential for vehicle strikes of murrelets and disturbance at nest sites would remain at the current condition. Across the zone, approximately 70% of the late-successional habitat would continue to be security habitat.

Cross Country Motorized Travel

Cross-country motorized travel would continue in approximately 14% (15,802 acres) of murrelet habitat. Approximately 86% of the habitat on the forest would continue to be unaffected by cross country motorized travel. Continuing cross-country travel could eventually establish new unauthorized routes, reducing security habitat by increasing potential disturbance to nest sites and collisions. It is not known where or to what extent this would occur, however since it could potentially affect such a small portion of the habitat, the overall effect on the species is expected to be minor. Potential for collisions is likely a very minor effect, since OHV speeds over these undeveloped routes are less than those of vehicles travelling on more developed roads, and the chance of a vehicle strike would be reduced.

Motorized Access for Dispersed Camping

Corridors would not be designated with Alternative A, and access for dispersed camping would continue in a small portion of the murrelet habitat. This would continue to reduce the quality of the habitat due to potential disturbance to nest sites from motorized vehicle use to access dispersed camping. It is likely that additional routes would be developed over time, which could result in increased disturbance and displacement.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

Alternatives B, C, or D would slightly increase the amount of security habitat by closing maintenance level 1 roads to motorized vehicles. This would reduce the potential for disturbance and vehicle strikes on 139 miles of road through murrelet habitat. These alternatives would increase security habitat by 3.1% over the current condition and Alternative A.

Table *. Increase in Late-successional Security Habitat from Current Condition

		Current Condition/ Alt. A	***Alt.B, C, and D***	***Change from Current***
Subbasin	*Marbled Murrelet Zone*			
	acres	*% of Habitat that is security habitat*	*% of Habitat that is security habitat*	*% increase in security hbt*
Naches	88,209	74%	76%	2%
Upper Yakima	154,942	57%	63%	6%
Wenatchee	77,442	86%	87%	1%
forest totals:	***320,594***	***71%***	***74%***	***3%***

*security habitat is defined as the area outside of a road or trail buffer.

Cross Country Motorized Travel

Closure of the forest to motorized cross-country travel would increase habitat effectiveness on about 15,802 acres (14% of the habitat). This would improve the habitat effectiveness for the species by eliminating potential disturbance from motorized vehicles.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate corridors where access could occur on existing routes, on approximately 1,578 acres (0.5%) in the marbled murrelet habitat. Corridors in Alternative C would include approximately 1,163 acres (0.4%) in the marbled murrelet zone. Alternative D corridors would include 5,550 acres (1.7%).

Table *. Acres and Percent of Corridors Within Marbled Murrelet Habitat by Alternatives B, C, and D

	Alternative B	**Alternative C**	**Alternative D**
Acres Corridors in Murrelet Habitat	1,578	1,163	5,550
Percent of Total Murrelet Habitat	0.5%	0.4%	1.7%

Motorized access for dispersed camping could reduce the habitat quality because of potential disturbance to nest sites. Despite the differences in the overall acres of habitat within corridors, the effect on murrelet habitat would be similar comparing all action alternatives. Alternative D would have roughly 4,000 additional acres of murrelet habitat than Alternatives B, or C, however all action alternatives reduce access in comparison to alternative A, which does not restrict vehicle access for the purpose of dispersed camping. This reduction in access would reduce the potential for vehicle strikes and disturbance to murrelets and nests.

Cumulative Effects

Geographic boundary for Cumulative Effects-

The geographic boundary is the marbled murrelet zone on the Okanogan-Wenatchee National Forest.

Temporal boundary

Temporal boundary is the time since European settlement, about 150 years, to about 10 years into the future. Management activities on Forest Service lands began affecting murrelets in the early 1900s with timber harvest, fire suppression, and road and trail construction and use, which resulted in loss and fragmentation of suitable nest habitat. Logging, residential, agricultural and urban development began earlier on private lands and resulted in loss of large tree habitat.

Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Past actions

Marbled murrelet population declines are related to loss of nesting habitats due to logging and urbanization (McShane et al. 2004), which have resulted in small isolated habitat patches.

Forest activities have resulted in changes to marbled murrelet habitat over the past century. Past timber harvest, danger tree removal, and wildfires have altered the distribution and abundance of suitable nesting habitat for the marbled murrelet. The Northwest Forest Plan went into effect into 1994, and resulted in declines in logging of large, old forest. The Plan was aimed at protecting habitats for spotted owls and other species associated with late, old forest habitat, including marbled murrelets.

Other activities that have resulted in habitat loss and fragmentation on federal lands include development of recreational facilities, mining, thinning, firewood cutting, prescribed burning, and road and trail construction. Development of private lands adjacent to forest lands has also reduced and fragmented habitat for marbled murrelets.

On-going Actions

On-going actions on the Okanogan-Wenatchee National Forest that would affect marbled murrelets are danger tree removal around recreational sites and roads in murrelet habitat. Danger tree removal eliminates potential nest trees, and use of roads, particularly higher standard roads with higher vehicle speeds could result in murrelet mortality through collisions. Use of roads and recreation sites may lead to disturbance near nest sites. However, the effects of noise disturbance at nest sites appear to be minor, although information is limited (McShane, 2004).

Reasonably Foreseeable Future Actions

Actions that are proposed by the Forest Service or by state agencies and private parties could affect marbled murrelet terrestrial habitat. Actions by federal agencies consider murrelets during the planning process and are mitigated to reduce or eliminate adverse effects to murrelets. Consultation with U.S. Fish and Wildlife Service is required for negative effects, and conditions may be imposed to further ameliorate negative consequences to marbled murrelets.

The only reasonably foreseeable future action within marbled murrelet habitat on the Okanogan-Wenatchee National Forest is hazard tree removal along roads. Currently, the focus of most restoration projects is dry site restoration, outside of the marbled murrelet zone. There are no additional foreseeable road or motorized trail actions planned in the murrelet zone.

Natural events such as fires, insect and disease outbreaks, nest predation, low breeding success, and possibly climate change effects on ocean foraging areas or nest microsites also impact murrelet populations and habitat.

Cumulative Effects Summary

On-going hazard tree removal, along approximately 410 miles of existing open road in murrelet habitat on the Okanogan-Wenatchee National Forest would degrade habitat slightly. The outlook for murrelets is a continued population decline (McShane, 2004). However, habitat on the Okanogan-Wenatchee National Forest is largely protected by the Northwest Forest Plan, and management activities are limited in the murrelet zone.

Alternative A

The cumulative effect of the past, present, and reasonably foreseeable future action and Alternative A would be a continuation of the slight degradation of habitat from hazard tree removal.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and alternatives B, C or D would be a slight reduction in the net motorized access in the marbled murrelet habitat because of the closure of ML 1 roads to motorized traffic and the closure to cross-country motorized travel. This would slightly increase security habitat and habitat effectiveness.

Determination

Alternative A may affect, but is not likely to adversely affect marbled murrelets. Alternative A is the current baseline condition. However, it is expected that additional trails would develop over time due to continued cross-country motorized use, which would be allowed in this alternative. This could decrease security habitat away from roads and trails. Because hazard trees (which may provide nest sites) would not be cut for safety purposes along these user-created trails, and vehicle speeds would be slow (reducing risk of vehicle strikes) on the cross-country routes, this is expected to be a minor effect to murrelets.

Alternatives B, C, and D may affect, but are not likely to adversely affect marbled murrelets. This is based on small gains in security habitat from road closures and closures of the forest to cross country travel.

Compliance with Laws and Regulations

Alternatives A, B, C, and D comply with the Migratory Bird Treaty Act, Wenatchee Forest Plan, the recovery plan for marbled murrelets and the Northwest Forest Plan. Marbled murrelet habitat is protected under the Northwest Forest Plan in Late-Successional Reserves. Future actions would need to comply with LSR standards and guidelines for habitat.

Northern Spotted Owl

Introduction

The current range of the northern spotted owl extends from southwest British Columbia through the Cascade Mountains, coastal ranges, and intervening forested lands in Washington, Oregon, and California. On the Okanogan-Wenatchee National Forest, it ranges in forested areas from the Chewuch River, west and south to the Forest boundary. An estimated 82,115 acres of spotted owl habitat is present on the Okanogan portion of the Forest, and 631,105 acres on the Wenatchee portion.

The northern spotted owl was listed as threatened under the Endangered Species Act on June 26, 1990 (USFWS 1990) due to widespread loss of habitat across its range and inadequacy of regulatory mechanisms to conserve the spotted owl. It is currently being considered for uplisting to endangered status. An interagency conservation strategy was developed by Thomas et al. (1990), and the Northwest Forest Plan (1994) provided extensive direction to promote the conservation of the northern spotted owl, by use of late-successional reserves (LSRs). A revised recovery plan was released by the USFWS in July, 2011 and builds on the Northwest Forest Plan. Critical Habitat for Northern spotted owls, discussed in the next section, has also been designated and provides protection for spotted owls (USFWS, 2012).

The northern spotted owl was also designated as a management indicator species (MIS) for late successional habitat in both the Okanogan and Wenatchee Forest Plans (1989, 1990). The northern spotted owl is listed as vulnerable (G3) throughout its range, and critically imperiled (S1) in Washington State due to relatively few occurrences of high quality habitat, and the population trend is downward (NatureServe 2010). Based on population trends, habitat assessment, and risk factors, the viability outcome for the spotted owl is an "E" on the Okanogan National Forest, and is a "C" on the Wenatchee National Forest (Youkey, 2011). On the Okanogan National Forest, the range of the spotted owl only occurs on the west half of the Forest, suitable habitat is not widely distributed, and risk factors are negatively influencing habitat occupancy and demographic performance. On the Wenatchee National Forest, suitable habitat is broadly distributed, but risk factors are limiting habitat occupancy and demographic performance, so the population is currently patchily distributed.

There are no estimates of the size of the spotted owl population prior to settlement by Europeans. Demographic data from 14 study areas across the range of the northern spotted owl indicated an annual population decline of approximately 3.7% from 1985 to 2003 (Anthony et al. 2006). On the two study areas in the Eastern Washington Cascades, estimated population declines were approximately 6.2% annually, or 40 to 60% total, from 1990 to 2003 (Anthony et al. 2006:31). On the only demographic study area still being monitored in the Eastern Cascades, Cle Elum, the number of owls detected declined by 78% between 1992 and 2010. Analysis of mark-recapture, reproductive output, and territory occupancy data collected from 1985-2013 indicated that northern spotted owl populations were declining throughout the range of the subspecies and that annual rates of decline were accelerating in many areas (Dugger et al. 2016).

Regulatory Framework

In addition to the regulatory documents listed above, the Revised Recovery Plan for the Northern Spotted Owl (USFWS, 2011) provides direction for forest management. Principles are focused on dry forest restoration treatments. However, principle 6 "manage roads to address fire risk" addresses roads.

Best Available Science

Northern spotted owls use late-successional forest habitat primarily in the western hemlock, grand fir, and Douglas-fir forested vegetation zones of the eastern Washington Cascades. The upper elevation limit (roughly 5,000 feet) at which spotted owls occur corresponds to the transition to subalpine forest, characterized by relatively simple structure and severe winter weather (Forsman 1975; Forsman *et al.* 1984).

Several local studies have characterized nest sites of spotted owls. Buchanan et al. (1995) compared random sites with spotted owl nest sites and found that nest sites had more Douglas-fir trees 35-60 cm diameter at breast height (dbh), greater basal area of Douglas-fir trees, more large ponderosa pine trees (61-84 cm dbh), greater live tree basal area, and greater basal area of Class IV (soft) snags. In addition, nest sites had less basal area of Class I and II (hard) snags, however, volume of coarse woody debris and canopy closure did not differ between sites. Snag classes are from Buchanan (1991). Everett et al. (1997) found that spotted owl nest stands had multi-layered canopies and that the presence of shade-tolerant tree species have increased as a result of reduced fire effects. While spotted owls will nest in a wide variety of habitats within the east Cascades Physiographic Province (Buchanan and Irwin 1998), a general definition of nesting and roosting habitat includes a moderate to high canopy closure (60 to 90 percent); multi-layered, multi-species canopy with a component of Douglas-fir and large overstory trees (dbh greater than 30 inches), a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly (Thomas et al. 1990). Most nests occur in mistletoe platforms and/or abandoned goshawk nests in Douglas-fir. About 10% of the nests are in cavities of large trees (Buchanan, 1991).

Foraging habitat generally has attributes similar to those of nesting and roosting habitat, but may not always support successful nesting pairs (USFWS 1992a). Dispersal habitat has been used to define the conditions necessary for spotted owls to move between patches of nesting, roosting and foraging habitats. Dispersal habitat provides linkages between habitat patches for owl movement, but may not contain the structural attributes, such as canopy closure, large trees, and snags, associated with nesting, roosting and foraging habitats. Little research has been conducted to quantitatively define dispersal habitat for spotted owls. However, Sovern et al. (2015) found that roosting habitat used during natal dispersal included some large trees (>20") and canopy cover greater than 70%.

The local food habits of spotted owls have been studied by Richards (1989) and Forsman et al. (2001). The primary prey species that were identified in these studies include the northern flying squirrel, bushy-tailed woodrat, deer mouse, and voles. Courtship behavior usually begins in February or March; nesting activities begin in early March with incubation of the eggs from April to June. Feeding and care of the young occurs from April through August, and then juveniles disperse from natal areas in August and September. Site specific monitoring on the Wenatchee NF has shown that within the Eastern Washington Cascades Province, after July 31, spotted owl young are mobile and generally considered to be able to move from disturbance (J. Krupka, USFWS, pers.comm.). Natal dispersal of spotted owls typically occurs in September and October (Miller et al. 1997; Forsman et al. 2002).

Estimates of the median size of spotted owl annual home range (the area traversed by an individual or pair during their normal activities) vary geographically across its range (Thomas and Raphael 1993). In the Eastern Washington Province, the median annual home range was 7,124 acres (2,883 ha) (Thomas et al. 1990, USDA and USDI 1994).

The 2011 Recovery Plan (USFWS 2011) identified range-wide threats to the spotted owl as competition with barred owls, ongoing loss of suitable habitat as a result of timber harvest and uncharacteristic wildfire, and loss of amount and distribution of suitable habitat as a result of past activities and disturbances. Habitat effects include loss of habitat quality and quantity as a result of past activities and disturbance, and ongoing and projected loss of habitat as a result of fire, logging and conversion of habitat to other uses. Habitat loss from logging has declined since the Northwest Forest Plan was implemented, however low net rates of loss continue, largely as a result of wildfire (Davis et al. 2011, 2015). Davis et al. (2016) estimated a rangewide net decrease in nesting/roosting habitat of 1.5% on all federal lands since 1993.

Little research has been conducted on the effects of recreational activities, including motorized use, on the northern spotted owl. In the Wenatchee Late Successional Reserve Assessment it was assumed that northern spotted owls could be affected negatively by the edge effects of roads (USDA, 1997). Wasser et al. (1997) found that stress hormone levels were significantly higher in male northern spotted owls (but not females) when they were located less than 0.41 km from a major logging road, compared to northern spotted owls in areas greater than 0.41 km from a logging road. Hayward et al. (2011) examined the effects of off-highway vehicle use on spotted owls during incubation and fledging periods. They concluded that acute vehicle exposure increased stress hormones in spotted owls, and that, with the strong association of decreased reproductive success near loud roads, suggests that disturbance from traffic can have a significant impact on the fitness of spotted owls. They suggested that a precautionary approach to motorized traffic within 800 meters of spotted owl territories. Swarthout and Stiedl (2001) reported that the closely related Mexican spotted owl *(Strix occidentalis lucida)* was negatively affected by hikers. They reported that juveniles and adults were unlikely to flush at distances ≥12 meters (39.3 feet) and ≥24 meters (78.7 feet) from hikers, respectively.

Methods

GIS analysis was used to analyze habitat and compare between alternatives. The late-successional non-winter security habitat (Gaines, 2003), described below, was clipped to LSRs, MLSAs, the Snoqualmie Pass AMA and subbasin.

Analysis Area

The analysis area is the Okanogan-Wenatchee National Forest within the range of the spotted owl.

Existing Condition

Protocol surveys have been conducted within approximately 85% of the suitable habitat on the forest since the late 1980s and approximately 230 pairs of spotted owls have been located. Of these, about 65% were located within LSRs/MLSAs, and 33% within the Snoqualmie Pass Adaptive Management Area (AMA), which is managed under the Snoqualmie Pass Adaptive Management Area Management Plan. This plan adopted standards and guidelines nearly identical to LSR standards and guidelines.

Monitoring of spotted owls on the Wenatchee National Forest has indicated a declining population (Forsman et al. 1996, Franklin et al. 1999, Anthony et al. 2006). There is also strong evidence for declines in apparent survival on two spotted owl demography study areas on the forest (Anthony et al. 2006). In the Wenatchee and Cle Elum long-term study areas, population declines range from 40 to 60 percent during the study period of 1990 to 2003 (Anthony et al. 2006). Decreases in apparent adult survival rates were an important factor contributing to decreasing population trends.

Maintenance Level 1 Roads

Motorized use on maintenance level 1 roads contributes to the reduction of security habitat. Security habitat, defined as the area outside these buffers, is compared to the total amount of late-successional habitat within the subbasin, LSR, MLSA, and AMA.

The late-successional non-winter security habitat index (Gaines et al. 2003) was used to quantify existing security habitat for spotted owls, and the effects of the proposed changes, to late-successional habitat within the range of the spotted owl across the Okanogan-Wenatchee National Forest by subbasin, LSR, MLSA, and the AMA. This index is used to evaluate the effects of displacement and avoidance, disturbance and human access (Gaines et al. 2003). The index buffers roads and motorized trails by 200 meters (656.1 feet), and non-motorized trails by 100 meters (328 feet).

The following table presents the existing condition for late-successional habitat and late successional *security* habitat, by subbasin (4th field Hydrologic Unit Code, HUC), within the range of the northern spotted owl. Security habitat is defined as the area outside of the zone of influence of a road or trail.

Table *. Late-successional Habitat on the Okanogan-Wenatchee National Forest by Subbasin

Subbasin	Proportion of Subbasin in Late-successional habitat	Late- Successional *Security* Habitat (Proportion of Late-sucessional habitat that is outside the influence of a road or trail)
Chief Joseph	6%	55%
Lake Chelan	13%	88%
Methow	9%	71%
Naches	42%	71%
Upper Columbia-Entiat	20%	64%
Upper Skagit	9%	89%
Upper Yakima	30%	58%
Wenatchee	31%	69%
Forest totals	***24%***	***69%***

The security habitat figures above consider only roads and trails, and do not take into account the fact that the entire Forest is open to motorized use unless specifically closed. Because of this, the actual amount of late-successional security habitat would be less than shown above.

Cross Country Motorized Travel

It is estimated, based on topography, land allocation, and vegetation that cross-country motorized travel could occur on 4,469 acres of spotted owl habitat within the range of the northern spotted owl, approximately 1% of the total habitat. This is reducing the quality of the security habitat estimated in Table * due to potential disturbance or displacement of owls, especially during sensitive times, such as nesting season.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is occurring within spotted owl habitat. There are currently no restrictions on motorized access for dispersed camping within areas open to motorized vehicles. Motorized access and dispersed camping occurring near open roads is potentially decreasing habitat quality by disturbing owls, especially during nesting season.

LSRs, MLSAs, and Snoqualmie Pass AMA

Habitat for spotted owls and other species associated with late-successional habitat is managed through a network of habitat reserves designated as Late-successional reserves (LSRs) or Managed Late-Successional Areas (MLSAs) (USDA and USDI, 1994). The Snoqualmie Pass Adaptive Management Area (AMA) plan adopts similar standards for that management area, and is also focused on providing late-successional forest.

Late-successional reserves (LSRs) were established to protect and enhance conditions of late-successional and old-growth forest ecosystems. Non-silvicultural activities located inside LSRs are allowed only if they are neutral or beneficial to the creation and maintenance of late-successional habitat (USDA and USDI, 1994). Road construction in LSRs is generally not recommended, unless potential benefits exceed the costs of habitat impairment. They should be routed through non-late-successional habitat where possible, and be designed to minimize adverse impacts (USDA and USDI, 1994). Development of new recreation facilities that would adversely affect LSRs would not be permitted, but would be reviewed on a case by case basis, and may be approved when adverse effects can be minimized and mitigated. Developments will be located to avoid degradation of habitat and adverse effects on late-successional species (USDA and USDI, 1994).

Maintenance Level 1 Roads

Security habitat, defined as areas 200 meters or more from a road or motorized trail, and 100 meters or more from a non-motorized trail was modeled for these areas. Motorized use of maintenance level 1 roads contributes to the reductions in security habitat. The current condition is presented in the table below.

Table *. Security Habitat by LSRs, MLSRs, and AMA

LSRs	**Proportion of Late-successional habitat that is security habitat**
Sawtooth	78%
Hunter Mountain	68%
Twisp River	68%
Upper Methow	75%
Nice	48%
Boundary Butte	55%
Bumping	54%
Chiwawa	61%
Deadhorse	72%

Icicle	60%
Lake Wenatchee	70%
Lucerne	84%
Manashtash	61%
Rattlesnake	68%
Sawtooth	63%
Shady Pass	73%
Slide Peak	97%
Swauk	51%
Teanaway	71%
Tieton	58%
Upper Nile	46%
MLSAs	
Camas	43%
Crow	64%
Eagle	39%
Haystack	46%
Lost Lake	61%
Milk Creek	31%
Natapoc	38%
Russell Ridge	61%
Sand Creek	63%
Tumwater	77%
Twin Lake	89%
AMA	
Snoqualmie Pass	58%
Forest totals	***62%***

Cross Country Motorized Travel

Cross country motorized travel is potentially impacting some of these areas shown as security habitat in Table *. A rough estimate of approximately 0.5% of the total habitat (1,450 acres) in the LSRs, 0.2% of the total habitat in the MLSAs (67 acres) and 0.2% of the total habitat in the AMA (100 acres) could potentially receive use by cross-country motorists. The overall impact to LSR, MLSA, and the AMA habitat from cross country motorized travel is minimal due to the very small amount affected. Cross-country motorized use could potentially reduce habitat quality through disturbance and vegetation damage.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is also occurring along some open roads that pass through LRSs, MLSAs, and the AMA. There are no limitations on motorized access except for the prohibition on causing resource damage, and in areas closed to motorized vehicles. The motorized access may be reducing habitat effectiveness through disturbance and vegetation damage.

Environmental Consequences

Direct and Indirect Effects

Alternative A

Maintenance Level 1 Roads

Implementation of Alternative A would result in approximately 69% of the late-successional habitat across the forest continuing to provide security habitat away from roads and trails. Approximately 62% of the habitat within LSRs, MLSAs and the AMA would continue to be security habitat. The remaining habitat along ML 1 roads would not be as effective as habitat, as owls can be sensitive to noise disturbance such as motorized vehicles.

Cross Country Motorized Travel

Across the range of the spotted owl on the Okanogan Wenatchee National Forest, an estimated 4,469 acres (1%) of spotted owl habitat may currently be used for cross-country motorized travel, based on the vegetation, topography and land allocation. This would not change with implementation of Alternative A, and disturbance to owls and displacement from habitat would continue at current levels. Over time, new routes are expected to be created. The overall impact to LSR, MLSA, and the AMA habitat from cross country motorized travel is minimal due to the very small amount affected. Cross-country motorized use could potentially reduce habitat quality through disturbance and vegetation damage.

Motorized Access for Dispersed Camping

Corridors would not be designated in Alternative A and motorized access to dispersed sites would continue to be unrestricted in areas open to cross country motorized travel. Over time, new routes to access camp sites would likely develop, some of them in spotted owl habitat. These routes would result in some vegetation loss, but would not require danger tree management (beyond trees removed for firewood or danger tree management along open system roads- see Cumulative Effects section). Snag habitat would remain in the current condition over the short term and would provide potential nest sites for spotted owls and their prey.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

The closure of maintenance level 1 roads to motorized use would result in a net increase in the amount of security habitat for northern spotted owls and their prey in approximately 4% forestwide and by about 0.9% in the LSRs, MLSAs and AMA. This would slightly reduce potential for disturbance to owls and displacement from usable habitats. The late-successional non-winter security habitat index for spotted owls (Gaines, 2003) quantifies these changes.

The following tables present the changes in the amount of late-successional security habitat across the range of the spotted owl on the Forest, from the existing condition (the "no change" alternative, alternative A) by subbasin and in the LSRs, MLSAs and AMA.

Table *. Late Successional Security Habitat by Subbasin

	Existing Condition/ Alternative A	*Alternative B,C, and D*	*Change from Alternative A to Alternative B,C, and D*	
Subbasin			*Acres*	*%*
Chief Joseph	55%	66%	+52	+11%
Lake Chelan	88%	88%	+69	0%

Methow	70%	77%	+4,040	+6%
Naches	71%	74%	+7,194	+3%
Upper Columbia-Entiat	64%	68%	+2,488	+4%
Upper Skagit	89%	90%	+130	+1%
Upper Yakima	58%	63%	+7,704	+5%
Wenatchee	69%	74%	+12,381	+5%
Forest totals:	***69%***	***73%***	***+34,058***	***+4%***

Table *. Late-successional Security Habitat in LSRs, MLSAs and the AMA

	Alternative A	***Alternative B,C and D***	
	Proportion of the Late-successional habitat that is security habitat	*Proportion of the Late-successional habitat that is security habitat*	*Change from alternative A*
LSRs			
Sawtooth	78%	81%	+3 %
Hunter Mountain	69%	90%	+22%
Twisp River	68%	74%	+5%
Upper Methow	75%	80%	+5%
Nice	47%	62%	+14%
Boundary Butte	55%	64%	+9%
Bumping	53%	54%	+1%
Chiwawa	60%	66%	+6%
Deadhorse	66%	81%	+14%
Icicle	59%	65%	+7%
Lake Wenatchee	69%	74%	+5%
Lucerne	84%	84%	0%
Manashtash	59%	63%	+4
Rattlesnake	67%	69%	+2%
Sawtooth	63%	63%	0%
Shady Pass	72%	76%	+5%
Slide Peak	97%	97%	0%
Swauk	49%	57%	+8%
Teanaway	70%	71%	+1%
Tieton	58%	61%	+3%
Upper Nile	45%	54%	+9%
MLSAs			
Camas	47%	60%	+13%
Crow	63%	72%	+9%
Eagle	38%	66%	+28%
Haystack	45%	56%	+11%
Lost Lake	60%	62%	+2%
Milk Creek	29%	40%	+10%

Natapoc	34%	75%	+41%
Russell Ridge	64%	72%	+7%
Sand Creek	59%	59%	+0%
Tumwater	77%	86%	+9%
Twin Lake	89%	94%	+5%
AMA			
Snoqualmie Pass AMA	54%	61%	+7%
Forest totals	***7%***	***8%***	***+1%***

Cross Country Motorized Travel

Alternatives B, C, and D would prohibit cross-country motorized travel on the 4,468.8 acres of spotted owl habitat currently open to cross-country travel. This would reduce potential for disturbance to spotted owls, increasing habitat effectiveness in comparison to Alternative A by 1% of the habitat forestwide.

The closure of the forest to motorized cross-country travel would potentially result in a decrease in disturbance to spotted owls in LSRs, MLSAs and the AMA. Approximately 0.5% of the LSRs, 0.2% of the MLSRs, and 0.2% of the AMA would no longer have motorized cross country travel. While this would eliminate any impacts from this activity, the overall improvement to habitat quality would be minimal because of the very small amount of habitat affected.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

The designation of corridors would not alter the structure of late successional habitat since there would be no ground-disturbing activities, as new routes would be prohibited. No snags would be cut for safety purposes in corridors, so snag habitat would not change as a result of corridor designation.

Implementation of alternative B would result in approximately 8,632 acres of corridors in LSRs, 3,312 acres in MLSAs, and 1,053 acres in the AMA. Alternative C would include less of each designation, while Alternative D would include more, as displayed in the following table.

Table *. Acres and Percent of Corridors within LSRs, MLSAs and AMA, by Alternative

	Alternative B		**Alternative C**		**Alternative D**	
	acres	***%***	***acres***	***%***	***acres***	***%***
LSRs	8,641	1%	6,795	1%	28,687	3%
MLSAs	3,312	3%	2,835	3%	6,190	6%
AMA	1,053	1%	413	0%	4,176	4%

Motorized vehicle access within corridors would be limited to existing routes, but could lead to disturbance and displacement of spotted owls. This effect could occur on substantially more acres with implementation of Alternative D, compared to Alternatives B or C. However, motor vehicles would be restricted to using established routes only, where the use is already occurring. Since no new routes would be authorized, no additional disturbance or displacement of owls should occur with implementation of Alternative B, C, or D, Each of these alternatives would reduce the likelihood of disturbance and displacement in comparison to alternative A, which does not restrict vehicle access for the purpose of dispersed camping. Reduction in access would reduce potential for disturbance and displacement of spotted owls.

Cumulative Effects

Geographic boundary for Cumulative Effects

The forested area within the range of the Northern spotted owl (all districts except Tonasket and the Methow Valley east of the Methow and Chewuch Rivers.) and the 4^{th} field subbasins associated with this area, including the other land ownerships. This area includes a large portion of the Eastern Washington Cascades province, which is an area of similar vegetation, topography and climate, defined by the 2011 Revised Recovery Plan.

Temporal boundary

Management activities began affecting spotted owls and spotted owl habitat in the early 1900s with timber harvest, fire suppression, and road and trail construction and use. Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Past and Present Actions

Habitat

Forest activities have resulted in changes to spotted owl habitat over the past century. Past timber harvest and wildfires have substantially altered the distribution and abundance of suitable habitat for the spotted owl. In many areas, the most sustainable habitat has been previously removed by management or fire, and a large proportion of the remaining spotted owl habitat is in the less sustainable dry forest.

A trend analysis for habitat of the spotted owl conducted by the Service (USFWS 2004a) indicated an overall decline of approximately 2.11 percent in the amount of suitable habitat on Federal lands as a result of range-wide management activities from 1994 to 2003. This rate of loss is lower than the 2.5 percent-per-decade estimate of habitat loss resulting from management activities that was predicted in the NWFP (USDA and USDI 1994a).

Current harvest levels and the removal of suitable habitat on the Forest are within expectations (USDA Forest Service and USDI Fish and Wildlife Service 1994a. Preliminary data on the Okanogan-Wenatchee National Forest suggests that over 36,000 acres of suitable habitat for the spotted owl have been removed due to wildfire since 1994. At the same time, only 8,797 acres have been removed or downgraded due to management actions (Jeff Krupka 2008, personal communication to Joan StHilaire).

Other activities that have resulted in habitat loss and fragmentation include hazard tree management along open roads, development of recreational facilities, mining, thinning, firewood cutting, prescribed burning, and road and trail construction. Development of private lands adjacent to forest lands has also reduced habitat for spotted owls.

Fire suppression has changed the distribution and amount of spotted owl habitat, allowing stand densities and canopy closures to increase, and the development of multi-storied stands where more open stands previously occurred. This has resulted in increases in spotted owl habitat. Because many of these stands are not sustainable in their current condition given their fire regimes, these denser stands are at high risk for insects, disease and stand-replacing fires.

Disturbance

Most forest activities have the potential to disturb nesting owls, including use of roads and trails, forest thinning, fuels projects and recreational activities. The development of the forest road and trail network over the last 100 years has allowed access to previously inaccessible areas of the forest. A retrospective analysis of a 19-year demographic study of northern spotted owls in California suggested that, in high quality habitats, disturbance may have cumulative negative effects on reproductive output that take at least a decade to appear (Damiani et al. 2007).

Reasonably Foreseeable Future Actions

Many of the actions that are proposed by the Forest Service or by state agencies and private parties could affect spotted owl habitat, in a negative or positive manner. Actions by federal and state agencies are mitigated to reduce or eliminate adverse effects to owls, thus these projects are not expected to have major adverse effects. Consultation with U.S. Fish and Wildlife Service is required for negative effects, and they may impose conditions to further ameliorate negative consequences to owls.

Reasonably Foreseeable Future Actions in the Okanogan-Wenatchee National Forest and the adjacent lands are listed in this chapter. Those actions that may affect spotted owl habitat and are proposed in the near future on or adjacent to the Okanogan-Wenatchee National Forest include:

Table *. Reasonably Foreseeable Future Actions that Could Impact Spotted Owls

Project type	***Potential negative or beneficial effect***	***Possible effect to spotted owls?***
Restoration - timber sales and commercial thinning	Both	-Loss of snags and large trees, reduction in canopy closures. Federal sales mitigate reductions of owl habitat or habitat components. + reduced risk of stand loss resulting from insects, disease and fire and accelerates development of late-successional structure.
Fuel reduction projects (ladder thinning, prescribed burning, piling, thinning from below)	Both	-loss of snags for safety reasons, canopy closure reduction. + reduced risk of stand loss resulting from insects, disease and fire. Accelerates development of late-successional structure.
Pre-commercial thinning	Beneficial	+Accelerates development of late-successional structure.
Road and trail construction, reconstruction and relocation.	Negative	-Fragments habitat and leads to loss of snags for safety and firewood cutting. Increases human access. May remove large trees.
Road maintenance	Negative	-Loss of snags as hazard trees.
Firewood cutting	Negative	-Loss of snags. Prohibited in LSRs, MLSAs and AMA.

These projects generally result in noise disturbance during implementation and use, as well.

Natural events- competition from barred owls, fires, insect and disease outbreaks and climate change will also continue to affect spotted owls and spotted owl habitat in the future. Wildfire potential is expected to increase dramatically, in response to projected climate changes. In the forested ecosystems of the eastern Cascades, Littell et al. (2010) predict a near doubling by the 2080s of the mean area burned between 1980 and 2006 (from 63,000 to 124,000 ha).

Travel management actions in the range of the spotted owl on the Okanogan Wenatchee National Forest that are incorporated into other projects include road decommissioning/closing (35 miles) and 3.4 miles new motorized trails in Little Crow Restoration (Naches), 8 miles of decommissioning in Swauk Pine Restoration (Cle Elum) and closures and decommissioning in the Chewuch Transportation Plan (Methow). These projects would result in a net reduction in motorized routes, and would reduce potential for disturbance to spotted owls, displacement and avoidance of habitats. Road decommissioning would also eliminate loss of snags through hazard tree management and firewood cutting.

Loss of snags would continue on existing roads as part of road maintenance and also by firewood cutters along existing open roads, and would reduce potential nest sites for owls and their prey. Firewood cutting is permitted within 200 feet of open system roads, except in riparian areas, CHUs, LSRs, MLSAs and the Snoqualmie Pass Adaptive Management Area.

The Yakima Basin Project (Bureau of Reclamation) would flood spotted owl habitat in the Bumping Lake area. Mitigation in the form of land acquisition and habitat enhancement is planned and is predicted to be a net improvement in spotted owl habitat.

Cumulative Effects Summary

An expert panel convened by the U.S. Fish and Wildlife Service to identify the most current threats to the spotted owl unanimously identified past habitat loss, current habitat loss, and competition from barred owls as the most pressing threats to the spotted owl, even though timber harvest has been greatly reduced on Federal lands (U.S. Fish and Wildlife Service, 2010). Current habitat loss is primarily from catastrophic fires (Courtney and Gutiérrez 2004). Current and future vegetation management actions are being designed under restoration strategies to help isolate higher quality spotted owl habitat from wildfire, insects and disease.

Alternative A

The cumulative effect of Alternative A and the past, present, and reasonably foreseeable future actions would be an isolation of higher quality spotted owl habitat from wildfire, insects, and disease, and an accelerated development of large tree habitat as a result of restoration projects. The benefits of these restoration projects would be slightly offset from the continuation of cross country motorized travel in Alternative A, reducing the cumulative beneficial effect compared to the cumulative effects of Alternatives B, C, or D.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D on spotted owls and habitat would be reductions in the net motorized access to the Forest, which would increase security habitat and reduce potential for disturbance, displacement and avoidance of suitable habitat. Decommissioning would also improve spotted owl habitat by increasing snag levels, as snags would no longer be available for firewood cutting or cut as hazard trees on the decommissioned roads.

When the actions described above are considered cumulatively with reduced disturbance from Alternatives B, C, or D (closing level ML1 roads and closing the forest to cross-country motorized travel), the cumulative effect would be a reduction in risk to spotted owl habitat, and large tree development would accelerate, cumulatively improving the overall habitat for the spotted owl. Alternatives B, C, or D would increase the amount of security habitat that currently exists across the forest and would partially offset the negative effects of past human activities.

Past actions have reduced the suitable habitat for spotted owls. Ongoing and reasonably foreseeable future actions to restore landscapes and close or decommission roads have reduced suitable habitat, and reduced disturbance from motorized vehicles on roads. The cumulative effect of Alternatives B, C, or D and the past, present, and reasonably foreseeable future actions would be a further improvement in the quality of suitable habitat by reducing disturbance through prohibiting cross country motorized and closing ML 1 roads to motorized vehicles.

Determinations

Alternative A may affect, but is not likely to adversely affect spotted owls. Over time, implementation of alternative A is expected to lead to creation of additional motorized routes, which could reduce habitat effectiveness.

Alternatives B, C, or D may affect, but are not likely to adversely affect spotted owls. This is based on increases in security habitat resulting from road closures and closure of the forest to cross country travel, which would have a slight beneficial effect in comparison with alternative A.

MIS determination

Alternative A would have a small negative impact because continued cross country motorized travel would reduce habitat effectiveness and use of ML 1 roads would reduce the amount of potential security habitat over a small portion of the habitat on the Forest. Alternative A would not affect viability of spotted owls on the Okanogan-Wenatchee National Forest.

Alternatives B, C and D would improve conditions for northern spotted owls. The overall direct, indirect and cumulative effects would result in an increase in security habitat and habitat effectiveness due to road and area closures. Alternatives B, C and D would not contribute to a negative trend in viability of spotted owls on the Okanogan-Wenatchee National Forest.

Compliance with Laws and Regulations

Alternative A would be consistent with the recovery plan (USFWS 2011), Wenatchee and Okanogan Land Management Plans amended by the Northwest Forest Plan (which allows hazard tree felling for road maintenance) and the Endangered Species Act. Continued cross-country use could reduce security habitat, but this would likely be a minor effect.

Alternatives B, C, and D are consistent with the revised recovery plan (USFWS 2011), Wenatchee and Okanogan Land Management Plans amended by the Northwest Forest Plan (which allows hazard tree felling for road maintenance) and the Endangered Species Act. No spotted owl habitat would be degraded or downgraded by travel management actions in alternatives B, C, or D.

Critical Habitat for Northern Spotted Owl

Introduction

The conservation role of northern spotted owl critical habitat is to support a viable owl population at the range-wide scale by providing a network of functional units within each physiographic province. This critical habitat designation provides additional protection under section 7 of the Endangered Species Act, which requires that Federal agencies ensure that activities they authorize, fund, or carry out are not likely to destroy or adversely modify critical habitat (USFWL, 1992).

A Final Rule for Critical Habitat, based on the Revised Recovery Plan (USFWS 2011), was published in December 2012 and designates 913,213 acres as critical habitat on the Okanogan Wenatchee National Forest.

Regulatory Framework

In addition to the regulatory documents listed above, the Revised Recovery Plan for the Northern Spotted Owl (USFWS, 2011) provides direction for forest management. Principles are focused on dry forest restoration treatments. However, principle 6 “manage roads to address fire risk” addresses roads.

Best Available Science (also see Northern Spotted Owl section above)

Primary constituent elements (PCEs) of Critical Habitat Units (CHUs) are the physical and biological features of critical habitat essential to a species’ conservation. Primary constituent elements identified in the spotted owl Critical Habitat Final Rule include those physical and biological features that support nesting, roosting, foraging, and dispersal (USFWS 1992b). Nesting habitat is described (USFWS, 2008) as having a moderate to high canopy closure (60% -80%), multi-layered, multi-species canopy with large overstory trees, high incidence of deformities (cavities, broken tops, mistletoe infections), large snags, accumulations of large woody debris and open space below the canopy for flying. Roosting habitat is similar to nesting habitat, but may not contain nesting structures provided by the presence of deformities. Foraging habitat can be more open and fragmented than roosting habitat, but will contain some roosting structures, and can also function as dispersal habitat (USFWS, 2008).

Spotted owl critical habitat was designated based on the identification of large blocks of suitable habitat that were well distributed across the range of the spotted owl, although not all critical habitat acres were or are suitable habitat. CHUs were intended to identify a network of habitats that provided the functions considered important to maintaining stable self-sustaining, and interconnected populations over the range of the spotted owl, with each CHU having a local, provincial, and range-wide role in spotted owl conservation. Most CHUs were expected to provide suitable habitat for population support, some were designated primarily for connectivity, and others were designated to provide for both population support and connectivity (USFWS 2007b).

Regulatory Framework- see above.

Methods

The late-successional non-winter security habitat index (Gaines, 2003) was used to compare the amount of late-successional security habitat in the CHUs between alternatives. Security habitat for spotted owls is defined as areas more than 200 meters from an open road or motorized trail, and more than 100 meters from a non-motorized trail. The model buffers roads and trails and calculates the area outside of the influence of these features, which is the security habitat. The late-successional non-winter security habitat model was used to evaluate the effects of avoidance, displacement, fragmentation and disturbance to spotted owls in the designated Critical Habitat.

Analysis Area

The analysis area consists of the network of CHUs on the Okanogan-Wenatchee National Forest.

Existing Condition

CHUs comprise 913,213 acres on the Okanogan-Wenatchee National Forest under the 2012 Final Rule. There are three large CHUs, the Chiwawa, Swauk, and Manastash that were designed to support large clusters of 20 or more spotted owl pairs. The remainder of the CHUs support smaller numbers of owls and are arranged to provide a connected network of late-successional habitats across the forest.

Maintenance Level 1 Roads

Over ½ of the late-successional habitat in the forest network of CHUs is security habitat away from roads and trails and is not being affected by motor vehicle use on roads. There are approximately 1,020 miles of ML 1 roads in the remaining suitable habitat. Motorized use of maintenance level 1 roads are considered open roads for the purposes of this model.

Cross Country Motorized Travel

A rough estimate of potential cross-country use in the CHUs is about 5% of the area may be usable by off-road vehicles, considering topography, vegetation and land allocation. It is unknown how much of this area actually receives use. Where cross country use is occurring, it can degrade Critical Habitat by damaging or destroying understory vegetation, estimated in Table * above.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is occurring within CHUs on the forest. Motorized vehicles can degrade Critical Habitat by damaging or destroying understory vegetation. There are currently no limitations on motorized vehicle use for dispersed camping, aside from areas closed to motorized vehicles, so the number of access roads, and areas impacted by motorized vehicles has been increasing over time, therefore increasing the potential degradation of critical habitat.

Environmental Consequences

Direct and Indirect Effects

Alternative A

Maintenance Level 1 Roads

Alternative A would not close maintenance level 1 roads to motorized vehicles. Motorized vehicle use on the roads within critical habitat would continue to degrade the habitat by disturbing owls, damaging vegetation, and impacting prey species.

Across the CHU network on the forest, approximately 53% of the late-successional habitat would continue to be security habitat away from roads and trails, but open roads, including maintenance level 1 roads, would keep the remaining 47% from providing security habitat.

Cross Country Motorized Travel

Cross-country motorized use would potentially occur with Alternative A on 5% of the area. Over time, it is likely that more trails would develop, potentially reducing canopy closures and fragmenting habitat, which are components of nesting, roosting and foraging habitat, (PCEs).

Motorized Access for Dispersed Camping

Corridors would not be designated in alternative A. Access to dispersed sites would continue without restriction. Over time, additional routes could result in vegetation loss, potentially reducing canopy closures and fragmenting habitat, which are components of nesting, roosting and foraging habitat, (PCEs).

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

Within the critical habitat on the Forest, closure of maintenance level 1 roads would result in increases of security habitat of approximately 8% in comparison to alternative A. This would slightly increase the amount and quality of habitat within critical habitat across the forest.

Cross Country Motorized Travel

No cross-country motorized travel would be allowed in Alternatives B, C, or D, eliminating cross country travel within critical habitat for spotted owls. This would improve the quality of nesting, roosting and foraging habitat within the critical habitat on about 5% of the area. The potential for vegetation loss, associated fragmentation, and more open canopies from trail development would be eliminated.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternatives B, C, and D would reduce the potential impact to Critical Habitat from motorized access to dispersed camping, compared to Alternative A. Approximately 18,265 acres, or 2% (18,265 / 913,213 = 0.02 or 2%) of corridors would be designated in Critical Habitat on the Forest in Alternative B. Alternative C would designate corridors in 14,038 acres, or 1.5% (14,038 / 913,213 + 0.015, or 1.5%) of designated critical habitat, while Alternative D would designate corridors in 45,300 acres, or 5% (45,300 / 913,213 = 0.049, or 5%) of Critical Habitat.

Table *. Acres and Percent of Corridors Within Critical Spotted Owl Habitat by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Corridors in Critical Owl Habitat	18,265	14,038	45,300
Percent of Total Critical Owl Habitat	2%	1.5%	5%

Motorized vehicle use within corridors would be limited to existing routes, no new vegetation damage would be expected with implementation of Alternatives B, C, or D. All action alternatives reduce impacts from motorized vehicles in comparison to alternative A, which does not restrict vehicle access for the purpose of dispersed camping.

Cumulative Effects

Geographic Boundary

The geographic boundary for cumulative effects analysis for Critical Habitat for Northern spotted owls is the network of CHUs across the Okanogan-Wenatchee National Forest. This network of CHUs was designed to provide habitat to support owl populations and to provide connectivity between populations.

Temporal Boundary

Management activities began affecting spotted owl habitat in the early 1900s with timber harvest, fire suppression, and road and trail construction and use. The effects of those effects are still present today. Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as minimum roads analysis and Forest Plan Revision are likely to result in changes to the forest road system within about 10 years. Minimum roads analysis (Subpart A) will result in recommendations for projects that make changes in the open road system.

Past Actions

See Northern Spotted Owl cumulative effects section, above, for more detail on habitat effects.

Management activities within CHUs have resulted in changes to the primary constituent elements (nesting, roosting, foraging and dispersal habitat structure) within the Critical Habitat Units. Fuel reduction projects, thinning, hazard tree reduction, firewood cutting, road, trail and facilities construction, and wildfire suppression (line building, hazard tree falling), and timber harvest have degraded spotted owl habitat by reducing the number of snags, down logs, large trees or trees with deformities, or by opening the forest canopy. Fuels reduction projects have also reduced the risk of wildfire on spotted owl habitat.

Wildfire suppression has also resulted in changes to spotted owl habitat in the opposite direction. By suppressing wildfires, stand densities have increased and resulted in some increases in owl habitat. These denser stands are at high risk for insects, disease and stand-replacing fires.

On-going and Reasonably Foreseeable Future Actions

The Reasonably Foreseeable Future Actions that are planned across the forest and adjacent ownerships are listed in the environmental assessment and are grouped into categories in the spotted owl section, above. While these actions and activities are similar to the past and present activities, all proposed projects will be designed to reduce or avoid negative effects to spotted owls and Critical Habitat. All federal actions will be reviewed by the U.S. Fish and Wildlife Service if there is potential for negative effects.

Travel management actions in Critical Habitat that are incorporated into other projects include road decommissioning/closing (35 miles) and 3.4 miles new motorized trails in Little Crow Restoration (Naches), 8 miles of decommissioning in Swauk Pine Restoration (Cle Elum) and 7 miles of decommissioning in the Chewuch Transportation Plan (Methow).

Loss of snags would continue on existing roads as part of road maintenance and also by firewood cutters along existing open roads, and would reduce potential nest sites for owls and their prey. Firewood cutting is permitted within 200 feet of open system roads, except in riparian areas, CHUs, LSRs, MLSAs and the Snoqualmie Pass Adaptive Management Area.

The Yakima Basin Project (Bureau of Reclamation) would flood spotted owl habitat in the Bumping Lake area. Mitigation in the form of land acquisition and habitat enhancement is planned and is predicted to be a net improvement in spotted owl habitat.

Cumulative Effects Summary

Alternative A

The cumulative effect of the past, present and reasonably foreseeable future actions and Alternative A on Critical Habitat for spotted owls would be reduction in the net motorized access to the Forest by road decommissioning associated with other projects, but to a lesser degree than the cumulative effects of Alternatives B, C, and D because of the continuation of cross country motorized travel and continued motorized use of maintenance level 1 roads.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D on Critical Habitat for spotted owls would be reductions in the net motorized access to the Forest, improving the quality of nesting, roosting and foraging habitat within the Critical Habitat Units. Decommissioning would also improve spotted owl habitat by increasing snag levels, as snags would no longer be available for firewood cutting on the decommissioned roads or cut as hazard trees.

Determination

Alternative A may affect, but is not likely to adversely affect Critical Habitat for Northern spotted owls. Over time, more routes would be created by cross-country travel, which would reduce habitat by vegetation loss. This could affect the PCEs by reducing canopy closure or removing understory vegetation. This effect is expected to be minor.

Alternatives B, C, or D may affect, but are not likely to adversely affect Critical Habitat for Northern spotted owls. They would prohibit establishment of new cross-country motorized routes which would be a beneficial effect compared to the current condition, as it would prevent further vegetation loss in Critical Habitat for spotted owls, which could, over time, develop into owl habitat.

Compliance with Laws and Regulations

Alternatives A, B, C, or D would be consistent with principles outlined in the revised recovery (principle 6- Manage roads to address fire risk), the Critical Habitat Rule (which also directs managing roads to address fire risk) and the Wenatchee and Okanogan Land Management Plans amended by the Northwest Forest Plan.

Fisher

Introduction

Fishers were proposed for listing by U.S. Fish and Wildlife Service as a threatened species (USDI Fish and Wildlife Service 2004). The Fish and Wildlife Service determined in April, 2016 that the fisher did not face the risk of extinction now or in the foreseeable future, and is not a threatened species. The fisher is an R6 sensitive species and a Washington state endangered species (Hayes and Lewis 2006). The Cascades have been identified as one of 3 fisher recovery areas in Washington (Hayes and Lewis, 2006). This recovery area is composed primarily of national forests and national parks. Both the southern and northern portion of the Cascades Recovery Area are considered to have sufficient habitat to support a fisher population (Hayes and Lewis, 2006).

Regulatory Framework- see also general wildlife section, above.

The Washington State Fisher Recovery Plan (Hayes and Lewis, 2006) has a recovery strategy that states “manage habitat on federal lands to improve conditions for fishers over time”. Habitat management should occur at both forest stand and landscape scales. At the stand level, management should emphasize maintaining large trees, snags, and logs for denning and resting structures and high canopy cover and structural diversity for travel cover and foraging habitat.

Best Available Science

Fishers are opportunistic carnivores whose diet includes small rodents, rabbits, squirrels, porcupines, amphibians, reptiles, birds and their eggs, and sometimes carrion, fruits, and berries (Zielinski et al. 1999, Weir et al. 2005, Golightly et al. 2006, Aubry and Raley 2006).

Throughout their range, they are generally associated with mid-elevation coniferous and mixed coniferous-deciduous forest (Bailey 1936, Grinnell et al. 1937, Hagmeier 1956, Banci 1989, Aubry and Houston 1992, Buskirk and Zielinski 2003, Aubry and Lewis 2003, Lofroth et al. 2010, 2011). Forests with high canopy closure, multiple canopies, shrubs, and that support a diverse prey base are most used (Lofroth et al. 2010). Within the range of the west coast fisher population, Lofroth et al. 2010 found that the most consistent predictor of fisher occurrence at large spatial scales was moderate to high amounts of contiguous canopy cover, rather than a particular forest plant community. Fishers use a diversity of forest successional stages and plant communities (Lofroth, 2010).

All known dens are in cavities of large, old live trees or snags (Lofroth et al. 2010). Large diameter trees, large snags, tree cavities, mistletoe brooms, large limbs, and logs are most often used for rest sites, and are components of suitable habitat (Lewis and Stinson, 1998, Lofroth et al. 2010).

Female home range size varies with latitude in the west (Lofroth et al. 2010), from <5 square kilometers (1,236 acres)(Zielinski et al. 2004, Buck et al. 1983, Reno et al. 2008) to greater than 50 square kilometers (12,355 acres)(Weir and Corbould 2000, 2006, 2007, 2008, Weir et al. 2004). They have a large home range and generally avoid non-forested areas (Weir and Corbould 2008), suggesting that viable populations would require large areas of relatively contiguous habitat. Fishers historically occurred throughout much of the forested areas of Washington; though they were not abundant (Lewis and Stinson, 1998). The fisher’s range in Washington was drastically reduced in the 1800s and early 1900s through over-trapping, loss and fragmentation of forested habitats by logging, fire, farming, development, and predator and pest control campaigns (Powell and Zielinski 1994, Lewis and Stinson 1998, USDI Fish and Wildlife Service 2004, Lofroth et al. 2010).

In 2003, Aubry and Lewis (2003) considered the fisher extirpated in Washington. The Washington Recovery Plan (Hayes and Lewis, 2006) suggested that reintroductions would be necessary to restore fishers in Washington. A feasibility study (Lewis and Hayes 2004) evaluated the potential for reintroduction into Washington and determined that habitat in the Olympic National Park had the most potential to support fishers. Ninety fishers were released over a three-year period, and reproduction has been confirmed (Lewis et al. 2011).

While habitat loss and over-trapping are considered the two most important causes of the fisher's decline, other threats can have serious consequences for a small population. Vehicle collisions have accounted for a loss of 4% and 3% of study populations in Maine and Massachusetts (USDI Fish and Wildlife Service 2004). The potential for vehicle collisions increases with the density of open roads in suitable habitat. In a Sierra Nevada region study, Campbell (2004) found that sample units occupied by fishers were negatively associated with road density, a relationship that was statistically significant at spatial scales from 2 to 30 square kilometers (0.7 to 11.5 square miles). Dark (1997) found that fishers more often used areas with a greater than average density of low use roads, and may not have used areas that were dissected by moderate to high use roads. Lewis et al. (2011) documented the survival of introduced fishers in Olympic National Park, Washington, and found that vehicle strikes accounted for 20% of the fisher mortality, and was the second most common known cause of death, after predation (23%).

The motorized access to forest areas provided by roads leads to increased human disturbances from resource use and extractive activities (USDI Fish and Wildlife Service 2004). These disturbances within fisher habitat result in an overall degradation of habitat. Because fishers occur at relatively low elevations, they are likely to be directly affected by human activities (USDI Fish and Wildlife Service 2004).

Incidental trapping, which is facilitated by road and trail access, may also lead to population declines (USDI Fish and Wildlife Service 2004). Powell (1979) estimated that a loss of 1to 4 fishers per year due to trapping, over a 100 square kilometer area (38.6 square miles), could cause a decline in a mid-western fisher population. Trapping-related deaths accounted for 3.3% of deaths in the population of introduced fishers in Olympic National Park in Washington State (Lewis et al. 2011). Trapping with body-gripping traps is no longer legal in Washington state, so incidental mortality of fishers and other species through trapping has been reduced or eliminated (Aubrey and Lewis, 2003).

Off-highway and over-snow vehicles are used throughout the range of the fisher, and can also directly kill fishers or cause behavioral changes due to disturbance (USDI Fish and Wildlife Service 2004). Vehicle traffic during the breeding season (late February through April) in suitable habitat may impact foraging and breeding activity (USDI Fish and Wildlife Service 2004).

Methods

Fishers are generally associated with mid-elevation coniferous and mixed coniferous-deciduous forest, which is best represented on the Okanogan Wenatchee National Forest by the cold moist habitat type. Access to fisher habitat was measured by comparing miles of motorized routes occurring or proposed in the cold, moist habitat.

Analysis area

The analysis area is the cold, moist habitat across the forest.

Existing Condition

Fishers are considered extirpated in Washington (Aubrey and Lewis, 2003), with the exception of the reintroduced population on the Olympic Peninsula. Both the northern and southern portions of the Cascade Recovery Area have adequate habitat to support a fisher population, and this habitat is primarily on federal lands (Hayes and Lewis, 2006).

On the Okanogan-Wenatchee National Forest, the cold, moist habitat type associated with fisher habitat is present in varying amounts across the forest subbasins. The table below displays the amount of habitat by subbasin.

Table *. Fisher Habitat by Subbasin

Cold, Moist Habitat by Subbasin (NFS land only)		
	Cold, Moist Habitat type (acres)	Portion of Subbasin with Cold, Moist Habitat
Chief Joseph	334.2	2%
Kettle	19,352	26%
Lake Chelan	121,630	30%
Methow	207,034	21%
Naches	247,107	45%
Okanogan	19,802	14%
Sanpoil	15,070	17%
Similkameen	79,968	38%
Upper Columbia-Entiat	85,001	29%
Upper Skagit	103,175	52%
Upper Yakima	281,331	57%
Wenatchee	360,255	46%
Forest totals:	***1,540,061***	***36%***

Maintenance Level 1 Roads

The following table displays the current amount of motorized access to this habitat type by subbasin. Motorized use on maintenance level 1 roads contributes to the reduction in fisher habitat quality because of the risks of disturbance, displacement, and mortality from vehicle collisions, hunting and trapping.

Table *. Miles of Road and Motorized Trails Within Fisher Habitat by Subbasin

	Motorized Miles
Chief Joseph	1
Kettle	86
Lake Chelan	51
Methow	199
Naches	555
Okanogan	72
Similkameen	6
Upper Columbia-Entiat	262
Upper Skagit	33
Upper Yakima	946
Wenatchee	607
Forest totals:	***2,818***

Cross Country Motorized Travel

Cross country motorized travel has the potential to reduce the quality of fisher habitat by increasing the risk of vehicle collisions, disturbing or displacing fishers, or leading to increased access for hunting and trapping. A rough estimate of the amount of cross-country travel potential in the cold moist habitat type is that 180,293 acres are potentially receiving cross-country motorized use. This is approximately 8% of the total cold moist habitat type. However, fishers are associated with forested areas of contiguous canopy cover and high levels of fallen trees, and these densely forested areas are less likely to be easily travelled by OHVs, so the actual impact would likely be minimal.

Motorized Access for Dispersed Camping

Motorized access to dispersed camping occurs in a fairly unrestricted fashion within fisher habitat. This has the potential to result in disturbance, displacement, collisions, and access for hunting and trapping, therefore reducing the quality of fisher habitat.

Environmental Consequences

Direct and Indirect Effects:

The following table displays the miles of open road and motorized trail within fisher habitat (characterized as cold, moist habitats), and the changes from the current condition, alternative A.

Table *. Change in Motorized Access in Fisher Habitat by Alternative

	Alternative A/Existing Condition	*Alternative B,C and D*	*Decrease in Motorized Access Comparing Action Alternative to Existing and Alternative A*
	miles	*miles*	*miles*
Chief Joseph	1	1	0
Kettle	86	57	29
Lake Chelan	51	46	5
Methow	199	155	44
Naches	555	463	92
Okanogan	72	48	24
Similkameen	6	3	3
Upper Columbia-Entiat	262	183	79
Upper Skagit	33	32	1
Upper Yakima	946	770	176
Wenatchee	607	496	111
Forest totals:	***2,818***	***2,254***	***564***

Alternative A

Maintenance Level 1 Roads

Alternative A would not close maintenance level 1 roads, or change motorized access to the cold, moist habitat type from roads and motorized trails. The potential for disturbance, displacement and avoidance, and mortality by vehicle strikes would remain at the existing level.

Cross Country Motorized Travel

Cross country motorized travel would potentially continue on the estimated 180,293 (8%) acres of cool/moist habitat type where fisher habitat is located and conditions would accommodate cross-country motorized travel. Since fishers are associated with forested areas of contiguous canopy cover, and these densely forested areas are less likely to be easily travelled OHVs, the actual impacts would likely be minimal.

Motorized Access for Dispersed Camping

Alternative A would not designate corridors, and motorized access to dispersed camping would continue in a fairly unrestricted fashion. Potential for disturbance, displacement, collisions, and access for hunting and trapping would remain at the present level in the short-term, but would likely increase over time.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

The closure of 564 miles of maintenance level 1 roads to motorized vehicles in Alternatives B, C, and D would reduce the motorized access from the current condition. This would improve fisher habitat by reducing:

- potential for human disturbance which could lead to displacement or avoidance of important habitats or rest and den sites,
- potential for mortality through vehicle strikes,
- access for hunting and trapping, which could result in incidental captures and mortality of fishers. This is probably a minor effect, since body-gripping traps have been banned in Washington State since 1996.

Cross Country Motorized Travel

Alternatives B, C, and D would close the forest to cross-country travel, which would increase habitat effectiveness for fishers, by reducing potential for human disturbance. The estimated 180,293 acres of cool-moist habitat type currently open to cross country travel would no longer receive this use. However, as mentioned earlier, since fishers are associated with forested areas of contiguous canopy cover, and these densely forested areas are less likely to be easily travelled OHVs, so closure to cross-country travel may not have as large a beneficial effect to fishers as the estimate would suggest.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate 9,145 acres of corridors in the cold moist habitat, or approximately 0.6% of the habitat. Alternative C would designate corridors in 6,917 acres of the cold moist habitat type (0.4% of the habitat), while Alternative D corridors would be designated in 23,060 acres (about 1.5% of habitat) of the habitat.

Table *. Acres and Percent of Corridors in Fisher Habitat by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Fisher Habitat in Corridors	9,145	6,917	23,060
Percent of Total Fisher Habitat	0.6%	0.4%	1.5%

The effect of the motorized vehicle use within corridors would be the potential for collisions, disturbance, displacement and access for hunting and trapping, but vehicles would be limited to using existing routes, so the potential would be less than with implementation of Alternative A.

Cumulative Effects

Geographic Boundary

The geographic boundary is the forested area in cold, moist habitat types and the 4th field subbasins associated with this area, including the other land ownerships.

Temporal Boundary

The temporal boundary is the time since European settlement in Washington. The fisher's range in Washington was dramatically reduced in the 1800s and early 1900s through over-trapping, loss and fragmentation of forested habitats by logging, fire, farming, development, and predator and pest control campaigns (Powell and Zielinski 1994, Lewis and Stinson 1998, USDI Fish and Wildlife Service 2004, Lofroth et al. 2010). Forest management activities began affecting fisher and fisher habitat in the early 1900s with timber harvest, fire suppression, and road and trail construction and use.

Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as actions stemming from minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Trends

Habitat for the fisher has declined from 11.65% to 9.38% of the Columbia basin (Wisdom, 2000) from historic to current time periods. Densities of large snags declined from historical to current levels across the basin, which affects densities of cavities and down wood, important components of fisher habitat.

Fisher populations declined in Washington as early as the mid-1800s (Lewis and Stinson, 1998), due to extensive trapping. While commercial trapping closed in 1933, fisher populations did not recover in Washington.

Past Actions

Human actions that have had the greatest impact on fisher populations are fur harvest, predator control, timber harvest and urbanization (Lofroth et al. 2010). Trapping of fishers in Washington has been closed since 1933.

In the Okanogan-Wenatchee National Forest, timber harvest and wildfire suppression have changed vegetation characteristics at the stand and landscape scale. Timber harvest reduced canopy closures, snags and down wood, structures that are important as den, rest and foraging sites. Wildfire suppression interrupted natural disturbance patterns and changed composition and structure of forested lands, later resulting in larger, more intense fires which resulted in large open areas which would not be suitable habitat. Many large fires have resulted in loss of canopy closure in the last decade on the Okanogan-Wenatchee National Forest.

On private land, forested areas were converted to agricultural use and urbanization occurred, resulting in habitat loss and fragmentation.

Ongoing Actions

Ongoing actions that may affect fisher habitat are firewood cutting and danger tree removal from recreation areas and along open roads, which would result in less available den and rest sites and under-snow foraging areas. Firewood cutting is allowed along roads, across the forest, except in late-successional reserves, riparian reserves and administratively withdrawn areas.

Wildfire suppression is also ongoing, and allows denser forest to develop. This would improve habitat for fisher, which are associated with closed canopies. In the longer term, fire suppression leads to fuel accumulation, which may result in more intense fires, resulting in canopy removal and less suitable habitat for fisher. Fuels treatment projects are on-going across the forest to mitigate fuel accumulation.

Trapping with body-gripping traps is no longer legal in Washington state, so incidental mortality of fishers and other species through trapping has been reduced or eliminated (Aubrey and Lewis, 2003).

Ecosystem management objectives incorporated into the Okanogan and Wenatchee Forest Plans from the Northwest Forest Plan (USDA and USDI, 1994) and Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales (1994)(Regional Forester's Amendment #2, "Eastside Screens") establish direction for snags and large down wood which mitigate the effects of current timber harvest on fisher habitat.

The Peshastin and Chumstick project will decommission approximately 10 miles in the cold moist habitat in the Wenatchee subbasin. This will further reduce the potential for reduction of den and rest sites and disturbance.

Reasonably Foreseeable Future Actions

Actions that are planned in and around the Okanogan-Wenatchee National Forest that would act cumulatively with the travel management proposed action to affect fisher habitat are summarized in the table below. See Reasonably Foreseeable Actions (earlier in this chapter) for locations of these projects.

Table *. Reasonably Foreseeable Future Actions Affecting Fisher Habitat

Project type	***Potential negative or beneficial effect***	***Possible effect to fishers?***
Restoration and Fuel Reduction - timber harvest, thinning, fuels reduction projects	Negative and Beneficial	Simplification and fragmentation of forest structure, loss of snags, down wood, opening of canopy. Would be mitigated if needed. May accelerate development of late, old structure, reduce risk of wildfire to important habitats, or aid in restoring ecosystem structure, function or components.
Road, trail and motorized area construction, reconstruction, relocation and use.	Negative, would be mitigated if needed.	May result in loss of large trees and snags. Increases or improves motorized access which can result in incidental trapping and collisions, and may result in avoidance of travelway by prey species.
Road and trail decommissioning and closures	Beneficial	Reduces potential for disturbance, vehicle strikes and loss of snag and logs as danger trees or firewood.
Recreation and Mining	Negative	May result in loss of large trees and snags as danger trees or for structural use.

Large landscape plans, such as the Northwest Forest Plan, Regional Forester's Amendment #2, and Okanogan-Wenatchee's Restoration Strategy set direction for management of landscapes which will benefit fisher habitat by conserving important habitat elements. Many forest vegetation management activities are intended to restore ecosystem structure, function or components, reduce wildfire risk to important habitats, or improve forest health, and incorporate design or mitigation measures to reduce negative effects to late-successional species. This would result in long-term benefits to fisher habitat.

The Washington Department of Natural Resources (WDNR) and several companies that own large blocks of timberland in Washington have developed Habitat Conservation Plans with the U. S. Fish and Wildlife Service, committing to long-term (50-100 year) plans to protect selected species of birds and mammals. Some of these plans have habitat management provisions likely to benefit any remnant or reintroduced fisher populations (Hayes and Lewis, 2006). The WDNR's habitat conservation plan contains habitat provisions for spotted owls, marbled murrelets, forest riparian habitat and large legacy trees that would help conserve habitat for fishers, as well (Hayes and Lewis, 2006).

Federal projects affecting threatened or endangered species will undergo consultation with U.S. Fish and Wildlife Service, and will include mitigation to reduce negative effects. Those mitigations that would be implemented to reduce effects to spotted owls would also benefit fisher. The fisher is already listed as endangered by the State of Washington and all actions on non-Federal lands that may affect the fisher would go through a similar process.

Minimum Roads Analysis is currently being conducted in several watersheds across the forest, and decision documents stemming from these analyses would likely result in additional net reductions of open roads. Specifics are not known at this time for most of the analyses. The Chewuch Transportation Plan proposal would result in decommissioning of approximately 9 miles in the cold moist habitat types in the Methow subbasin. This would further reduce the potential for reduction of den and rest sites and disturbance.

Other projects that may involve road decommissioning in the cold moist habitat type include Little Crow Restoration (Naches), Swauk Pine Restoration (Cle Elum), Crawfish,Annie and Light projects (Tonasket). Little Crow also adds several miles of motorized trail, some of which may be in the cold moist habitat. These projects would result in a net reduction in motorized routes on the Forest.

Non-federal actions that continue to affect fisher habitat include agriculture, residential and urban development on private lands, which has fragmented fisher habitat and removed contiguous forest canopy.

Cumulative Effects Summary

While past actions of trapping, predator control, road and trail construction, loss, degradation and fragmentation of forest habitat and ongoing actions (use of the roads and trails, loss degradation, and fragmentation of forest habitat) have resulted in adverse effects to fisher populations, the proposed action would be beneficial to fishers by reducing access that could result in disturbance or vehicle strikes. This beneficial effect is offset by increasing urbanization and road densities on private lands, another source of permanent habitat loss.

Alternative A

The cumulative effects of the past, present, and reasonably foreseeable future actions and Alternative A would be a reduction of the net motorized access to the Forest as a result of road decommissioning associated with other projects. This would somewhat reduce potential for disturbance, displacement and avoidance of habitat near motorized routes, and reduce loss of snags and large woody debris, but to a lesser degree than the cumulative effect of Alternatives B, C, or D.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and alternatives B, C or D would be a reduction of the net motorized access to the Forest, which would reduce potential for vehicle strikes, reduce access for trapping, reduce potential for disturbance, displacement and avoidance of habitat near motorized routes, and reduce loss of snags and large woody debris.

Determination

Alternative A is not likely to jeopardize the continued existence of fishers. Vehicle speeds on ML 1 roads and cross-country motorized areas would be slow enough to avoid most vehicle strike mortality. Disturbance and displacement could occur. Loss from incidental hunting/trapping facilitated by access is not as likely in Washington due to the ban on body-gripping traps since 1996. If the fisher is listed as a federal threatened species, the determination would be may affect, not likely to adversely affect fishers.

Alternatives B, C, and D are not likely to jeopardize the continued existence and would likely have a beneficial impact to fishers due to reduced access in comparison to the current condition. If the fisher is listed as a federal threatened species, the determination would be may affect, not likely to adversely affect fishers.

Compliance with Laws and Regulations

Alternative A would comply with the Forest Plans, the National Forest Management Act (species' viability, manage sensitive species) and (if listed as threatened) the state recovery plan and Endangered Species Act.

Alternatives B, C, and D also comply with Forest Plan direction to protect sensitive species and the state recovery plan. Alternatives B, C, and D would reduce motorized access to fisher habitat. Reduction in access would reduce potential for disturbance at sensitive sites, hunting or poaching, or vehicle strikes, loss of snags and down woody debris.

Management Indicator Species

Introduction

The National Forest Management Act is implemented by the use of Management Indicator Species (MIS) and Management Requirement Areas (for some MIS species). Management Indicator Species are featured species (threatened, endangered, sensitive or other special interest species) or species thought to be ecological indicators. They were selected during the forest planning process because their population changes are believed to indicate the effects of management activities on other species or on biological communities such as old growth forests, dead and defective trees, winter range or riparian habitat. Management Indicator Species (MIS) for the Okanogan and the Wenatchee forests (Okanogan-Wenatchee National Forest, 2011) are as follows:

Table *. Summary of Management Indicator Species (MIS) for the Okanogan National Forest and the Wenatchee National Forest (from Okanogan-Wenatchee National Forest, 2011)
B

	MIS	***Indicator for:***	***Habitat Present in Analysis Area***	***Species Present in Analysis Area***
	Northern spotted owl	Mature and old-growth conifer/late successional	Yes	Documented
	Barred owl (Oka NF only)	Mature and old-growth conifer/late successional	Yes	Documented
	Pileated woodpecker	Mature and old-growth conifer/late successional	Yes	Documented
	Three-toed woodpecker	Mature and old-growth conifer/late successional	Yes	Documented
	Pacific marten	Mature and old-growth conifer/late successional	Yes	Documented
	Mountain goat (Wen NF only)	Rock, alpine, high elevation old-growth conifer	Yes	Documented
	Mule deer	Winter range	Yes	Documented
	Rocky Mountain elk (Wen NF only)	Winter range shrub, grass, and cover	Yes	Documented
	Beaver (Wen NF only)	Riparian and deciduous	Yes	Documented
	Ruffed grouse	Riparian and deciduous	Yes	Documented
	Canada lynx (Oka NF only)	Lodgepole pine	Yes	Documented
Primary Cavity Excavators	Pileated woodpecker	Dead and defective trees	Yes	Documented
	Three-toed woodpecker	Dead and defective trees	Yes	Documented
	Black-backed woodpecker	Dead and defective trees	Yes	Documented
	Downy woodpecker	Dead and defective trees	Yes	Documented
	Hairy woodpecker	Dead and defective trees	Yes	Documented
	Lewis' woodpecker	Dead and defective trees	Yes	Documented
	White-headed woodpecker	Dead and defective trees	Yes	Documented
	Williamson's sapsucker	Dead and defective trees	Yes	Documented
	Red-naped sapsucker*	Dead and defective trees	Yes	Documented
	Northern Flicker	Dead and defective trees	Yes	Documented

*The yellow-bellied sapsucker listed in the Okanogan Forest Plan (USFS 1989:III-78), was taxonomically split into three species in 1983: red-naped, red-breasted, and yellow-bellied sapsuckers (AOU 1983, Walters et al. 2002); only the red-naped sapsucker occurs in Eastern Washington.

Species' information for the management indicator species is condensed from the *Status of Management Indicator Species on the Okanogan and Wenatchee National Forests* (Okanogan-Wenatchee National Forest, 2011), which is incorporated by reference.

Protection for some MIS is provided by the establishment of management requirement areas. Management requirement areas provide habitat sufficient to maintain viability for the species they are delineated for, and are distributed across the forest in a manner that will provide for connectivity between populations or individuals. Within the Northwest Forest Plan area, the management requirement areas for old growth and mature habitats are met through the establishment of late-successional reserves. For the rest of the forest, the management requirement areas are established in the best habitats for the species they represent. The travel management plan will not change management requirement areas for any species because it does not involve any ground-disturbance. The management requirement areas will not be considered further in this document.

Regulatory Framework

The selection of Management Indicator Species (MIS) and Management Requirements is mandated by the National Forest Management Act (NFMA, 1976), which directs the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" and that "Fish and wildlife shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area."

Mature and Old Growth Conifer Habitat

Mature and Old Growth Conifer Species

Northern spotted owls, barred owls, pileated woodpeckers, Pacific marten, three-toed woodpeckers, are associated with mature and old growth conifer, often referred to as last successional habitat, and may be affected by the travel management alternatives through changes in disturbance levels, displacement and avoidance caused by use of the forest transportation system.

Northern Spotted Owl
The Northern Spotted Owl was discussed earlier in this report, in the Threated and Endangered Species section.

Barred Owl
Introduction
The barred owl was selected to be a Management Indicator Species for mixed conifer old-growth and mature habitat on the Okanogan portion of the forest. The barred owl uses habitat very similar to the northern spotted owl, and its habitat is widely distributed across the Washington Eastern Cascade Province and on the Okanogan National Forest (USFWS 2011).

Best Available Science
Much of the following information is compiled in "Status of Management Indicator Species On the Okanogan and Wenatchee National Forests" (Youkey, 2011).

Distribution
Broad-scale: Eastern half of the United States, extends west across all the Provinces of southern Canada, northwestern Montana, northern Idaho, far eastern Washington, and extends down the Coast Ranges and Cascade Range.
Local: Barred owls have been documented on every district of the Forest.

Habitat Use and Associations
Once thought to be more closely associated with early successional forests than spotted owls (Hamer et al. 1989, Iverson 1993), recent studies in the Pacific Northwest indicate that barred owls frequently use mature and old-growth forest (Pearson and Livesey 2003, Schmidt 2006), where they use mice and a wide variety of mammals, birds, reptiles, amphibians and invertebrates for food. In the Eastern Washington Cascades, Singleton et al. (2010) found barred owls and spotted owls selected sites with similar canopy closure and tree-size characteristics, though barred owls occurred lower on the slopes or valley bottoms. Singleton et al. (2010), found barred owls were associated with moist, structurally diverse, closed canopy forests on gentle slopes.

Habitat is widely distributed across the Washington Eastern Cascade Province and on the Forest (USFWS, 2011), and connectivity appears to be adequate.

Available Habitat
Barred owl habitat was modeled as the dry forest group, high (>60%) canopy closure, large trees, and moderate slopes (16-25°) (Gaines et al. 2010, Singleton et al. 2010). Unlike the spotted owl, the barred owl is distributed across the entire Okanogan National Forest.

This model indicates there is currently 170,799 acres of habitat distributed across 25 of 25 watersheds in the Okanogan National Forest (Youkey, 2011).

Home Range Size
Home-range sizes found by Singleton et al. (2010) in the Eastern Washington Cascades averaged 184 hectares (38.6 square miles) during the breeding season.

Risk Factors
West Nile virus arrived in North America in 1999 and has killed millions of wild birds. Mosquitoes are the primary carriers, with infected prey species also likely spreading the disease to predators such as owls. The virus is expected to spread throughout the range of the barred owl, but it is unknown how it will affect populations (Blakesley et al. 2004).

Conservation Status
The barred owl is considered secure throughout most of their North American range and is listed as secure in Washington State (NatureServe 2010). It is not listed as a species of concern by the US Fish and Wildlife Service (USFWS 2008).

Population Trends
In North America, barred owls have a stable to increasing trend (Mazur et al. 2000). Breeding Bird Survey data 1966–1996 show a significant increase in North America (+3.3% trend) (Sauer et al. 1997). North American Christmas Bird Count data (1959–1988) reported a 0.7% increase (Sauer et al. 1996). In western North America, numbers and range are expanding (Dark et al. 1998, Gutierrez et al. 2004).

Viability
Based on population trends, habitat assessment, and risk factors, the viability outcome for the barred owl is an “A” on the Okanogan-Wenatchee National Forest. Habitat is widely distributed, and risk factors are not influencing habitat occupancy or demographic performance.

Pileated Woodpeckers

Introduction
The pileated woodpecker was selected as an MIS to be an indicator of mixed conifer old-growth and mature habitat (USDA Forest Service 1989, 1990). It is associated with the medium-large trees in the cool/moist forests group. This species is well distributed across the Forest.

Best Available Science
Much of the following information is from Youkey (Okanogan Wenatchee National Forest, 2011).

Distribution
Broadscale: from southern and eastern British Columbia across southern Canada to Quebec and Nova Scotia, south in Pacific states to central California, in the Rocky Mountains to Idaho and western Montana, in the central and eastern U.S. to the eastern Dakotas, Gulf Coast, and southern Florida, and west in the eastern U.S. to Iowa, Kansas, Oklahoma, and Texas. Absent from or very limited in much of northern Illinois, Indiana, and Ohio (Natureserve, 2010)

Local: This species is well distributed across the Forest.

Habitat Use and Associations

Pileated woodpeckers are associated with older stands, where they nest and roost in large diameter snags and hollow trees and forage on ants in large logs and snags (Bull et al. 1992a, 1992b; Bull and Holthausen 1993; Bull and Jackson1995; Torgersen and Bull l995). This species prefers areas with high densities of large snags and logs for foraging, roosting and nesting. Pileated woodpeckers select late-successional stages of coniferous or deciduous forest, but also use younger forests that have scattered, large, dead trees (Bull and Jackson 1995, Bull et al. 2007).

In northeastern Oregon, pileated woodpeckers selected unlogged stands of old-growth grand fir (Abies grandis) with closed canopies (Bull and Holthausen 1993) and in some cases open stands with high densities of large snags and logs (Bull et al. 2007). These woodpeckers are rarely found in stands of pure ponderosa pine (Bull and Holthausen 1993). Their association with late seral stages stems from their use of large-diameter snags or living trees with decay for nest and roost sites, large-diameter trees and logs for foraging on ants and other arthropods, and a dense canopy to provide cover from predators (Bull 2003).

Nest cavities are quite large (mean diameter of 8 inches and depth of 22 inches) and are excavated at an average height of 50 feet (15 meters) above the ground, so nest trees must be large enough to contain nest cavities at this height (Bull 1987). In northeast Oregon, 75% of nest trees were ponderosa pine and mean diameter at breast height (dbh) of nest trees was 33 inches dbh (84 centimeters (cm)) (Bull 1987). In northeastern Oregon, pileated woodpecker roosts were typically located in live or dead grand fir with a mean dbh of 28 inches (71 cm.) (Bull et al. 1992).

Available Habitat:
Habitat modeled for this species indicates there are currently 66,237 acres distributed across 19 of 25 watersheds in the Okanogan National Forest, and 58,861 acres distributed across 29 of 34 watersheds in the Wenatchee National Forest (Appendix B). Currently 55 (76%) of the watersheds in the planning area have less habitat than the historical median while the remaining 17 watersheds showed little departure from the historical median. These conditions reflect the reduction in late-successional forests that have occurred in the planning area and were consistent with the findings Wisdom et al. (2000) reported for the North Cascades and Northern Glaciated Mountains Ecological Recovery Units (ERUs).

Home Range Size
Average home range size in northeast Oregon was 350 hectares (864.8 acres) (Bull and Holthausen 1993).

Risks: Habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) indicated that about 60% of the watersheds in the Blue Mountains showed a decreasing trend in pileated woodpecker habitat and 30% showed an increasing trend. Declines in source habitat are primarily attributed to a reduction in late seral forest. The abundance of closed-canopied forests with >40 cm dbh trees in the dry, mesic, and cold moist reference condition has declined from the historical condition.

Timber harvest has had a negative effect on habitat for this woodpecker (Bull 2003, Bull et al. 2007). Removal of large-diameter live and dead trees, of down woody material, and of canopy eliminates nest and roost sites, foraging habitat, and protective cover. In addition, prescribed fire may eliminate or reduce the number of snags, logs, and cover (Bull 2003).

Roads affect pileated habitat by allowing access for firewood cutting, and precipitating the need for removal of hazard trees, which are potential nest sites.

Conservation Status: Pileated woodpeckers are listed as secure, due to their wide distribution in wooded areas of North America (Natureserve, 2010).

Population trends/viability status: Breeding Bird Survey (BBS) data indicated a 7.8% annual decline in populations in Oregon and Washington from 1966 through 1994 (Wisdom et al. 2000).

Three-toed Woodpecker

Habitat: The three-toed woodpecker was selected as an MIS to be an indicator of old-growth and mature habitat in lodgepole pine types (including subalpine fir) on the Okanogan National Forest and mature or old-growth habitat on the Wenatchee National Forest.

Distribution

Broadscale: northern regions of North America from Newfoundland to Alaska, and south along the Rocky Mountains to Arizona and New Mexico, and the Cascades to Oregon (NatureServe 2010). In Washington they occur at mid- to higher elevations of the Cascades, Blue Mountains, and the northeastern mountains.
Local: Three-toed woodpeckers have been documented across the forest.

Habitat Use and Associations: Source habitat for three-toed woodpeckers is old forests in subalpine and montane forest (lodgepole pine, grand fir-white fir, Engelmann spruce-subalpine fir, white-bark pine and mountain hemlock) (Wisdom et al. 2000). Specific habitats are mature and over-mature stands with bark beetles, disease, and heart rot (Goggans et al. 1988 in Wisdom, 2000) and recent stand-replacing fires with abundant wood-boring insects (Caton, 1996, Hutto 1995 in Wisdom, 2000), where they forage predominantly on wood-boring larvae. Snags are an important component of three-toed woodpecker habitat, and are used for foraging and nesting.

Spahr et al. (1991) reported optimal habitat in the northern Rockies as areas with 42-52 snags per 100 acres, with snags occurring in clumps, measuring 12-16 inches dbh and 20-40 feet tall, and mostly with bark still present. Cavity nests are usually placed in dead (occasionally live) trees, commonly conifer or aspen. Short (1982) reported that in the west they occur in dense coniferous forests, and are associated with subalpine fir and Engelmann spruce at higher elevations; they occur mainly in lodgepole pine forests or in mixed-conifer forests with a lodgepole component at lower elevations. Recent post-fire habitats are important and may lead to local increases in woodpecker populations 3-5 years after a fire (Spahr et al. 1991, Kreisel and Stein 1999).

Several studies have been conducted on the Okanogan and Wenatchee National Forests evaluating the effects of management activities on woodpecker habitat. Initiated in 2001, the fates of 1,133 snags within five dry-forest restoration projects have been monitored, and reported in three studies (Gaines et al. 2007, Lyons et al. 2008, Gaines et al. 2010).

Changes in snag density following forest management activities on the Okanogan-Wenatchee National Forest within dry and mesic forests

Snag Size (Inches DBH)	Changes in Snag Density as a Result of Vegetation Treatments		
	Mechanical thinning only	Prescribed fire only	Mechanical and prescribed fire
6-10	-48%	+14%	+55%
10-20	-34 %	+10%	+45%
>20	-30%	0%	+100%

Habitat available: GIS data from the Washington Department of Fish and Wildlife "Priority Habitat and Species" (PHS) program was used to model three-toed woodpecker habitat (WDFW 2011). This model indicates there are currently 783,357 acres of habitat distributed across 14 of 25 watersheds in the Okanogan National Forest, and 973,135 acres of habitat distributed across 27 of 34 watersheds in the Wenatchee National Forest.

Home Range Size: Goggans et al. (1988) reported a home range size of 131 – 751 acres during a bark beetle outbreak in central Oregon. Spahr et al. (1991) reported a territory size of 74 acres and density of 3 pairs per 247 acres (with increases after fire) in the northeastern U.S.

Risk Factors: Risk factors include declines in densities of large snags (>21" dbh) and declines in late-seral subalpine and montane forests, especially Engelmann spruce-subalpine fir. (Wisdom et al. 2000, NatureServe 2010).

Conservation Status: The three-toed woodpecker is considered secure throughout most of their North American range but are listed as vulnerable in Washington State (NatureServe 2010).

Population Trends: The Partners in Flight (PIF) database for Bird Conservation Region (BCR) 9 rate the three-toed woodpecker a 12 (Punjabi et al. 2005). Scores range from 5 to 25 with higher scores having fewer viability concerns. Species with scores >13 are potentially a species of Regional Concern (Punjabi et al. 2005).

Viability: Large-scale viability assessments conducted for the Northwest Forest Plan (NWFP) and the Interior Columbia Basin Project (ICBEMP) analyzed three-toed woodpecker populations for the Okanogan and Wenatchee National Forests.

The three-toed woodpecker was determined to be closely associated with late-successional and old-growth forests, with occurrence of large snags necessary for optimal habitat (USDA and USDI 1994b). A viability assessment was completed by the Scientific Analysis Team (Thomas et al. 1993). The viability outcome was 100 percent likelihood of Outcome A – "Habitat is of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands" (USDA and USDI 1994b). This outcome determination was based on provisions of: 1) a large system of late-successional reserves, 2) standards and guidelines for riparian reserves, and 3) retention of green trees, snags, and coarse woody debris within the matrix.

The Forest Service has been implementing the Northwest Forest Plan and monitoring late-successional habitat trends since 1994. The 10-year monitoring report (Haynes et al. 2006) states "…it appears that the status and trends in abundance, diversity, and ecological functions of older forests are generally consistent with expectations of the Plan. The total area of late-successional and old-growth forest (older forests) has increased at a rate that is somewhat higher than expected, and losses from wildfires are in line with what was anticipated."

As a result, projects consistent with the Northwest Forest Plan should be expected to maintain viability of the 10 late-successional associated MIS, including the three-toed woodpecker.

Densities of large-diameter snags (>21 inches dbh), which are important habitat components for cavity nesters and excavators, have declined basin-wide from historical to current levels (Wisdom et al. 2000, Korol et al. 2002).

Based on population trends, habitat assessment, and risk factors, the viability outcome for the three-toed woodpecker is a "B/C" on the Okanogan and Wenatchee National Forests (Appendix A). Populations and habitat are widely distributed, but highly dispersed with some areas exhibiting lower abundance.

Pacific Marten

The Pacific marten was selected as an MIS to be an indicator of mixed conifer old-growth and mature habitat. Martens are associated with large trees, snags and coarse woody debris in cool/moist coniferous forests with high canopy closures.

Distribution

Broad-scale: Pacific martens are broadly distributed from northern New Mexico to northern limit of trees in Alaska and Canada, and from southern Sierra Nevadas in California to Newfoundland. Distribution is contiguous in Canada and Alaska, but limited to mountain ranges with preferred mesic conifer habitat in the American West (Ruggiero et al. 1994).

Local: Martens are found across the forest in mesic coniferous habitats.

Habitat use/association: Martens prefer riparian habitats throughout their range (Buskirk et al. 1989, Anthony et al. 2003) and habitats near water (Bull et al. 2005). A study conducted in late-successional reserves in the Okanogan-Wenatchee National Forest detected marten in wet forest habitats, but not in dry forest habitats (Munzing and Gaines 2008).

Snags are an important habitat component for martens, and are used for denning and resting. Course woody debris is a key component associated with foraging areas, providing habitat for their small mammal and bird prey, and subnivean (under snow) access to prey during winter.

Andruskiw et al. (2008) showed that the frequency of prey encounter, prey attack, and prey kill were higher in old uncut forests for Pacific martens, despite the fact that small-mammal density was similar to that in younger logged forests. These differences in predation efficiency were linked to higher abundance of CWD, which seems to offer sensory cues to martens, thereby increasing hunting success.

Generally, more habitat, larger patch sizes, and larger areas of interior forest were important predictors of occurrence of martens (Chapin et al. 1998; Hargis et al. 1999; Potvin et al. 2000, Kirk and Zielinski 2009). Snyder and Bissonette (1987) reported limited use of patches < 15 ha by martens. Patches used by resident martens were 18 times larger (median = 27 ha) than patches that were not used (median = 1.5 ha) and were closer to adjacent forest preserves (Chapin et al. 1998). Median size of largest forest patch in martens' home ranges was 150 ha for females and 247 ha for males (Chapin et al. 1998). Similarly, Slauson et al. (2007) reported a minimum patch size used by Pacific martens of >81 ha with a mean patch size of 181 ha. Potvin et al. (2000) recommended that uncut forest patches be >100 ha to maximize core area and to minimize edge.

Habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) indicated that about 50% of the watersheds in the Blue Mountains showed a decreasing trend in marten habitat and 35% showed an increasing trend. The distribution of marten within the Interior Columbia Basin has been fairly stable, but population changes are not known (Wisdom et al. 2000). Wisdom et al. (2000) also reported strongly negative trends in the amount of source habitat across the northern portion of the North Cascades Ecological Reporting Unit (ERU) (northern Okanogan National Forest). Dispersal across the planning area was also an issue for this species historically (38 percent of the planning area had a low permeability for dispersal, 34 percent moderate, 28 percent high).

Road Effects: The findings of Godbout and Ouellet (2008) indicate that increasing road density results in lower quality habitat for Pacific martens. Hodgman et al. (1994) reported 90 percent of martens' mortality resulted from trapping on an area with a road density of 1.09 km/sq. km. (0.68 mi./sq.mi.). Thompson (1994) also reported that trapping was the major source of mortality for martens. He also observed that predation and trapping mortality rates were higher in logged forests (with road development) than in uncut forests.

Alexander and Waters (2000) observed avoidance by martens of areas within 50 meters (164 feet) of roads. Roads also facilitate the removal of snags as fire wood and for safety considerations (Gaines et al. 2003, Bate et al. 2007, Wisdom and Bate 2008). Webb and Boyce (2009) showed that increased disturbance, particularly road access and oil and gas well sites, negatively affected habitats of Pacific martens and reduced trapper success.

Goszczynski et al. (2007) observed that martens avoided barriers such as roads and passed through open areas with reluctance. Zielinski et al. (2008) compared marten occupancy rates in high elevation areas where recreation vehicle use is legal and encouraged with areas where it was not, and found no effect of vehicle use on marten occupancy. However, their approach did not measure potential effects of OHVs on individual marten behavior, and did not provide any insight on how martens react to OHVs, or whether a stress response could ultimately produce deleterious effects on reproduction or survival (Zielinski et al. 2008).

Habitat Available: Habitat modeled using GIS (Okanogan-Wenatchee National Forest, 2011) for this species indicates there are currently 30,262 acres distributed across 19 of 25 watersheds in the Okanogan National Forest, and 166,310 acres distributed across 29 of 34 watersheds in the Wenatchee National Forest.

Home range size: Martens use home ranges that are large by mammalian standards (Ruggiero et al 1994). Male home range sizes varied significantly across sites and studies, ranging from 0.8 square km (197.7 acres) in Montana (Burnett, 1981) to 15.7 square km (3,879.5 acres) in Minnesota (Mech and Rogers, 1977). Home range size varies with prey abundance (Thompson and Colgan, 1987) and habitat type (Soutiere 1979, Thompson and Colgan 1987).

Risks: Trapping is a major source of mortality for martens (Hodgman et al. 1994) and is facilitated by road and trail access. Hodgman et al. (1994) demonstrated that trapping has the potential to cause marten populations to decline in landscapes with high road access. Use of body-gripping traps in Washington State was banned in 1996.

Despite management of trapping since 1953, continued habitat loss has led to increased concern about martens in the West (Ruggiero et al. 1994, Zielinski et al. 2001).

Martens are associated with large trees, snags, and coarse woody debris all of which are affected by timber management practices.

Conservation Status: the Pacific marten is considered secure (G5) through most of its North American range and is listed as secure (S5) in Washington State (NatureServe 2010).

Population trends/viability status:
Under historical conditions there was a high probability that viable populations of Pacific martens and other species associated with the cool/moist forests group in the medium/large trees family were well distributed throughout northeastern Washington. The effects of development and habitat change have led to a lower probability that populations of Pacific martens and all other species associated with the cool/moist forests group in the medium/large trees family were viable and a finding that they were likely well-distributed in only a portion of the planning area (Okanogan-Wenatchee National Forest, 2011).

Within their historical habitat, declines in source habitats have been extensive, -60 percent in the Northern Cascades and -88 percent in the Northern Glaciated Mountains according to Wisdom et al. (2000).

Last Successional Species Habitat

Methods
The late-successional non-winter security habitat index (Gaines, 2003) was used to compare direct and indirect effects of displacement, avoidance, disturbance and access caused by change in use of the road and trail system, and the cumulative effects associated with the use of the entire road and trail system.

Analysis Area

The analysis area for the late-successional species is the late-successional forest across the Okanogan-Wenatchee National Forest. Effects were measured at the subbasin scale. A subbasin is large enough to contain one or more territories for species using large territories and provide for habitat connections between territories.

Existing Condition

The amount of late-successional habitat varies widely by subbasin. This habitat type has declined from historical to current periods across the interior Columbia Basin due to timber harvest and large-scale fire exclusion (Wisdom et al. 2000). On private lands, conversion to agriculture, residential and urban development has also resulted in decline of late-successional habitats in comparison to historic timeframes (Wisdom et al. 2000).

Maintenance Level 1 Roads

Security habitat, defined as areas 200 meters (656.1 feet) or more from a road or motorized trail, and 100 meters (656.1 feet) or more from a non-motorized trail was modeled for these areas. Motorized use of maintenance level 1 roads contributes to the reductions in security habitat. Non-security habitat is less effective for these species because of increased disturbance, especially during nesting periods, risk of mortality from vehicle collisions, and an increased risk of mortality from hunting or trapping. The current condition is presented in the table below.

Table *. Late Successional Security Habitat by Subbasin

Subbasin	total NFS acres in Subbasin	Total Late-successional Habitat in Subbasin (acres)	Late-successional Security Habitat (acres)	Portion of Subbasin that is Late-successional Security Habitat
Chief Joseph	17,393	737	425	2%
Kettle	74,017	17,371	10,270	14%
Lake Chelan	405,236	54,104	47,694	12%
Methow	1,000,520	93,608	66,509	7%
Naches	548,731	228,948	163,367	30%
Okanogan	145,863	22,773	13,085	9%
Sanpoil	89,414	14,448	6,510	7%
Similkameen	212,204	27,818	25,212	12%
Upper Columbia-Entiat	289,871	59,179	38,536	13%
Upper Skagit	198,599	17,523	15,658	8%
Upper Yakima	494,011	150,135	91,522	18%
Wenatchee	782,674	239,079	167,842	21%
forest	***4,258,534***	***925,724***	***646,629***	***15%***

Cross Country Motorized Travel

Motorized cross-country travel is estimated to be possible on approximately 123,094 acres within late-successional habitat (13% of the total late-successional habitat). This is degrading the quality of the habitat for these species where the activity occurs by creating new travel routes that could fragment the habitat, disturbing and displacing individuals, potentially causing the areas to be avoided by the individuals, and increasing the possibility of mortality from hunting or trapping.

Motorized Access for Dispersed Camping
Motorized access for dispersed camping is occurring in an unregulated pattern in late successional habitat along roadways at various places across the forest. The access is potentially degrading the late successional habitat by disturbing and displacing late successional species, and causing individuals to avoid the area where the access is occurring.

Environmental Consequences

Direct and Indirect Effects

Maintenance Level 1 Roads
Closure of ML 1 roads, closure to motorized cross-country travel and designation of corridors for motorized access to dispersed camping could result in changes in levels of disturbance, displacement, avoidance, and access which facilitates hunting and trapping. This was measured through use of the late-successional non-winter security habitat index (Gaines, 2003).

The following table displays the changes to late-successional security habitat by alternative as a result of closing ML 1 roads to motorized use.

Table *. Late-successional Security Habitat by Alternative

	Alternative A	Alternative B,C, and D	
Subbasin	late-successional security habitat	Increase from Alternative A	
	acres	acres	%
Chief Joseph	425	58	14%
Kettle	10,270	1,809	18%
Lake Chelan	47,694	188	0%
Methow	66,509	3,982	6%
Naches	163,367	4,888	3%
Okanogan	13,085	2,495	19%
Sanpoil	6,510	2,537	39%
Similkameen	25,212	140	1%
Upper Columbia-Entiat	38,536	1,889	5%
Upper Skagit	15,658	67	0%
Upper Yakima	91,522	5,987	7%
Wenatchee	167,842	10,259	6%
forest totals:	***646,629***	***34,300***	***5%***

Alternative A

Maintenance Level 1 Roads
Implementation of Alternative A would not change the amount of security habitat because maintenance level 1 roads would continue to be open to motorized use. Late-successional security habitat occurs on approximately 15.2% of the

forest. The current amount of displacement, disturbance, habitat avoidance, access for hunting and trapping, potential vehicle collisions would continue.

Cross Country Motorized Travel

Motorized cross-country travel would continue on the approximate 123,094 acres within late-successional habitat (13% of the total late-successional habitat) where this activity is already occurring. This would continue to degrade the quality of the habitat for these species over time. New travel routes would fragment the habitat, disturbing and displacing individuals, potentially causing the areas to be avoided by the individuals, and increasing the possibility of mortality from hunting or trapping, or vehicle collisions.

Motorized Access for Dispersed Camping

Corridors would not be designated with Alternative A, and motorized access for dispersed camping would continue in a fairly unrestricted manner. It is likely that routes would increase over time, further limiting the extent and effectiveness of security habitat.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

Implementation of Alternatives B, C, or D would close all maintenance level 1 roads to motorized vehicles. This would increase the amount of late successional security habitat by approximately 5.3% across the Forest. This would benefit the late successional species by decreasing the potential for disturbance, displacement or avoidance of habitat. There would also be a decrease in motorized access for hunting and trapping, and vehicle collisions, further improving the habitat.

Cross Country Motorized Travel

Prohibiting cross country motorized travel would benefit the late successional species by eliminating the activity on approximately 13% (123,094 acres) of the late successional habitat across the forest. Motorized vehicles would no longer disturb or displace individuals. Hunting, trapping, and vehicle collisions in the 123,094 acres would also be reduced, further improving the habitat.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate corridors where access could occur on existing routes, on 7,062 acres in the late-successional habitat, less than 1% of the late-successional habitat. Alternative C would designate corridors in approximately 5,829 acres of late-successional habitat (0.6%), while Alternative D would designate approximately 17,140 acres (1.8% of the habitat type).

Table *. Acres and Percent of Corridors Within Late Successional Habitat by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Corridors in Late Successional Habitat	7,062	5,829	17,140
Percent of Total Late Successional Habitat	1%	0.6%	1.7%

Implementation of any of these alternatives would benefit the late successional species by reducing impact to late successional habitat from motorized access for dispersed camping compared to the effects of Alternative A. These alternatives would limit where the activity could occur, and, within the corridors, restricting motorized vehicles to established routes only, not farther than 300 feet from the road, and not closer than 100 feet to water.

Alternative D would designate corridors in approximately 3 times as many acres of late successional habitat as Alternative C, and over twice as many as Alternative B, but the overall percentage of late successional habitat impacted by any alternative would be small. Within the corridors, however, motorized vehicle access would reduce the habitat quality because of displacement, disturbance, and the potential for mortality from vehicle collisions, hunting, and trapping.

Cumulative Effects

Geographic boundary
The geographic boundary for cumulative effects is all subbasins containing late-successional forest stands across the Okanogan-Wenatchee National Forest, including other ownerships. This is a large enough area to assess effects on species using large territories, and providing for movements between the territories that are important for maintaining genetic diversity.

Temporal boundary
The temporal boundary is the time since European settlement in Washington. Habitat loss and degradation began affecting late-successional species when settlement began, influencing population size and distribution.

Management activities began affecting late-successional habitat in the early 1900s with timber harvest, fire suppression, and road and trail construction and use. Motorized travel is expected to continue in perpetuity on the Forest. Future decisions that affect travel management such as minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Past actions
Forest activities have resulted in changes to late-successional habitat over the past century. Past timber harvest and wild fires have substantially altered the distribution and abundance of late-successional habitat for associated species. In many areas, the most sustainable habitat has been previously removed by management or fire, and a large proportion of the remaining habitat is in the less sustainable dry forest, often denser stands of smaller trees susceptible to insect and disease activity.

Listing of the Northern spotted owl in 1990 and direction from the Northwest Forest Plan and Regional Forester Amendment #2 (1995) resulted in management direction to decrease the amount of late-successional habitat available for harvest, which has and will result in increases in late successional habitat over time.

Other activities that have resulted in loss or degradation of late-successional habitats include development of recreational facilities, mining, thinning, firewood cutting, prescribed burning, danger tree management, and road and trail construction. Development of private lands adjacent to forest lands has also reduced habitat for late-successional species.

Fire suppression has changed the distribution, character, and amount of late-successional habitat, allowing stand densities and canopy closures to increase, and the development of multi-storied stands late-successional stands where more open stands previously occurred. These denser stands are at high risk for insects, disease and stand-replacing fires.

On-going Actions

Fire suppression is on-going, as is danger tree removal around administrative sites and roads, and firewood cutting.

Forest management activities such as timber harvest, thinning and fuels reduction are in progress. However, these are mitigated by direction from the Northwest Forest Plan and Regional Forester Amendment #2, which reduce loss of large trees and snags.

Reasonably Foreseeable Future Actions

Many of the actions that are proposed by the Forest Service or by state agencies and private parties could affect late-successional habitat, in a negative or positive manner. Actions by federal and state agencies are mitigated to reduce or eliminate adverse effects to spotted owls, which may benefit other late-successional species, as well.

Those actions that may affect late-successional habitat and are proposed in the near future on or adjacent to the Okanogan-Wenatchee National Forest include:

Project type	***Negative or beneficial effect***	***Possible effect to late-successional species?***
Restoration - timber sales and commercial thinning	Both	-Loss of snags and large trees, reduction in canopy closures. Federal sales mitigate reductions of spotted owl habitat or habitat components. Negative effects would be mitigated to reduce effects. + reduced risk of stand loss resulting from insects, disease and fire and accelerates development of late-successional structure.
Fuel reduction projects (ladder thinning, prescribed burning, piling, thinning from below)	Both	-loss of snags for safety reasons, canopy closure reduction. Negative effects would be mitigated to reduce effects. + reduced risk of stand loss resulting from insects, disease and fire. Accelerates development of late-successional structure.
Pre-commercial thinning	Beneficial	+Accelerates development of late-successional structure.
Road and trail construction, reconstruction and relocation.	Negative	-Fragments habitat and leads to loss of snags for safety and firewood cutting. Increases human access. May remove large trees. Negative effects would be mitigated to reduce effects.
Road maintenance	Negative	-Loss of snags as hazard trees.
Firewood cutting	Negative	-Loss of snags

Many recent projects are aimed at accelerating development of or protecting late-successional habitat, and this will likely continue.

Several other projects would have a net effect of reducing road densities by decommissioning roads across the forest over the next decade. The restoration and transportation system management projects detailed in Appendix A of the E.A. would close or decommission 389 miles of road. Other projects would add motorized trails (Naches, Little Crow learner loops 3.4 miles) and allow cross-country access (Cle Elum, Ferris Hard Rock mining project). Some of the decommissioning may occur in late-successional habitats, and would result in reduction in potential for disturbance, displacement and habitat avoidance, reduced access for trapping and reduced loss of snags and down wood for firewood or hazard removal.

Also continuing to affect late-successional habitat in the future are natural events- fires, insect and disease outbreaks and climate change. Increase in wildfire potential in response to projected climate changes is expected to increase dramatically. In the forested ecosystems of the eastern Cascades, Littell et al. (2010) predict a near doubling by the 2080s of the mean area burned between 1980 and 2006 (from 63,000 to 124,000 ha).

Cumulative Effects Summary

Alternative A

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternative A would be an improvement in the amount and quality of late successional habitat as a result of restoration projects that include fuel reduction, road decommissioning, and an acceleration of large tree development. These beneficial effects would be offset by the continued cross country motorized travel, motorized vehicle use of maintenance level 1 roads, and unrestricted motorized access for dispersed camping associated with Alternative A. Hazard tree felling and firewood gathering would continue to remove large trees and snags along roadways and in campgrounds.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D would be an improvement in the amount and quality of late successional habitat across the forest. There would be reductions to the net motorized access to the Forest, which would result in decreased potential for disturbance, displacement or avoidance of important habitats, and decreased access for trapping.

The components of Alternatives B, C, or D (closing of ML 1 roads, corridor designation, closure to cross-country motorized travel) would improve the quality of the habitat by reducing access and disturbance.

These alternatives, in conjunction with vegetation management projects resulting in the reduction of risk to late-successional habitat and the acceleration of development of large trees, and road decommissionings result in some cumulative improvement of late-successional habitat.

Felling of hazard trees would continue on existing roads as part of road maintenance and also by firewood cutters along existing open roads. Firewood cutting is permitted within 200 feet of open system roads, except in riparian areas, LSRs, MLSAs and the Snoqualmie Pass AMA.

Currently, late-successional habitat loss is primarily from catastrophic fires (Courtney and Gutiérrez 2004). Current and future vegetation management actions are being designed under restoration strategies to help isolate higher quality late-successional habitat from wildfire, insects and disease.

When these actions are considered in concert with reduced disturbance from Alternatives B, C, or D (closing level maintenance level1 roads and closing the forest to cross-country motorized travel), the risk to late-successional habitat and the species associated with it would be reduced, and large tree development would accelerate, cumulatively improving the overall late-successional habitat for associated species.

MIS Determinations

Alternative A would have a small negative impact on habitat for late-successional MIS because additional routes would likely develop over time, which could result in increased disturbance and reduced vegetation. This effect would be minor, and insignificant at the scale of the Forest. Continued viability of MIS for late-successional habitat is expected.

The travel management action alternatives would improve conditions for MIS species using late-successional habitat, and would not contribute to a negative trend in species' viability across the Okanogan Wenatchee National Forest. Alternatives B, C, or D would not have negative effects to late-successional species, including barred owls, pileated woodpeckers, marten, three-toed woodpeckers and other cavity excavators. This is based on increases in security habitat from closure of ML 1 roads to motorized use and closures to cross country travel. The continued viability of late-successional Management Indicator Species is expected.

Compliance with Laws and Regulations

Alternatives A B, C, and D would be consistent with the National Forest Management Act because species viability is expected, Forest Plan standards and guidelines for late-successional habitat, snag and down wood habitat, and the Northwest Forest Plan.

Rock, Alpine, High Elevation Old-growth Conifer Habitat

Mountain Goat

Introduction

The mountain goat is a Management Indicator Species (MIS) for the Wenatchee National Forest for rockland, alpine, and high elevation old-growth conifer habitat (USFS 1990) and a Region 6 sensitive species. The mountain goat was selected as an MIS because the present population is divided into a number of subpopulations where forest management could potentially eliminate a sub-population and reduce distribution (USFS 1990).

Regulatory Framework- also see general wildlife section, above.

The Okanogan National Forest Land and Resource Management Plan sets standards and guidelines for mountain goat habitat in management area 10. The standards applicable to this project are:

MA10-17A: Motorized traffic is prohibited in MA 10, except for designated through routes.

MA10-8F: New trail access that encourages use during wintering and kidding season shall not be provided.

The Wenatchee Plan directs the forest to limit the roads in mountain goat summer range, to close as many as is reasonable while providing recreation access, and prohibit building roads in winter range when other alternatives exist. Activities in winter and kidding range from Dec. 1 until July 1 are discouraged. Other direction from the Wenatchee Forest Plan includes providing thermal cover between winter and summer ranges and creating/maintaining small openings for forage.

Best Available Science

The following information is primarily from the *Status of Management Indicator Species on the Okanogan and Wenatchee National Forests* (Okanogan Wenatchee National Forest, 2011).

Distribution

The mountain goat ranges across the mountains of northwestern North America from southeast Alaska to Washington, western Montana and southern Idaho, and has self-sustaining introduced populations in Oregon, South Dakota, and the Olympic Peninsula of Washington (NatureServe 2011). In Washington, they are found throughout the Cascades, in the Selkirks, and in the Olympics (introduced) (Johnson and Cassidy 1997).

On the Okanogan-Wenatchee National Forest, mountain goat habitat is patchily distributed on every district except Tonasket, where no mapped habitat is found.

Habitat

Mountain goats are associated with open country with steep rocky cliffs, talus slopes, and meadows for foraging (Wilson and Ruff 1999). In the southern portion of its range, they inhabit high alpine and subalpine zones in the mountains. They spend the majority of their time on or directly adjacent to cliffy escape terrain. In the winter, some groups of goats inhabit higher-elevation wind-swept ridges, and others move to lower-elevation steep south-facing slopes. In some areas goats spend the majority of the year in steep shrubland, forests, and grasslands during the long winter (Rice 2010).

Habitat for mountain goats includes 15 cover types within six community groups: alpine, subalpine forest, montane forest, lower montane forest, upland shrubland, and rock-barren (Wisdom et al. 2000). Mountain goats show no apparent preference for any cover type, as long as they occur on steep terrain or near cliffs or talus, and use all structural stages within forested cover types except for the stem-exclusion stage of montane and lower montane forests. Upland shrublands provide important foraging habitat, and forests provide both foraging habitat and protection from inclement weather (Johnson 1983). Special habitat features identified for mountain goats are cliffs, talus, and seasonal wetlands. Cliffs and talus are central to mountain goat distribution and habitat use (Hjeljord 1973) and provide escape terrain from predators (Johnson 1983, Rideout 1978).

The historical distribution of source habitats for mountain goats was essentially the same as it is now, occurring in the mountains of central and northeast Washington, northeast Oregon, central and northern Idaho, and western Montana (Wisdom et al. 2000).

Habitat Available

GIS data from Washington Department of Fish and Wildlife “Priority Habitat and Species” (PHS) program was used to model mountain goat habitat (WDFW 2011) on the Wenatchee National Forest. This model indicates that there is currently 218,446 acres of habitat distributed across 22 watersheds in the Wenatchee portion. The Okanogan National Forest mapped mountain goat habitat for the Forest Plan (1989). Approximately 32,860 acres of habitat are found in the Methow and Upper Skagit subbasins.

Home Range Size

Home ranges varied from 6 to 24 square kilometers (2.3- 9.2 square miles) in Montana (Singer and Doherty 1985). Collared adult nannies captured on the north and south shore of Lake Chelan and Nason Ridge were found to concentrate their activity within 4-5 square miles of the capture location (WDFW 2010).

Risk Factors

Speculations regarding the cause of population declines in mountain goats have included habitat change, predation, disease, parasites, recreation impacts, and excessive harvest (Rice and Gay, 2010). Modeling of hunter harvest on mountain goats by Rice and Gay (2010) documented that declines in Washington State could be attributed primarily to hunting.

Fire suppression policies and natural forest succession continue to degrade critical mountain goat foraging habitat (WDFW 2010). Fire suppression allows conifers to invade natural openings and decreases their foraging value for goats. The degradation and loss of alpine meadows, coupled with increasing recreational human use and disturbance of alpine habitat are likely the two greatest negative impacts to mountain goats.

Human activities disrupt mountain goats and can cause displacement from important habitats (Wisdom, 2000). Roads can increase mortality through collisions (Singer, 1978) and increase access to mountain goat habitat, which may increase mortality through hunting (Johnson, 1983). Mountain goat populations are sensitive to over-exploitation because of their low population growth rate and relatively low densities (Hamel et al. 2006, Festa-Bianchet and Côté 2008).

Conservation Status

The mountain goat is considered secure throughout most of its western North American range and is listed as imperiled/vulnerable in Washington State (NatureServe 2010). The species is hunted in Washington, and populations are managed by the Department of Fish and Wildlife with management goals including: 1) Preserve, protect, perpetuate, and manage mountain goats and their habitat to ensure healthy, productive populations, and 2) Enhance statewide mountain goat populations and manage goats for a sustained yield (WDFW 2008). Statewide mountain goat strategies recommend that prior to a population being hunted, that it be surveyed a minimum of three years to determine size and trend and have a minimum 100 goats within the management unit (WDFW 2010).

Population Trends/Viability

Mountain goat populations have been on the decline in Washington for many years (WDFW 2010). Historically, goat populations may have been as high as 10,000 animals, but today likely number around 2,400. Despite the overall declining statewide trend in goat numbers and range, goat populations around Mt. Baker, along the lower Cascade crest, and the north shore of Lake Chelan appear to be stable or increasing. Goats were historically managed like deer with a heavy annual hunter harvest permitted (>10%), but research in the 1990s suggested a conservative harvest of no more than 4% of healthy populations occur. Since 1996, harvest has been more conservative and many populations are increasing (WDFW 2010).

Based on population trends, habitat assessment, and risk factors, the viability outcome for mountain goats is a “B”. Populations and habitat are generally widely distributed, with some areas exhibiting lower abundance, but dispersal is still possible among subpopulations to allow for interactions within the metapopulation. Research indicates that overharvest by hunters led to population declines and many subpopulations are now increasing with the more conservative hunting regulations adopted in the mid 1990s.

Rock, Alpine, High Elevation Old-growth Habitat

Methods

Overall access was measured by the mileage of roads, motorized trails and non-motorized trails in mountain goat habitat. The potential for cross-country travel was measured by using a GIS model that considers topography, access, vegetation and land allocation to determine where an OHV could leave the roadway in mountain goat habitat.

Analysis Area

The analysis area is the mountain goat ranges across the forest, approximately 251,306 acres on the Okanogan Wenatchee National Forest.

Existing Condition

Maintenance Level 1 Roads

Currently, there are approximately 295 miles of roads and motorized trails, and 400 miles of non-motorized trails through mountain goat habitat on the Okanogan-Wenatchee National Forest. Motorized vehicle use on maintenance level 1 roads contributes to the habitat impacts from roads. Roads decrease habitat quality because their use can increase mortality through collisions (Singer, 1978) and increase access to mountain goat habitat, which may increase mortality through hunting (Johnson, 1983). Mountain goat populations are sensitive to over-hunting because of their low population growth rate and relatively low densities (Hamel et al. 2006, Festa-Bianchet and Côté 2008). The table below displays the motorized road and trail miles, and non-motorized trail miles by subbasin.

Table *. Access in Mountain Goat Habitat by Subbasin

	Motorized miles	***Non-motorized Miles****	***total access miles***

Lake Chelan	0	0	0
Methow	12	32	43
Naches	25	16	41
Upper Columbia-Entiat	0	4	4
Upper Skagit	0	10	10
Upper Yakima	84	84	168
Wenatchee	23	55	78
Forest totals:	***144***	***201***	***344***
***Non-motorized Trail Mileage would not change with any alternative, so this information is not included in the effects analysis.**			

<u>Cross Country Motorized Travel</u>

The potential for cross-country motorized travel in mountain goat habitat was modeled using a GIS analysis, and is estimated at 11,282 acres, approximately 4% of the total mountain goat habitat. This cross country travel is potentially degrading habitat quality and impacting individuals by increasing the risk of mortality from vehicle collisions and hunting.

<u>Motorized Access for Dispersed Camping</u>

Motorized access for dispersed camping in mountain goat habitat is potentially degrading habitat quality and impacting individuals by increasing the risk of mortality from vehicle collisions and hunting. This activity is likely limited because it typically occurs in areas with slopes less than 20%, and is concentrated along open roads.

Environmental Consequences

Direct and Indirect Effects

The table below displays the change in miles of motorized routes in mountain goat habitat by alternative. None of the alternatives would change the miles of motorized or non-motorized trails

Table *. Change in Miles of Motorized Access in Mountain Goat Habitat Between Alternatives

	Alternative A	*Alternatives B, C and D*	*Decrease in Miles of Motorized Access*
subbasin	***miles***	***miles***	***miles***
Lake Chelan	0	0	0
Methow	12	8	3
Naches	26	23	3
Upper Columbia-Entiat	0	0	0
Upper Skagit	0	0	0
Upper Yakima	84	71	13
Wenatchee	23	20	3
Forest totals:	***145***	***122***	***22***

Use of the forest network of roads and trails could affect mountain goats by disturbing or displacing goats in important habitats or during critical periods, increasing the chance of mortality by collisions (roads) or providing access for hunting and poaching.

Alternative A

Maintenance Level 1 Roads
Alternative A would not close ML 1 roads, and so there would continue to be 145 miles of roads and trail open to motorized vehicles in mountain goat habitat. The amount of disturbance and displacement and hunting access to goats would remain at current levels, potentially affecting mountain goats by disturbing or displacing goats in important habitats or during critical periods, increasing the chance of mortality by collisions (roads) or providing access for hunting and poaching.

Cross Country Motorized Travel
Cross-country travel would be allowed to continue in Alternative A, with the potential to affect approximately 11,282 acres, 4% of the total mountain goat habitat. This cross country travel would continue to potentially degrade habitat quality and impact individuals by increasing the risk of mortality from vehicle collisions and hunting. It is possible that more routes would develop over time, which would increase hunting access and the potential for disturbance and displacement.

Motorized Access for Dispersed Camping
Corridors would not be designated with alternative A, and access for dispersed camping would continue in a fairly unrestricted manner. It is possible that more routes would develop over time, which would reduce security habitat, increase hunting access, and the potential for disturbance and displacement.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads
Alternatives B, C, and D would all prohibit motorized use on maintenance level 1 roads, so any impacts to mountain goats from motorized vehicles would be eliminated on approximately 22 miles (15%) of maintenance level 1 roads. However, since goats are sensitive to all human activities, closing maintenance level 1 roads to motorized vehicles would have little effect on mountain goat habitat, since the roads would still be potentially used by non-motorized recreation activities.

Cross Country Motorized Travel
The closure to cross-country motorized travel would increase habitat effectiveness and reduce disturbance on the 4% of mountain goat habitat currently potentially receiving cross country travel. This would reduce the risk of mortality from vehicle collisions and hunting within this small amount of mountain goat habitat.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate corridors where access could occur on existing routes, on about 362 acres in mountain goat habitat, about 0.1% of the habitat. Alternative C would designate approximately corridors in approximately 47 acres in mountain goat habitat, less than 0.1% of the habitat, while Alternative D corridors would be in 725 acres of mountain goat habitat (0.3% of total habitat).

Table *. Acres and Percent of Corridors in Mountain Goat Habitat, by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D

Acres Corridors in Mountain Goat Habitat	362	47	725
Percent of Total Mountain Goat Habitat	0.1%	<0.1%	0.3%

Implementation of Alternative B, C, or D could cause a minor reduction of motorized access in comparison with Alternative A, which could potentially reduce disturbance and displacement, and the risk of mortality from vehicle collisions and hunting.

Cumulative Effects

Geographic boundary

The cumulative effects boundary is the mountain goat habitat across the forest, which encompasses a number of subpopulations and allows for movement between the habitat patches.

Temporal boundary

The temporal boundary is from the early 1900's when forest management activities began with the establishment of the U.S. Forest Service. The effects of the road and trail network would continue in perpetuity. However, future decisions that affect travel management such as minimum roads analysis and Forest Plan revision are likely to change travel management direction within about 10 years.

Past Actions

Much of the mountain goat habitat on the Okanogan-Wenatchee National Forest is remote, steep, and not easily accessed. Because of this, forest management activities have played a smaller role in the current state of mountain goat habitat and populations compared to species occurring in more accessible areas such as deer and elk.

Past actions that have affected mountain goats are:

- Recreational activities and developments, including heli-skiing and trails, which may lead to disturbance during critical periods, avoidance of important habitats and access for hunting and poaching.
- Road construction and use have resulted in collisions, displacement from roadside habitat and access for hunting and poaching.
- Timber harvest has removed thermal cover and improved forage availability.

The Forest Plans were implemented in 1989 and 1990 and established management direction for mountain goat habitat. All projects planned and implemented after the plans were published met the standards and guidelines, so reduced access to goat habitat and disturbance to goats, particularly during sensitive periods.

Overharvest of mountain goats contributed to population declines from an estimated state-wide high of 10,000 animals in the 1960s (WDFW, 2012) to the current estimate of 2,800 goats (Rice, 2008).

Ongoing Actions

Use of recreational trails and facilities, and use of roads is occurring in mountain goat habitat and could result in some disturbance, displacement or avoidance, and collisions. Fire suppression is also on-going, and results in less forage in goat habitat.

Hunting is on-going, however, current harvest levels are very conservative, with about 16 permits issued by WDFW each year. Hunting permits are given only where subpopulations are doing well.

Reasonably Foreseeable Future Actions

Few forest management activities occur in mountain goat habitat, which is largely rocky and high elevation public land. Forest succession (changing of habitats to more forested types with less forage) and increasing recreation use are expected to be the greatest impacts on mountain goats in Washington State (WDFW 2010).

It is reasonably foreseeable that the number of people recreating will increase in the future, and some of the activities most rapidly increasing could degrade goat habitat. Rock climbing, back country skiing, and hiking all have the potential to occur in mountain goat habitat, and could cause increasing disturbance to goats.

Several future trail maintenance, reconstruction or relocation projects, and landscape restoration projects (including road decommissioning) could be in areas used by mountain goats or adjacent to these areas and could cause short-term disturbance and displacement. Any projects considered in mountain goat ranges would comply with forest plan standards and guidelines to mitigate effects to mountain goats and habitat. Road decommissioning would reduce access in goat habitat, and have a long-term beneficial effect. Any timber sale units that are within the mountain goat habitat would be managed to provide a 50/50 cover:forage ration in the Wenatchee portion of the forest. Timber sales are not permitted in MA-10 mountain goat habitat on the Okanogan portion.

Cumulative Effects Summary

The Forest's mountain goat habitat is largely in areas that do not have much management activity other than recreation, access to recreation, and wildfire suppression. Though disturbance from recreation and reduced forage are a concern, mountain goat populations in Washington appear to be more sensitive to overharvest of goats and this has likely been the major factor in their decline. The Washington Department of Fish and Wildlife has reduced hunting permits for goats to very conservation levels (less than 4% of observed population size) and issue these only where surveys show the subpopulation to be doing well. Assuming the harvest modeling is correct, the population in Washington is expected to recover (WDFW, 2012).

Alternative A

The cumulative effect of all past, present, and reasonably foreseeable future actions and Alternative A would be an improving trend for mountain goat habitat because of the Forest Plan standards and guidelines designed to protect habitat. The exception to the upward trend would result from the increasing recreation activities in mountain goat habitat. Overall, the cumulative effect would be mountain goat habitat to support populations across the habitat on the Forest because current Forest Plan standards and guidelines would limit new access to habitat, particularly winter and kidding areas to mitigate effects of management activities.

Alternatives B, C, and D

The cumulative effect of all past, present, and reasonably foreseeable future actions, and Alternative B, C, or D would be very similar to the cumulative effects of Alternative A, since all the alternatives would have little impact on mountain goat habitat. Alternatives B, C, and D would have a slightly more beneficial cumulative effect because of the closure of cross country travel and closure of maintenance level 1 roads to motorized vehicles. Overall, the cumulative effect would be mountain goat habitat to support populations across the habitat on the Forest because current Forest Plan standards and guidelines would limit new access to habitat, particularly winter and kidding areas to mitigate effects of management activities.

Sensitive Species Determination

Alternatives A, B, C, and D may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Alternatives B, C, or D alternatives would have a minor beneficial impact because they slightly reduce motorized access to occupied mountain goat ranges.

MIS Determination

Alternative A would have a small negative impact on mountain goats because additional motorized trails would likely develop over time. Because the area would be a small percent of the suitable habitat across the Forest, it would be insignificant at the scale of the Forest, and continued viability of mountain goats is expected.

Alternatives B, C, and D would slightly improve conditions for mountain goats across the forest because they reduce access in mountain goat range. It will not contribute to a negative trend in viability on the Okanogan-Wenatchee National Forest.

Compliance with Laws and Regulations

If new trails develop in winter range or kidding areas as a result of cross-country motorized use, alternative A would not be consistent with the Okanogan Forest Plan. Alternatives B, C, and D would be consistent with the Forest Plans because they reduce motorized access to mountain goat habitat.

All alternatives are consistent with the National Forest Management Act.

Winter Range & Winter Range Shrub, Grass and Cover

Regulatory Framework- see Management Indicator Species and general wildlife regulatory framework, above. The Okanogan Land and Resource Management Plan and the Wenatchee Land and Resource Management Plan provide additional direction for management of deer and elk.

Okanogan National Forest Land Use and Resource Management Plan standards and guidelines pertaining to deer and activities proposed in this project are:

- MA14-17A (deer winter range): To limit wildlife disturbance, road density shall be limited to two miles of road open to motorized use per square mile of discrete individual Management Area. Exception to this road density may be permitted provided they meet the goals of the management area.

- MA14-17B (deer winter range): Access by motorized vehicles shall be prohibited on deer winter range, December through March, except for designated through routes.

- This timing restriction is in the Okanogan Travel Plan, and will be continued in the travel management proposals.

- MA5-17C: To limit wildlife disturbance, local road density shall be limited to 3 miles of road open to motorized use (not including snow machines) per square mile of discrete individual Management Area.

- MA5-17E On deer winter range, access for motorized vehicles shall be prohibited December 1 through March 31 except for designated through routes. This timing restriction is in the Okanogan Travel Plan, and will be continued in the travel management proposals.

- MA26-17B To limit wildlife disturbance, road density shall be limited to one mile of road open to motorized use per square mile of discrete individual Management Area. Exceptions to this road density may be permitted provided they meet the goals of the management area.

- MA26-17C Access by motorized vehicles shall be prohibited December through March, except for designated through routes. Access through fawning area by motorized vehicles shall be prohibited in June, except where designated open.

- The timing restrictions for December through March are in the Okanogan Travel Plan, and will be continued in the travel management proposals.

The Wenatchee Land and Resource Management Plan standards and guidelines concerning deer and elk are:

- that activity closures earlier than December 1 or later than April 15 may be established by District Rangers for each big game management area in cooperation with the Washington Department of Fish and Wildlife,

- that activities will be restricted to allow big game to fully utilize habitat, and

- that lands north of the Wenatchee River will be managed as winter range for deer.

- that activities in deer and elk winter range will be limited to corridors for access to other areas from December 1 to April 15.

Winter Range and Winter Range Shrub, Grass, and Cover Species

Mule Deer

Mule deer are a management indicator species for winter range on the Okanogan and Wenatchee National Forests. The proposed action and alternatives for this Travel Management project do not apply to over-the-snow vehicles, and would not change the current seasonal closures of roads and areas in mule deer winter range (December 1 to March 31 for the Okanogan, December 1 to April 15 for the Wenatchee). The Wenatchee Forest Plan requires the area north of the Wenatchee River to be managed for deer, and the area south, for elk.

The following information is from the Status of Management Indicator Species on the Okanogan and Wenatchee National Forests (Okanogan Wenatchee National Forest, 2011).

Distribution-

Broadscale - widely distributed across western North America from southcentral Alaska to northern Mexico, and the Pacific Coast to the central plains (NatureServe 2010).

Local- generally dispersed throughout the mid-to-high elevations during the summer and fall, and are more restricted at lower elevations during the winter.

Habitat use/association

Mule deer occupy many types of habitat in mountains and lowlands, including various forests and woodlands, forest edges, shrublands, grasslands with shrubs, and residential areas (Wilson and Ruff 1999, NatureServe 2010). In mountainous regions, they tend to migrate from higher elevation summer range to lower elevation winter range.

Mule deer winter ranges have been identified as the habitat most critical to maintaining deer populations on the Okanogan and Wenatchee National Forests (Ziegler 1978, USFS 1989, 1990). Bitterbrush and sagebrush interspersed with patches of conifers at lower elevations provide winter food and thermal and hiding cover.

Habitat available
Most of the forest is providing non-winter habitat for mule deer. Habitat modelling indicates that there is currently 321,775 acres of winter range habitat distributed across 18 of 25 watersheds in the Okanogan National Forest, and 152,581 acres of habitat distributed across 17 of 34 watersheds in the Wenatchee National Forest (Youkey, 2011).

Threats
Threats to mule deer include a louse which may be causing a deer population decline in Yakima and Kittitas counties (Bernatowicz 2010), habitat loss and degradation through development, invasive species, fire suppression (which initially resulted in establishment of winter forage species, but later resulted in reduced productivity of aging shrubs and lack of recruitment of new shrubs with continued fire suppression) (Fitkin and Heinlen, 2010), wildfires (Volsen and Gallie, 2010), collisions with vehicles, severe winters, overharvest and livestock grazing (resulting in reduced winter forage).

Conservation Status
Mule deer are considered secure (G5) through most of their North American range and are listed as secure (S5) in Washington State (NatureServe 2010).

Population trends/viability status
In North America, mule deer populations were estimated to have declined from the mid-1800s through the early 1900s during Euro-American settlement due to habitat conversion to agriculture, widespread livestock grazing, and uncontrolled hunting (Murie 1951, Schmidt 1978, Lehmkuhl et al. 2001). From the early 1900s, fire suppression allowed establishment and growth of shrub forage species on winter ranges, which, with controlled game management, led to herd growth for several decades, peaking in the 1960s or 1970s (Fitkin and Heinlen, 2010). Since that time, population estimates suggest a declining population, likely due to decreased winter forage.

Mule deer population levels are closely tied to severe winter events and are susceptible to overharvest (WDFW 2008). In the 1990s mule deer exhibited declines across most of the western United States. In Washington the decline was attributed to a deterioration of mule deer habitat due to vegetation succession (resulting in reduction in forage species) and high winter mortality during the severe winter of 1996-97. The total deer population in Washington is approximately 300,000 to 320,000, and mule deer populations in central and eastern Washington are currently stable.

Based on population trends, habitat assessment, and risk factors, the viability outcome for mule deer is an “A”. Populations and habitat are widely distributed and risk factors identified are being managed. The Washington Department of Fish and Wildlife is managing mule deer and their habitat to ensure healthy, productive populations at sustainable levels.

Rocky Mountain Elk

Rocky Mountain elk were selected as a management indicator species to be an indicator of big game species on the Wenatchee National Forest south of the Wenatchee River, with winter range identified as its limiting habitat.

Distribution
Broadscale: Elk are widely distributed across North America, with the highest concentration of animals in the Rocky Mountains from central Alberta and British Columbia south into central Arizona and New Mexico (NatureServe 2010). They appeared to be distributed widely throughout the Interior Columbia Basin before European settlement in the early 1800’s, though not always abundant (Lehmkuhl et al. 2001).

Local: WDFW currently recognizes 10 major elk herds totaling approximately 56,000 animals in the State (WDFW, 2006). The Colockum and Yakima herds overlap the planning area on the Wenatchee National Forest.

On and adjacent to the Wenatchee National Forest, the Washington Department of Fish and Wildlife manage elk in two herds (WDFW 2008). The Colockum herd ranges over 1,600 square miles between the Columbia River and the Cascade crest, U.S. Highway 2 and Interstate 90 (WDFW 2006). Areas north of Highway 2 are within the herd range, but the Washington Department of Fish and Wildlife manages this area to minimize elk. Approximately 85% of the elk use occurs east of the Teanaway River and Peshastin Creek. The Yakima herd occurs in Kittitas County south of I-90, all of Yakima County except the Yakama Indian Reservation, and Benton County north of the Yakima River (WDFW 2002).

Habitat Use and Ecology

Elk use a wide variety of habitats in Washington, including shrub-steppe, bunchgrass, open meadows near forests, and subalpine forest in summer (Johnson and Cassidy 1997). Elk presence tends to decline with increasing human activity, road density, and hunting pressure.

Elk habitat capability declined by an average of 35% from historical levels across the Interior Columbia Basin, almost half due to a decrease in security habitat from increased roads (Lehmkuhl et al. 2001).

Summer range forage for the Colockum herd is improving due to recent timber harvest, but large areas now lack hiding cover (WDFW 2010). Colockum winter range forage quality may be decreasing, primarily on WDFW-managed lands, which are planted in grasses that are undesirable elk forage or have low winter digestibility. Summer range forage for the Yakima herd varies across ownerships. The Forest Service shifted toward a late-seral stage emphasis over 20 years ago leading to reduced forage production on a portion of summer range. However, insect outbreaks have recently killed overstory trees over large areas, increasing forage quality in the understory, and prescribed burns and wildfires have improved forage quantity and quality. For both the Colockum and Yakima herds, human use is becoming a concern with drastically increased human activity (for antler hunting) on winter and spring range (WDFW 2010).

Habitat Available

There are currently 152,581 acres of habitat distributed across 17 of 34 watersheds in the Wenatchee portion of the National Forest.

Threats

The negative effect of roads and human disturbance on elk has been well documented and summarized (Gaines et al. 2003, Rowland et al. 2005, Wisdom et al. 2005a, Wisdom et al. 2005b). Human activities are of particular concern for ungulates when they occur on their winter ranges or calving areas (Canfield et al. 1999). Negative effects include loss of habitat, avoidance of areas near open roads, increased energy loss and vulnerability to hunting. Peek et al. (2002) in a report to the Washington Fish and Wildlife Commission stated “Most authorities recommend restrictions in human activity to reduce displacement and energy loss in winter.” The negative impact of roads generally increases with increased human use (Wisdom et al. 2005a). Wisdom et al. (2005b) found ORVs had the greatest negative impact on elk compared to other recreational activity.

Conservation Status

Elk are considered secure (G5) through most of their North American range and are listed as secure (S5) in Washington State (NatureServe 2010). The species is hunted in Washington, and populations are managed by the Department of Fish and Wildlife with management goals including: 1) Preserve, protect, perpetuate, and manage elk and their habitat to ensure healthy, productive populations, and 2) Manage elk populations for a sustainable annual harvest. The WDFW has established management objectives that maintain or increase elk populations south of US. Highway 2, but minimize populations north of the highway (WFDW 2006).

Population trends/viability status

Elk harvest increased dramatically in eastern Washington as European settlement expanded into this region, and by the beginning of the 1900s, most of the elk had been eliminated (WDFW 2008). In northcentral Washington, small but rapidly expanding elk populations recolonized shrub-steppe habitat. In recent times, elk populations peaked in Washington in the late 1960s and early 1970s mostly due to habitat conditions and forest management practices such as timber harvest which produced understory forage species. In the last two decades, a marked reduction in timber harvest and an increase in the human population (resulting in habitat loss from development) have reduced the overall carrying capacity for elk in Washington compared to decades past.

Elk populations have varied across the Interior Columbia Basin during the last 25 years (Lehmkuhl et al. 2001). Population surveys are conducted annually by the Washington Department of Fish and Wildlife (WDFW 2010). Population estimates for the Colockum herd have been relatively stable over the last decade, and were estimated at 4,594 in 2010. Population estimates for the Yakima herd have declined slightly over the last decade, and were estimated at 8,589 in 2010.

Based on population trends, habitat assessment, and risk factors, the viability outcome for elk is an "A". Populations and habitat are widely distributed and risk factors identified are being managed. The Washington Department of Fish and Wildlife is managing elk and their habitat to ensure healthy, productive populations at sustainable levels.

Deer and Elk Habitat

Methods

The deer and elk summer habitat disturbance index (Gaines, 2003) was used to calculate the proportion of the forest that is influenced by roads and trails, and provides a comparison of avoidance, displacement, and access (which can result in mortality from collisions, hunting and poaching) between alternatives. This index buffers motorized trails, closed roads that are open to all-terrain vehicles, low, moderate and high traffic open roads, at different distances, to evaluate effects of the use of roads on ungulates.

Jen- I want to keep the following highlighted text in my report, but it would probably be better to leave it out of EA. It's more info than I included in most of the methods sections.

The following buffers were applied.

Table *. Buffers Applied for Mule Deer and Elk Summer Habitat Disturbance Index Analysis

	Buffer distance	*Road/trail class used*
Motorized trails	300m (984')	motorized trails
Closed roads open to motorized use & unauthorized routes	300m (984')	ML 1
Low traffic open road (0-1 vehicle /12 hours)	900m (2,953')	ML 2
Moderate traffic open road (>2- ≤4 vehicles/12 hours)	1000m (3,281')	ML 3
High traffic open road and non-Forest routes (>4 vehicles /12 hrs.)	1300m (4,265')	ML 4 and 5

Traffic level information on roads has been collected on a very limited basis on the forest, and the assignment of road operational levels to these categories is an assumption based on estimates from the forest road engineers. It was assumed that the addition of WATV traffic would not change traffic levels substantially.

Analysis Area

The analysis area is the entire forest, measured at the subbasin (4th field HUC) scale. Deer are found across the forest during the non-winter months. Elk are found primarily on the Wenatchee portion of the forest, and managed south of

Highway 2 by the Washington Department of Fish and Wildlife. The subbasin scale was chosen because it provides large enough areas for animals to meet their yearly resource needs.

Existing Condition

Mule deer are widespread across the forest in summer, but use a very limited area during the winter months. Elk are largely restricted to the south end of the forest, utilizing a variety of habitats in the non-winter season, and a limited winter range area. Timing restrictions to limit motorized use on winter ranges are currently in place for the forest, and would not change as a result of travel management.

Maintenance Level 1 Roads

Motorized vehicles on roads and trails are affecting habitat across the forest. Maintenance level 1 roads contribute to the impact since they are currently open to motorized vehicles during the non-winter months. Ungulates respond to recreational activities by avoiding areas near roads, recreation trails, and other types of human activities (Cassier et al. 1992, Freddy et al. 1986, Leslie and Douglas 1980, MacArthur et al. 1982, Papouchis et al. 2001, Rowland et al. 2000). Hunting and poaching, collisions, and disturbance at sensitive sites are also concerns associated with roads and trails (Cassier et al. 1992, Freddy et al. 1986, Canfield et al. 1999, Johnson et al. 2000, Rowland et al. 2000).

Across the forest, approximately 49% of the habitat is outside of the zone of influence of roads and motorized trails. The table below displays the area outside the zone of influence of a road or trail by subbasin.

Table *. Area Outside the Zone of Influence of a Road or Motorized Trail

Subbasin	***Acres within forest boundary***	***Area outside the Zone of Influence of a Road or Motorized Trail***	
		acres	%
Chief Joseph	18,101	145	1%
Kettle	73,568	13,107	18%
Lake Chelan	405,217	288,193	71%
Methow	1,001,016	552,486	55%
Naches	548,662	207,831	38%
Okanogan	145,887	22,222	15%
Sanpoil	89,350	6,425	7%
Similkameen	212,712	198,849	94%
Upper Columbia-Entiat	289,937	81,779	28%
Upper Skagit	198,832	168,762	85%
Upper Yakima	487,381	138,281	28%
Wenatchee	783,724	392,436	50%
forest totals	***4,254,387***	***2,070,516***	***49%***

Cross Country Motorized Travel

Cross country motorized use is authorized, and likely occurring on approximately 675,000 acres across the forest, given land allocation, vegetation and topography. Approximately 101,585 acres of the cross country motorized use could occur on winter ranges.

Cross country motorized travel may displace deer and elk, provide access for hunting and poaching, disturb animals at sensitive sites, and degrade habitat through vegetation loss.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is occurring in deer and elk habitat, and has the potential to disturb or displace individuals, provide access for hunting and poaching, disturb animals at sensitive sites, and degrade habitat through vegetation loss.

Environmental Consequences

Direct and Indirect Effects

Closing maintenance level 1 roads to motorized vehicles would change the summer habitat disturbance index results. The results are displayed in the following table, with the effects of the changes discussed in the specific alternative sections below.

Table *. Change in Percent of Subbasin Influenced by Roads and Motorized Trails by Alternative

Subbasin	*Alternative A*	*Alternatives B, C, and D*	Change from Alternative A
	% of subbasin		
Chief Joseph	1%	1%	1%
Kettle	18%	20%	2%
Lake Chelan	71%	71%	0%
Methow	55%	56%	1%
Naches	38%	38%	0%
Okanogan	15%	18%	3%
Sanpoil	7%	12%	4%
Similkameen	94%	93%	0%
Upper Columbia-Entiat	28%	29%	1%
Upper Skagit	85%	85%	0%
Upper Yakima	28%	29%	1%
Wenatchee	50%	50%	0%
forest totals	***49%***	***49%***	***<1%***

Alternative A

Maintenance Level 1 Roads

Alternative A would not close maintenance level 1 roads to motorized vehicles, so the amount of the Forest outside the influence of roads and trails would continue at approximately 49%. Disturbance at sensitive sites, displacement, avoidance, mortality from vehicle collisions, hunting, poaching, associated with roads and trails would continue at the present levels.

Cross Country Motorized Travel

Alternative A would not close the Forest to motorized cross-country travel, and over time, additional unauthorized motorized routes would likely be created on the approximate 675,000 acres of Forest currently open to and likely being used for cross country travel. This would continue to reduce habitat effectiveness for deer and elk in these areas since the motorized vehicles could result in the displacement of animals or avoidance of areas, increase access for hunting and poaching, and disturb sensitive sites, such as fawning and calving areas.

Continued cross country motorized travel would affect winter range habitat by reducing vegetation used as winter range forage, as trails develop. This could occur on as much as 101,585 acres, 1/3 of the winter range. This would reduce the ability of the range to support wintering animals, and could result in population declines.

Motorized Access for Dispersed Camping

Corridors would not be designated with alternative A, and access for dispersed camping would continue in a fairly unrestricted manner. Over time, new routes would likely be created, and would reduce security habitat and habitat effectiveness. Where this occurs on winter range, vegetation loss could occur, leading to reduced ability of the range to support wintering deer and elk.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

The closure of maintenance level 1 roads to motorized vehicles with implementation of Alternative B, C, or D would slightly increase security habitat in comparison with the current condition, (0.6% forest-wide). This is too small of an amount to actually improve habitat at the forest-wide or subbasin level, however there would likely be areas, such as those with a higher density of maintenance level 1 roads, where the potential for avoidance and displacement from habitats, potential for collisions with vehicles and access for hunting and poaching would decrease more substantially.

Cross Country Motorized Travel

Alternatives B, C, and D would prohibit cross country motorized travel across the forest, improving deer and elk habitat forest-wide. Deer and elk habitat on the 675,000 acres mostly likely receiving motorized cross country travel would improve due to the reduced access for hunting and poaching, reduced potential for displacement of animals or avoidance of areas, and reduced potential for disturbance to sensitive sites, such as fawning and calving areas.

Prohibiting cross country motorized travel on winter range would reduce the potential for forage loss as trails develop, on as much as 101,585 acres, 1/3 of the winter range. Because recent large wildfires across the forest have resulted in forage loss on winter ranges that is affecting winter range capacity, further loss of forage is important.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate corridors where access could occur on existing routes, on approximately 43,124 acres, or roughly 1% of the Forest. Corridors in Alternative C would include 37,408 acres (0.09% of the Forest), while Alternative D corridors would include 92,611 acres, or 2% of the Forest.

Table *. Acres and Percent of Corridors by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres in Corridors	43,124	37,408	92,611
Percent of Total Forest in Corridors	1%	0%	2%

Motorized access within corridors would be limited to existing routes, not further than 300 feet for the road, and not closer than 100 feet to water. Alternative D would include more acres in corridors, but would still be a small percentage of all deer and elk habitat on the forest. The corridor designation in Alternatives B, C, or D would reduce the areas that receive motorized use compared to Alternative A, and may increase security habitat and reduce disturbance and displacement, further improving deer and elk habitat forest-wide.

Cumulative Effects

Geographic boundary

The analysis area is the entire forest, measured at the subbasin scale. Elk are found primarily on the Wenatchee portion of the forest, and managed south of Highway 2 by the Washington Department of Wildlife. The subbasin scale provides large enough areas for animals to meet their yearly resource needs.

Temporal Boundary

The temporal boundary is the time since European settlement in the mid-1800s, when deer and elk populations declined due to habitat conversion to agriculture, widespread livestock grazing, and uncontrolled hunting (Murie 1951, Schmidt 1978, Lehmkuhl et al. 2001).

Management activities began affecting deer and elk in the early 1900s with timber harvest, fire suppression, and road and trail construction and use. Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as those resulting from minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Past Actions

Past management actions that have affected deer and elk on the forest and private lands include:

- Thinning, timber harvest, and prescribed burning have resulted in increased forage, and some loss of hiding and thermal cover. Recent reduction in timber harvest has resulted in less habitat capacity for deer and elk due to less available understory forage.

- Development of recreation sites, roads and trails have reduced habitat and resulted in displacement and avoidance, disturbance to sensitive wintering and reproductive sites, and provided access for hunting. Collisions with vehicles are another effect associated with use of roads.

- Uncontrolled and over-hunting during early settlement times reduced populations.

- Overgrazing by cattle and sheep reduced forage availability.

On private lands, habitat conversion to agriculture and other development particularly on low-elevation winter ranges, has reduced suitable habitat and reduced habitat capability.

While not a management action, wildfire has reduced forage and cover in the short-term, but resulted in increased quantities, nutritional value, and palatability of forage.

On-going Actions

Recent forest activities implemented since the Forest Plans were signed in 1989 and 1990 consider deer and elk in the planning process to avoid negative effects to sensitive areas and populations.

Private land activities continue to degrade or reduce habitat for deer and elk, particularly on low-elevation winter ranges.

Fire suppression has resulted in and continues to result in increasingly dense forests with limited understory forage. Additional hiding cover also results in these dense forest stands.

In the Wenatchee subbasin, the Peshastin and Chumstick Road Decommissioning Project will decommission 52 miles of road. It will reduce potential for avoidance, displacement, and reduce access (which can result in mortality from collisions, hunting and poaching).

Reasonably Foreseeable Future Actions

Actions that are planned in and around the Okanogan-Wenatchee National Forest that would act cumulatively to affect deer and elk are summarized in the table below. See Reasonably Foreseeable Actions (earlier in this chapter) for locations of these projects.

Table *. Reasonably Foreseeable Future Actions That Could Affect Deer and Elk Habitat

Project type	Negative or beneficial effect	Possible effect to deer and elk?
Restoration and Fuel Reduction - thinning, timber harvest and prescribed burning	Both	-Increased forage availability and quality -Some loss of hiding and thermal cover.
Road and trail construction, reconstruction and relocation.	Negative to neutral	Construction of roads and trails increases human access and could result in mortality from hunting and vehicle collisions. Reconstruction may be neutral, if existing routes are closed as new routes are created in better locations.
Road closures/decommissioning	Beneficial	Reduces access that may result in hunting, poaching and collisions, displacement, avoidance.
Weed treatments	Beneficial	Reduces competition to native forage species.
Grazing	Neutral	May slightly reduce forage for deer and elk. However, forest plan standards limit forage use by cattle on winter range for deer on the Okanogan portion of the forest.

These projects, and other human activities, may produce noise disturbance during implementation and use, and cause displacement or avoidance responses by deer and elk. Actions taken by the Forest may be mitigated to reduce or avoid negative effects, and would be analyzed in a separate NEPA document.

The Chewuch Transportation Plan is proposing to decommission 118 miles in the Methow subbasin. The project would act cumulatively with Alternatives B, C, or D to reduce access in those subbasins and reduce potential for avoidance, displacement, and reduce access (which can result in mortality from collisions, hunting and poaching).

Several other projects would have a net effect of reducing road densities by decommissioning roads across the forest over the next decade. Swauk Pine (Cle Elum RD), South Summit 2 (Methow Valley RD), Little Crow (Naches RD), Annie and Light (Tonasket RD) would result in net road reduction of approximately 111 miles.
Other projects would add motorized trails (Naches, Little Crow learner loops 3.4 miles) and allow cross-country access (Cle Elum, Ferris Hard Rock mining project). Overall, these projects result in a net reduction of motorized routes, which would reduce potential for avoidance, displacement, and reduce access (which can result in mortality from collisions, hunting and poaching).

Cumulative Effects Summary

Alternative A

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternative A would be a limited improvement in mule deer and elk habitat due to road decommissioning associated with other projects. Continued cross country motorized travel and use of maintenance level 1 roads would result in the improvements being concentrated around newly decommissioned roads, as opposed to the more wide-spread cumulative benefits expected with implementation of Alternative B, C, or D.

Road decommissioning and closures will occur in the Peshastin and Chumstick Road Decommissioning project and are proposed in the Chewuch Transportation Plan and will increase security habitat. Timber and fuels management also have a positive effect, as they provide additional understory forage. However, loss of hiding cover can also result, and make ungulates more vulnerable to hunting pressure.

Overall, the trend on forest would be somewhat positive for deer and elk, due to the road decommissioning and increased forage. On private lands, however, the trend is reversed, with human population increases leading to increased development on winter and other ranges, increased road densities and human disturbance.

Alternative B, C, or D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternative B, C or D would be an overall improvement in mule deer and elk habitat with the reduction in the net motorized access to the Forest. This decrease would reduce potential for avoidance, displacement, and reduce access (which can result in mortality from collisions, hunting and poaching) for deer and elk.

Alternative B, C, or D would close ML 1 roads to motorized vehicles, and prohibit motorized cross-country travel, resulting in a beneficial effect on deer and elk by providing slightly more security habitat. Road decommissioning and closures will be completed in the Peshastin and Chumstick Road Decommissioning project and are proposed in the Chewuch Transportation Plan and will increase security habitat. Timber and fuels management also have a positive effect, as they provide additional understory forage. However, loss of hiding cover can also result, and make ungulates more vulnerable to hunting pressure.

Closure to cross country motorized use affecting 1/3 of the winter range would reduce potential forage loss on winter ranges already impacted by wildfire.
Overall, the trend on forest would be positive for deer and elk, due to the decreased access and increased forage. On private lands, however, the trend is reversed, with human population increases leading to increased development on winter and other ranges, increased road densities and human disturbance.

MIS Determination

Alternative A would have a small negative impact to deer and elk across the forest because additional routes would develop over time from continued use of cross-country motorized areas and access to dispersed camping on as much as 1/3 of the winter range, which has already been impacted by wildfire. Loss of winter range forage could lead to declines in population numbers, but because deer and elk are widespread and well-dispersed, continued viability of deer and elk is expected across the Forest.

Alternatives B, C, or D would improve conditions for deer and elk by reducing open road densities and slightly improving security habitat, and would not contribute to a negative trend in viability on the Okanogan Wenatchee National Forest.

Compliance with Laws and Regulations

Alternative A is consistent with Forest Plan standards and guidelines for deer and elk because it doesn't increase road densities. Over-snow activities and winter use is not a part of the travel management alternatives. Alternative A complies with the National Forest Management Act because it maintains species viability.

Alternatives B, C, and D are consistent with Forest Plan standards and guidelines for mule deer and elk. Open road densities in key habitats would not be increased above standards for the management area. They comply with the National Forest Management Act because they improve conditions and do not contribute to a negative trend in viability for deer and elk.

Dead and Defective Tree Habitat

Dead and Defective Tree Habitat Species

Three-toed woodpecker	Habitat Present?	Species Present?
Black-backed woodpecker	Yes	Documented
Downy woodpecker	Yes	Documented
Hairy woodpecker	Yes	Documented
Lewis' woodpecker	Yes	Documented
White-headed woodpecker	Yes	Documented
Williamson's sapsucker	Yes	Documented
Red-naped sapsucker*	Yes	Documented
Northern Flicker	Yes	Documented
Pileated woodpecker	Yes	Documented
Three-toed woodpecker	Yes	Documented

*The yellow-bellied sapsucker listed in the Okanogan Forest Plan (USFS 1989:III-78), was taxonomically split into three species in 1983: red-naped, red-breasted, and yellow-bellied sapsuckers (AOU 1983, Walters et al. 2002); only the red-naped sapsucker occurs in Eastern Washington.

The primary cavity excavators (PCE) use snags for nesting, roosting and foraging and are management indicator species (MIS) for dead and defective tree habitat in both Forest Plans. Snags are an important habitat component across forested habitat types, and are key elements for spotted owls (threatened), martens (MIS), brown creepers (focal species), fisher (proposed), flying squirrels, pygmy nuthatches (focal species), white-breasted nuthatches, white-headed woodpecker (sensitive), wood ducks, three-toed woodpeckers (MIS), pileated woodpeckers (MIS) and other vertebrate and invertebrate species.

Direct, Indirect, and Cumulative Effects of All Alternatives

None of the alternatives would affect snags or snag habitat because snags are not cut as danger trees on ML 1 roads and would not be cut as danger trees with designation of corridors. Therefore, there would be no direct, indirect, or cumulative effect on any primary cavity excavators and snag habitat species with implementation of Alternative A, B, C, or D.

Sensitive Species

Regulatory Framework

The Forest Service uses Sensitive Species to insure compliance with NFMA. The Regional Forester identifies Sensitive Species when population viability is a concern. An expected downward trend in population numbers and/or habitat could indicate the need to identify a species as "sensitive."

The analysis of the effects to these species is organized by habitat type, with the exception of gray wolf and fisher, which are discussed in the Threatened and Endangered Species section early in the report, mountain goat, which is discussed in the Management Indicator Species section, and bighorn sheep, which is discussed individually below.

The following species have been listed as sensitive or strategic (similar to sensitive but have not been described taxonomically to the species level or are only suspected to occur on federal lands) by the Regional Forester's Special Status Species List (May 2015) for the Okanogan Wenatchee National Forest, habitat is available within the planning area and may be affected by travel management alternatives. These species will be discussed further in the appropriate habitat section.

Table *. Sensitive and Strategic Species Potentially Affected by Travel Management Alternatives

Species	***Scientific Name***	***Location of Analysis in Report***
Gray wolf	*Canis lupus*	Threatened and Endangered Species
Fisher	*Martes pennanti*	Threatened and Endangered Species
Mountain goat	*Oreamnos americanus*	Management Indicator Species
Bighorn sheep	*Ovis canadensis californiana and O.canadensis*	Bighorn sheep
Northern goshawk	*Accipiter gentilis*	Dry Mesic Habitat
Townsend's big-eared bat	*Corynorhinus townsendii*	Dry Mesic Habitat
Western gray squirrel	*Sciurus griseus*	Dry Mesic Habitat
Blue-gray taildropper	*Prophysaon coeruleum*	Dry Mesic Habitat
Chelan Mountainsnail	***Strategic*** *(Oreohelix spp. nov.(Chelan)*	Dry Mesic Habitat
Cascade red fox	*Vulpes vulpes canadensis*	Cold Dry Habitat
North American wolverine	*Gulo gulo luscus*	Cold Dry Habitat
Common loon	*Gavia immer*	Riparian and Wetlands Habitat
Bald eagle	*Haliaeetus leucocephalus*	Riparian and Wetlands Habitat
Harlequin duck	*Histrionicus histrionicus*	Riparian and Wetlands Habitat
Puget Oregonian	*Cryptomastix devia*	Riparian and Wetlands Habitat
Western pond turtle	*Actinemys marmorata*	Riparian and Wetlands Habitat
Zigzag darner	*Aeshna sitchensis*	Riparian and Wetlands Habitat
Subarctic darner	*Aeshna subarctica*	Riparian and Wetlands Habitat
Subarctic bluet	*Coenagrion interrogatum*	Riparian and Wetlands Habitat
Boreal whiteface	***Strategic*** *(Leucorrhinia borealis)*	Riparian and Wetlands Habitat
American peregrine falcon	*Falco peregrinus anatum*	Cliff/talus Habitat
Larch mountain salamander	*Plethodon larselli*	Cliff/talus Habitat
Grand Coulee mountainsnail	*Oreohelix junii*	Cliff/talus Habitat
Shiny tightcoil	*Pristiloma wascoense*	Cliff/talus Habitat

Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	Non-forest Habitat
Sandhill crane	*Grus canadensis*	Non-forest Habitat
Striped whipsnake	*Coluber taeniatus*	Non-forest Habitat
Western bumblebee	*Bombus occidentalis*	Non-forest Habitat
Meadow fritillary	*Boloria bellona*	Non-forest Habitat
Great Basin fritillary	*Speyeria egleis*	Non-forest Habitat
Mardon skipper	*Polites mardon*	Non-forest Habitat
Peck's skipper	*Polites peckius*	Non-forest Habitat
Tawny-edged skipper	*Polites themistocles*	Non-forest Habitat

Sensitive and Strategic Species not Considered

The Giant Palouse earthworm appears to be a deep-burrowing worm. Little is known about this species, its distribution, habitat diversity, habitat requirements, biology or population trends (Federal Register, 2011), making potential threats to the species difficult to assess. Because the action alternatives would prohibit off-road activity, it is assumed that potential impacts to Giant Palouse Earthworm habitat (whatever that turns out to be) would be minimized.

Bighorn sheep found on the Okanogan-Wenatchee National Forest are Ovis canadensis californiana. O.canadensis (Rocky Mountain bighorn sheep) are not present on the Forest.

The following sensitive species will not be discussed in this report because the current motorized use is not affecting their habitat, or none of the alternatives would affect their habitat.

- Several invertebrates classified as sensitive species occur in high elevation habitats, largely Wilderness areas or near Wilderness, in rock habitats where travel management activities would not occur or would not affect the species. The astarte fritillary, freija fritillary, Labrador sulphur, lustrous copper, and Melissa arctic fall into this category.
- Gray flycatchers, also a sensitive species, would not be affected by travel management actions because the use of roads and trails does not appear to be a threat to these species.
- The masked duskysnail and Washington duskysnail are also designated as strategic species (similar to sensitive species, but that have not been described taxonomically to the species level), but will not be discussed further in this report, because the project would not affect habitat for the species. The duskysnails are small freshwater snails that inhabit kettle lakes, which would not be affected by any of the travel management alternatives.
- Great gray owls, Lewis' woodpeckers, white-headed woodpeckers, and little brown myotis, would not be affected by travel management alternatives because none of the alternatives would change hazard tree management or access for firewood-cutting, thus snag levels would be similar to the current condition. No road- or recreation-related effects were found for these species.

Survey and Manage Species

Regulatory Framework- see general wildlife section, above.

Six species are listed as "survey and manage" under direction from the Northwest Forest Plan and are found or suspected to occur on the Okanogan Wenatchee National Forest. These species were selected because they are species about which little is known, or were initially thought to be associated with late-successional conditions. The analysis of the effects to these species is organized by habitat type.

Pre-disturbance surveys are required for these species in all land allocations, if a project within the range of the species would negatively affect their habitat. Since no new roads or motorized trails are proposed in any alternative, no additional surveys are needed. Known sites (locations) for these species are protected.

Table *. Survey and Manage Species and Associated Habitat

Species	Scientific Name	Location of Analysis in Report
Chelan mountainsnail	*Oreohelix spp.*	Dry Mesic Habitat
Blue-gray taildropper	*Prophysaon coeruleum*	Dry Mesic Habitat
Great gray owl	*Strix nebulosa*	Cold Moist Habitat
Puget Oregonian	*Cryptomastix devia*	Riparian and Wetland Habitat
Columbia Oregonian	*Cryptomastix hendersoni*	Riparian and Wetland Habitat
Larch Mountain salamander	*Plethodon larselli*	Cliff/talus Habitat

The masked duskysnail is also designated as Survey and Manage, but will not be discussed further in this report, because the project would not affect habitat for the species.

Landbirds

Regulatory Framework

Direction for landbird conservation is provided by the Migratory Bird Treaty Act and Executive Order 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds* and MOU 08-MU-1113-2400-264 *Memorandum of Understanding between the U.S. Department of Agriculture Forest Service and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds*.

The Forest is in Bird Conservation Region 9. However, guidance for focal species selection is stratified by habitat type, with recommendations provided by landbird conservation strategies. Guidance for landbird conservation appropriate to the Okanogan Wenatchee National Forest habitat types is provided by three conservation strategies (northern Rocky Mountains of eastern Oregon and Washington, east-slope Cascade Mountains, and Columbia Plateau)(Altman 2000a, b, and Altman and Holmes, 2000), which identify priority bird species (focal species) and recommend mitigation for management activities.

The following table includes the focal landbirds whose habitat could be affected by Alternative A, B, C, or D, in addition to the habitat features and location of the habitat analysis in this report. It is adapted from the Landbird Conservation Plans (Altman 2000 a, b and Altman and Holmes, 2000).

Species that are potentially affected are listed in the following table. Species not potentially affected are listed in the second table.

Table *. Focal Landbird Species Habitat Potentially Affected by Alternatives

Species	Habitat	Habitat Feature/Conservation Focus	Location of the Analysis in Report
Pygmy nuthatch	Ponderosa pine	Large trees	Dry Mesic Habitat
Hermit thrush	Mixed Conifer (late successional)	Multi-layered/dense canopy and Subalpine Forest	Dry Mesic Habitat

Brown creeper	Mesic Mixed Conifer (late successional)	Large trees	Cold Moist Habitat
Clark's nutcracker	Cold dry	Whitebark pine	Cold Dry Habitat
Gray-crowned rosy finch	Cold dry	Alpine forest	Cold Dry Habitat
Sandhill crane	Meadows	Wet/dry meadows	Non-forest habitat
Prairie falcon	Cliff/talus	Cliffs and rimrock	Cliff/talus Habitat
Vesper sparrow	Meadows	Steppe shrublands	Non-forest habitat

The habitat for several species of landbirds would not be affected by Alternatives A, B, C, or D, and are not discussed further in this analysis. The justification for each is displayed in the following table.

Table *. Landbird Species Habitat Not Affected by Alternatives

Species	Habitat	Habitat Feature/Conservation Focus	Rationale
Lewis' woodpecker	Dry forest/Ponderosa pine	Burned old forest patches	No effects from proposed actions. Snag-associated.
White-headed woodpecker	Dry forest/Ponderosa pine	Old forest/large trees and snags.	No effects from proposed actions. Snag-associated.
Red-naped sapsucker	Snag	Large aspen trees and snags with regeneration	No effects from proposed actions. Snag-associated.
Flammulated owl	Dry forest	Old forest with openings and thicket, large snags	No effects from proposed actions. Snag-associated.
Chipping sparrow	Dry forest/Ponderosa pine	Open understory with regenerating pines	No effects from proposed actions. Common, widely distributed. Tolerates open conditions.
Vaux's swift	Mesic Mixed Conifer (late successional)	Large snags	Late-successional Habitat. Snag associated.
Williamson's sapsucker	Mesic Mixed Conifer (late successional)	Large snags	Snag-associated, no effects from proposed actions.
Olive-sided flycatcher	Mesic Mixed Conifer (late successional)	Edges and openings created by wildfire	No effects from proposed actions. Snag-associated.
Varied thrush	Mesic Mixed Conifer (late successional)	Structurally diverse, multi-layered	No effects from travel management.
MacGillivray's warbler	Mesic Mixed Conifer (late successional)	Dense shrub layer in forest openings or understory	No negative effects from travel management activities, associated with good quality riparian habitat where no new activities would occur.
Townsend's warbler	Mesic Mixed Conifer (late successional)	Overstory canopy closure	Snag-associated, no effects from proposed actions.
Lewis' woodpecker	Riparian woodland	Large snags	No effects from proposed actions. Snag-associated.
Red-eyed vireo	Riparian woodland	Canopy foliage and structure	No negative effects from travel management activities, associated with good quality riparian habitat where no new activities would occur.
Veery	Riparian woodland	Understory foliage and structure	No negative effects from travel management activities, associated with good quality riparian habitat where no new activities would occur.
Bullock's oriole	Riparian woodland	large canopy trees	Ubiquitous and scattered. No effects.

Yellow warbler	Riparian woodland	Subcanopy foliage	Merkle, 1999, showed higher nest success near recreational trails (non-motorized) than in areas with no trails, possibly because of fewer mammalian predators, no negative effects from travel management actions.
Willow flycatcher	Riparian shrub	Shrub density	Not snag users, no effects from travel management.
Lazuli bunting	Riparian shrub	Shrub-herbaceous interspersion	Not snag users, generally abundant and widespread. No effects from travel management.
Willow flycatcher	Riparian shrub	Willow/alder shrub patches	Not snag users, no effects from travel management.
Sage sparrow	Sagebrush, Meadows	Large unfragmented patches	Not snag users, no effects from travel management.
Black-backed woodpecker	Unique habitats- snag	Old growth Lodgepole pine	Snag-associated, no effects from proposed actions.
Blue Grouse*	Cold Dry	Subalpine forests	No effects from travel management proposals.
Upland sandpiper	Meadows	Montane meadows (wet/dry)	Little habitat on forest, species possibly extirpated in Washington (WDFW 2011). Not documented on forest.

*Blue grouse are now known as two species- dusky and sooty.

Best Available Science

Several studies have found that generalist, edge-associated landbirds and corvids are attracted to trails and recreational activities, whereas specialist landbirds are displaced (Hickman 1990, Miller et al.1998, Miller and Hobbs 2000, Femandez-Juricic 2001, Gutzwiller et al. 2002, but see Femandez-Juricic 2000a). American robins, blue jays, and brown-headed cowbirds increased in abundance near recreational trails (Hickman 1990). Miller et al. (1998) found that avian community composition was altered adjacent to recreational trails, with some generalist species more abundant near trails compared to lower abundance for more specialized landbirds. Five landbirds described as habitat specialists, western wood peewees, pygmy nuthatches, Townsend's solitaires, plumbeous vireos, and chipping sparrows decreased in abundance near trails in forests. Miller and Hobbs (2000) found that black-billed magpies were more abundant along trail sites compared to control sites in riparian habitats.

Barton and Holmes (2007) found evidence of increased nest desertion and abandonment, reduced nest predation, and reduced abundance of songbirds along OHV trails in northeastern California.

Altman, 2000 (a, b) and Altman and Holmes, 2000 have identified conservation measures that would mitigate effects to landbirds. Those most applicable to travel management activities are:

- Retain all large trees, snags and broken top/defective trees.
- Implement road closures (obliteration) where necessary to limit access to snags.
- Minimize timing and extent of human recreation in priority bird habitats during the nesting season.
- Reduce access that may increase levels of disturbance and lead to snag loss.
- Plan and locate recreational facilities away from riparian habitat. Restrict human access in wet/dry meadows.
- Restrict or eliminate human access to shrub-steppe, meadow, riparian and other sensitive habitats.
- Avoid road building and development that fragments existing shrub patches or accessing sensitive habitats.

Sensitive Species, Survey and Manage Species, and Focal Landbirds Species Analysis

Because the large number of sensitive species, survey and manage species, and focal landbird species, and the effects of travel management actions minor and largely beneficial, all the species, with the exception of bighorn sheep, will be grouped by habitat type for effects analysis.

Bighorn Sheep

Introduction

Bighorn sheep (*Ovis Canadensis californiana*) are a sensitive species for the Okanogan and Wenatchee National Forests. On the Okanogan-Wenatchee National Forest, bighorn sheep are found on Mount Hull, Swakane Canyon, Tieton, Clemans Mountain, and the North Shore of Lake Chelan. Suitable habitats are isolated and not well distributed across the forest. Five herds exist on the Forest:

- Cleman Mountain
- Lake Chelan
- Mt. Hull
- Swakane
- Tieton

The Mount Hull herd was exceeding WDFW population number objectives in 2014. The Tieton herd was decimated by pneumonia and remaining animals were killed. Reintroductions are planned for 2016 (WDFW, 2014).

Regulatory Framework

The Okanogan Forest Plan provides direction for management of bighorn sheep in management area 11 (Mt. Hull), which is managed to optimize habitat conditions and perpetuate a healthy population. Standards and guidelines applicable to travel management include:

- MA11-17A: Access by motorized vehicles shall be eliminated or prohibited year-round, except when and where designated open.

This standard is incorporated into the Okanogan Travel Plan and will be carried forward with timing restrictions in the Travel Management proposal.

The Wenatchee Forest Plan direction for bighorn sheep management is that bighorn sheep and mountain goat requirements will take precedence over deer and elk requirements and that coordination with the Washington Department of Fish and Wildlife will occur.

Best Available Science

Distribution of bighorns is defined by cliff/talus habitats, which are used for escape cover and secure habitat for raising young (Wisdom et al. 2000). They also use open, dry grass/shrub areas for foraging. Bighorn sheep prefer open habitats with low vegetation for forage (McWhirter et al. 1992) and good visibility for predator avoidance (Risenhoover and Bailey, 1985). A negative correlation exists between forest cover and the occurrence of bighorn sheep (Bentz and Woodard, 1988). Winter ranges are south-facing open slopes with nearby forest for cover.

Bighorn habitat is much more restricted than in historic times, and bighorns occur on a remnant of their former range (Wisdom et al. 2000). While cliff/talus habitat is little changed, important seasonal foraging habitats have been converted to agricultural uses or have become unsuitable due to forest succession to closed canopy stands, which are avoided by sheep (Wisdom et al. 2000).

Bighorn populations were extirpated in Washington and the surrounding states by the early 1900s and have since been reintroduced. Their numbers have been increasing over the last 50 years (Thorne et al. 1985), and population numbers for most Washington herds have remained stable (WDFW, 2015). However, the Tieton herd, as well as several herds not associated with National Forest lands, have recently suffered pneumonia-related die-offs(WDFW, 2015).

Threats to bighorn include loss, degradation and fragmentation of habitats, human disturbance, particularly at sensitive lambing areas and winter ranges, collisions, poaching and disease.

Road- and trail- (motorized and non-motorized) related risk factors are hunting/poaching, displacement and avoidance of habitats, and disturbance at sensitive sites (lambing areas and winter ranges) (Gaines et al. 2003). Collisions with vehicles cause mortality to sheep.

Bighorn sheep are sensitive to human disturbance (Hicks and Elder 1979, King and Workman 1986, Leslie and Douglas 1980, MacArthur et al. 1979, Papouchis et al. 2001, Smith et al. 1991). MacArthur et al. (1979) found that the heart rate of bighorn sheep varies inversely with the distance from a road and that sheep are affected by a human approaching within 50 meters (164 feet)(MacArthur et al. 1982). Papouchis et al. (2001) found that bighorn sheep respond to hikers at an average distance of 200 meters (656 feet). They also showed that avoidance of roads was greater for high-use roads (5–13 vehicles per hour) versus low-use roads (1 vehicle per hour). On average, radio-collared sheep were 490 meters (1,608 feet) from high-use roads compared to 354 meters (1,161 feet) from low-use roads.

Epps et al. (2005) found that factors related to human land-use can limit or restrict bighorn movement and habitat by creating barriers. These barriers included water systems (canals and reservoirs), high-use roads and highways, fences, and centers of human activity such as agricultural lands and residential areas (Smith et al. 1991; Johnson & Swift 2000; Epps et al. 2005). Barriers (highways, waterways, and human development) greatly reduced genetic diversity in desert bighorn sheep populations (Epps et al. 2005).

Methods

Effects to bighorn sheep were assessed by using the summer habitat disturbance index (Gaines et al. 2003), which buffers roads, motorized and non-motorized trails and calculates a zone of influence for these routes within bighorn sheep ranges. A GIS shapefile created for Forest Plan revision was used to delineate bighorn sheep habitat. Roads with more than one vehicle use per day were buffered by 500 meters, roads with less than or equal to one vehicle per day and motorized trails at 350 meters, and non-motorized trails at 200 meters.

See also cliff/talus and non-forest habitat sections.

Analysis Area

The analysis area for bighorn sheep are the seasonal ranges currently used by bighorn sheep on the Tonasket, Chelan, Entiat, Wenatchee River and Naches districts.

Existing Condition

Maintenance Level 1 Roads

Approximately 271,948 acres on the Okanogan-Wenatchee National Forest was considered to be occupied bighorn sheep habitat. Approximately 41% of this area is outside the zone of influence of a road or trail and is probably relatively undisturbed by humans, with the exception of motorized cross country travel, which is discussed below. Motorized vehicle use on maintenance level 1 roads contributes to the potential impacts from motorized vehicle use through direct mortality from collisions, access for hunting/poaching, displacement from or avoidance of otherwise suitable habitats, and disturbance at sensitive sites.

The following table displays this information by individual herd ranges.

Table *. Bighorn Sheep Habitat on the Okanogan-Wenatchee National Forest

	Habitat Concentration Area	*Security Habitat outside the influence of a road or trail*	
Herd	***acres***	***acres***	***%***
Cleman Mtn.	15,937	2,395	15%
Lake Chelan	144,749	84,843	59%
Mt. Hull	4,273	1,358	32%
Swakane	97,040	16,265	17%
Tieton	9,921	0	0%
Forest totals:	***271,920***	***104,861***	***39%***

Road density is having the biggest effect on the habitat for the Mount Hull and Tieton herds. Despite this, the Mount Hull herd was exceeding WDFW population number objectives in 2014. The Tieton herd, however, was decimated by pneumonia and remaining animals were killed. Reintroductions are planned for 2016 (WDFW, 2014).

Cross Country Motorized Travel

Cross-country motorized travel is estimated to occur (modeled using topography, access, vegetation and land allocation) on 45,101 acres, approximately 17% of the bighorn sheep habitat. Cross country motorized vehicle use has the potential to degrade the quality of the security habitat displayed in Table *. Cross country motorized vehicles can affect bighorns through direct mortality from collisions, access for hunting/poaching, displacement from or avoidance of otherwise suitable habitats, and disturbance at sensitive sites.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is likely reducing the quality of bighorn sheep habitat where it is occurring in the habitat. The vehicles could affect the sheep by displacing them, causing them to avoid otherwise suitable habitat, and disturbing sensitive sites.

Environmental Consequences

Direct and Indirect Effects

The summer habitat disturbance index (Gaines et al., 2003) was used to assess the effects of road and recreational trail-associated factors on bighorn sheep. This model compares the area of the sheep ranges that could be affected by roads, motorized trails and non-motorized trails. The areas outside of this zone of influence would receive little use by humans. The change (from the current condition) in the amount of undisturbed area is displayed in the table below.

Table *. Security Habitat Outside the Influence of Roads and Trails

	Alternative A	*Alternatives B, C, and D*	*Increase from Alternative A*
Herd	***%***	***%***	
Cleman Mtn.	15%	29%	14%
Lake Chelan	59%	61%	2%
Mt. Hull	32%	92%	60%

Swakane	17%	24%	7%
Tieton	0%	42%	42%
Forest totals:	***39%***	***44%***	***5%***

Note: these numbers assume that the ML 1 and authorized roads that are closed to motorized use are not receiving any hiking traffic, thus overstate the gain in security habitat.

Alternative A

Maintenance Level 1 Roads

Alternative A would not close maintenance level 1 roads to motorized vehicles, so the amount of habitat that is relatively undisturbed by humans would remain in the current condition. Currently, about 39% of the sheep range would be outside the range of influence of a road or recreational trail, providing security habitat. Use of the road and trail network would continue to affect bighorns through direct mortality from collisions, access for hunting/poaching, displacement from or avoidance of otherwise suitable habitats, and disturbance at sensitive sites.

Cross Country Motorized Travel

Implementation of alternative A would not close the forest to cross-country travel, and disturbance from this off-road use would be likely to grow over time, further reducing habitat effectiveness for sheep. Cross country motorized vehicles would continue to affect bighorns through direct mortality from collisions, access for hunting/poaching, displacement from or avoidance of otherwise suitable habitats, and disturbance at sensitive sites.

Motorized Access for Dispersed Camping

Corridors would not be designated with Alternative A, and access for dispersed camping would continue in a fairly unrestricted manner. New routes would likely be established over time which would reduce security habitat and habitat effectiveness for sheep. Motorized access for dispersed camping would continue to reduce the quality of big horn sheep habitat where it occurs in the habitat. The vehicles could affect the sheep by displacing them, causing them to avoid otherwise suitable habitat, and disturbing sensitive sites, and providing access for hunting.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

Alternatives B, C, and D would increase the amount of bighorn sheep habitat outside the influence of a road or trail by about 5% forest-wide (with a range of 2% to 60% increase, depending on the herd (see table above)), by prohibiting motorized vehicles on maintenance level 1 roads. Increases in security habitat would occur in each herd's range. This would decrease the potential for collisions between vehicles and sheep, reduce access for hunting or poaching, reduce the potential for displacement from or avoidance of habitats, and reduce disturbance at sensitive sites. The habitat for the Mount Hull and Tieton herds would be substantially improved with the closure of maintenance level roads to motorized vehicles. There would be an increase in the undisturbed area with the habitat range for these two herds.

Cross Country Motorized Travel

Closure of the forest to cross-country motorized travel would increase habitat effectiveness for bighorn sheep, reduce potential for introduction of noxious weeds, and potentially fragment habitat. Cross-country motorized travel is estimated to be possible over 17% of the bighorn range. Although it is unknown how much of this area is actually used, the closure to cross-country travel is likely to be important to reduce disturbance to sheep. Reducing disturbance may improve the health and productivity of the small herds present on the forest.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate approximately 1,650 acres of corridors, or approximately 0.6% of the total bighorn sheep habitat on the Forest. Alternative C would designate 1,612 acres of corridors (0.6%) in bighorn sheep habitat, while Alternative D corridors would designate 3,313 acres (1.2% of the habitat).

Table *. Acres and Percent of Corridors in Big Horn Sheep Habitat, by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Corridors in Big Horn Sheep Habitat	1,650	1,612	3,313
Percent of Total Big Horn Sheep Habitat	0.6%	0.6%	1.2%

The motorized access for dispersed camping would have the potential to displace or disturb big horn sheep, and degrade sensitive habitat. This potential would be reduced by restricting vehicles to existing routes only, eliminating any damage to undisturbed areas. Alternatives B, C, and D would all reduce impacts from motorized access for dispersed camping compared to Alternative A.

Cumulative Effects

Geographic Boundary

The geographic boundary is the bighorn sheep ranges that are currently mapped, and the areas that have been mapped as having the potential for occupation if the herd grows, including the non-federal lands adjacent to the forest where bighorn have been re-introduced.

Temporal Boundary

The temporal boundary is the time since European settlement until 10 years into the future. Bighorn populations declined substantially in the late 1800s and early 1900s, due to unregulated hunting, diseases transmitted from domestic sheep, habitat loss, degradation and fragmentation. Forest management activities affecting bighorns began in the early 1900s, with fire suppression and the initiation of a transportation network to support forest uses. Use of the forest road and trail network is expected to continue indefinitely, although Minimum Roads Analysis and Forest Plan Revision will likely result in changes to the current access.

Past Actions

Bighorn sheep use cliff/talus and open habitats. See also cumulative effects sections for cliff/talus and non-forest habitats.

An additional cumulative effect for bighorn sheep habitat was fragmentation of their ranges, which made portions of their habitat inaccessible, resulting in less available habitat. Fragmentation has occurred as a result of fire suppression, which has allowed the open habitats formerly used by sheep to grow into dense stands that they avoid. Fragmentation has also occurred as a result of human activities and development on federal and non-federal lands, including agricultural, mining, recreation, residential, urban and other uses.

Overhunting of bighorns was a major factor in population declines in the 1800's and early 1900's, and, with disease, resulted in extirpation across the forest by 1925 (Johnson 1999 in Gaines et al. 2009). Bighorns were reintroduced on the Okanogan-Wenatchee National Forest and seven herds currently exist on or adjacent to the forest. The Tieton herd was recently lost due to disease.

Bighorns have also been affected by overgrazing of livestock, which resulted in competition for forage resources, as well as habitat degradation from noxious weeds. Diseases spread by domestic sheep and possibly goats were also an important factor in the population decline. Domestic sheep allotments on the forest have been terminated where bighorn sheep were reintroduced, to prevent disease spread.

Bighorn sheep are sensitive to human disturbance, and the development of road and trail access to sheep habitat has resulted in a decrease in habitat effectiveness. A decline in habitat capability from historic to the present time resulted from the impact of grazing and the influence of roads on habitat effectiveness (Gaines et al. 2009).

On-going and Present Actions

On-going actions affecting bighorn habitat and bighorns include fire suppression, development of seasonal ranges, (particularly privately owned lands), loss of talus habitats for rock sources, grazing of sheep and goats, and recreational use of bighorn ranges. Noxious weeds are a continuing source of habitat degradation, and weed control efforts are on-going across the forest. The DNR will continue spraying for star thistle at Bear Mountain near Chelan in bighorn habitat. Chelan County treats weeds annually along county roads, some of which pass through bighorn ranges.

While cattle grazing continues, the Okanogan Forest Plan specifies that livestock use only 15% of the total forage. Grazing of domestic sheep in occupied bighorn ranges has been terminated on the Okanogan portion of the forest and is managed in cooperation with the WDFW for the Wenatchee portion . However, disease outbreaks associated with domestic sheep continue to be a concern for several Washington herds.

Hunting of bighorn sheep is ongoing. However, harvest of bighorns is tightly regulated with a permit system. Twenty-four permits will be awarded for herds associated with the Okanogan-Wenatchee National Forest for the 2012 hunting season.

Human disturbance facilitated by road and trail access to bighorn ranges is on-going. The Peshastin and Chumstick Road Decommissioning project will reduce motorized access on approximately 3.6 miles of road in bighorn sheep range, which will reduce human disturbance to sheep in that vicinity.

Reasonably Foreseeable Future Actions

The Forest is in the process of preparing a forest-wide EIS to address invasive species. This EIS will analyze effects of use of several new herbicides to manage forest weeds. Weed control on bighorn sheep ranges would be a beneficial effect, as it would reduce invasive plants that replace native vegetation used by bighorns.

Fuels reduction, timber sale and restoration projects would open canopies, and potentially improve conditions for bighorn sheep by rejuvenating grass and shrub forage species.

The Yakama Nation is planning shrub/steppe restoration projects and noxious weed management that could benefit bighorn sheep. They are also planning reintroduction of bighorns. WDFW may relocate sheep from the Mount Hull area if the population growth continues to augment other populations. Reintroduction to the Tieton range could begin in 2016.

Cumulative Effects Summary

Other forest management actions would improve habitat on bighorn ranges by improving forage or by eliminating noxious weeds. Fire suppression would continue on bighorn ranges and would degrade habitat for sheep by allowing stand densities to increase, although this would be partially offset by prescribed burning. Other agencies are also restoring habitats by managing weeds and restoring shrub/steppe lands. Both WDFW and the Yakama Nation are continuing with bighorn reintroductions. With the regulation of hunting, reintroductions, and habitat restoration, it may be possible for bighorn populations to increase across the forest and in Washington, if diseases that have caused large die-offs of bighorns can be controlled.

Alternative A

The cumulative effect of Alternative A and the past, present, and reasonably foreseeable future actions would be an increase in habitat quality due to road closure and decommissioning in reasonably foreseeable future actions. This improvement would be somewhat offset because motorized cross country travel would continue in approximately 17% of bighorn habitat, and maintenance level 1 roads would continue to be open to motorized vehicles. Disturbance from recreational activities such as hiking and climbing would continue to be a stressor to sheep. Recreation is expected to increase over time on public lands, as the population increases.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D would be reduction in the net motorized access to the Forest, which would decrease the potential for collisions between vehicles and sheep, reduce access for hunting or poaching, reduce the potential for displacement from or avoidance of habitats, and reduce disturbance at sensitive sites. The habitat for the Mount Hull and Tieton herds would be substantially improved. Closing the forest to cross-country motorized travel and closing of maintenance level 1 roads to motorized vehicles would reduce disturbance to bighorns, but disturbance from recreational activities such as hiking and climbing would continue to be a stressor to sheep. Recreation is expected to increase over time on public lands, as the population increases.

Determinations

Alternative A may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Alternative A would not change the current condition in the short term. Over time, more routes would be created by motorized cross country travel, which would reduce habitat effectiveness through noise disturbance.

Alternatives B, C and D would have a beneficial impact on bighorn sheep, because motorized cross-country travel would no longer be allowed on much as 17% of the bighorn habitat. Noise disturbance would also be reduced when ML 1 roads in bighorn habitat are closed to motorized use. This would increase security habitat by 5% over alternative A.

Compliance with Laws and Regulations

Alternative A, the current condition, is consistent with the National Forest Management Act and the Forest Plans. The Okanogan Forest Plan (management area 11 (Mt. Hull)) is managed to optimize habitat conditions and perpetuate a healthy population of bighorn sheep. The Wenatchee Forest Plan direction is to work cooperatively with the Washington Department of Fish and Wildlife to reduce potential for disease spread and cooperate in future management efforts for bighorn sheep, which is not applicable to travel management proposed actions.

Alternatives B, C, and D are consistent with the National Forest Management Act and the Forest Plans. These alternatives reduce access by motorized vehicles in Management Area 11 (Okanogan Forest Plan) reduce access and increase security habitat Forest-wide.

Dry Mesic Habitat

Introduction
The dry forest type is the ponderosa pine-dominated habitat found at the edge of the shrub steppe zone and is the lowest and driest forest type. This habitat is found within the hot-dry environmental zone. Generally the habitat has a frequent fire return interval.

The next lowest elevation habitat type is the mesic or moderate moisture habitat, comprised of mixed conifer ponderosa pine and Douglas-fir dominated forests, with a frequent to moderate fire return interval.

Regulatory Framework- see general Wildlife regulatory framework.

Dry Mesic Forest Habitat Species

The following table includes the sensitive, survey and manage, and landbird species associated with dry mesic forest habitats, that may be affected by travel management alternatives.

Northern goshawk	Sensitive Species
Townsend's big-eared bat	Sensitive Species
Western gray squirrel	Sensitive Species
Bluegray taildropper	Sensitive Species
Chelan mountainsnail	Survey and Manage Species
Pygmy nuthatch	Focal Landbird Species
Hermit thrush	Focal Landbird Species

Dry Mesic Species Affected by Alternatives

Northern Goshawk
Goshawks are a sensitive species that use old forest and unmanaged forests in montane, lower montane, and riparian woodland communities. Important habitat attributes of goshawk prey species include snags, down logs, woody debris, large trees, openings, herbaceous and shrubby understories and an intermixture of various forest structural stages (Wisdom et al. 2000). During winter some goshawks may travel short distances to lower elevations and more open habitats in all upland woodland types (Wisdom et al. 2000).

Goshawks are prey generalists (Squires and Reynolds 1997) that forage for small birds and mammals in open understories below the forest canopy and along small forest openings (Bull and Hohman 1994). Foraging areas are typically 4,900-5,900 acres comprising a forest mosaic that must support a wide range of suitable prey (Marshall et al. 2003).

Goshawks are found across North American and in Europe and Asia, as well. Global status is G5, secure, but is considered vulnerable in Washington. Population trends are uncertain.

Habitat loss and degradation through logging, fire suppression, grazing and wildfire is of concern (Natureserve, 2015). Disturbance due to logging activities conducted near nests during the incubation and nestling periods can cause nest failure due to abandonment (NatureServe 2010, Squires and Reynolds 1997). High road densities may result in loss of snags and down wood important to goshawk prey (Wisdom, 2000). Young goshawks may be collected by permit for falconry in Washington. Roads and trails provide access for falconers.

Townsend's Big-eared Bat
Townsend's big-eared bats are a Region 6 sensitive species associated with conifer forests and open shrub habitats in eastern Washington. They use most forest types, including aspen, except for early-successional stages. They will also use upland and riparian shrublands and herblands.

Townsend's big-eared bats roost in caves, mines, rock outcrops, and buildings and are sensitive to human disturbance, particularly around roosts. Townsend's big-eared bat roost sites have been found in Okanogan County in caves, mines and old buildings (Nagorsen and Brigham, 1993), although they may also use bridges and water diversion tunnels (Pierson et al. 1999).

Townsend's big-eared bats are insectivores that focus on moths and often glean them from the foliage of trees and shrubs. They forage in shrub-steppe and open ponderosa pine areas (Wisdom et al. 2000).

Conservation status for Townsend's big-eared bat is apparently secure in the western U.S. and Mexico, but the species is considered vulnerable due to specific cave requirements and sensitivity to disturbance.

Key strategies for conservation include providing a pesticide-free insect food source and preventing human disturbance in or near winter hibernation sites and nursery roosts. Large snags and stands of old growth should be retained for use as roost sites (Natureserve, 2011).

Western Gray Squirrel
Western gray squirrels are listed as a Washington state threatened species, and have experienced great reductions in numbers and distribution in the 20th century (Linders and Stinson, 2007). They are a sensitive species in Region 6. Historically, they were widely distributed across the state in oak, ponderosa pine, and Douglas-fir forests. Three separate populations occur now, in the Puget Trough, Klickitat, and Okanogan regions.

Western gray squirrels use low elevation multi- and single-storied nut-producing forests such as ponderosa pine, although they may additionally use young managed and unmanaged stands. They may use cavities or nests in snags or live trees, and nests are usually surrounded by closed canopies to facilitate arboreal travel (Wisdom et al. 2000). Food sources are seeds, nuts, and fungi. Threats to the population include habitat loss, disease, and mortality by vehicles (Linders and Stinson, 2007).

Blue-gray taildropper
The blue-gray taildropper is a terrestrial slug that primarily eats fungi, although lichen and plant material may also be eaten (NatureServe 2010). It is found in a variety of forest types and plant communities, including conifer-hardwood and mixed conifer stands. It is most often found in moist, late-successional forests where it is associated with conifer logs, hardwood species such as big-leaf maple, deep litter, fungi and mosses (Burke, 1999). In Washington, Burke and Hanson found it in a western hemlock/sword fern plant association, under bark and among mosses under conifer logs and under bits of small, usually conifer debris.

The blue-gray taildropper is listed as "critically imperiled" in the state of Washington by NatureServe (NatureServe 2010), and is a "survey and manage" species. A decade of surveys for this species on the Okanogan-Wenatchee National Forest has failed to locate them, and habitat is limited on forest. There are no known sites for blue-gray taildroppers on the Okanogan-Wenatchee National Forest.

For many slugs and slug-like species, including the taildroppers, absence of suitable moisture can serve as a barrier to movement (Frest and Johannes, 1995). The presence of roads and trails may affect this species by fragmenting habitat and affecting movement similar to that demonstrated by Meadows (2002) for landsnails.

Chelan mountainsnail

The Chelan mountainsnail is a terrestrial snail known to occur only in northeastern Chelan County, and although surveys have been conducted in Okanogan County none have been found (NatureServe 2010).

This species has been found in association with talus, near ridgetops, small draws, benches, and depressions. It has been found in open dry forests (ponderosa pine and Douglas-fir) edges with pinegrass or elk sedge (Burke 1999c).

The Chelan mountainsnail is listed as "critically imperiled" in the State of Washington by NatureServe (NatureServe 2011) due to small isolated populations, limited range, and significant threats from fire.

It is also a "Survey and Manage" and strategic species for Region 6. Strategic species are not sensitive species, and do not need to be addressed in biological evaluations. Information is generally limited on strategic species in terms of distribution, habitat, threats, or taxonomy, and conservation status may be unclear. For the Chelan mountainsnail, the taxonomy is unclear and the species is not yet described.

There is potential for new roads and trails to fragment habitat and create barriers for snails. Meadows (2002) demonstrated that pathways create barriers to movement for the Ogden Rocky Mountain snail (Oreohelix peripherica wasatchensis), a similar landsnail. He concluded that this snail's habitat may be fragmented by pathways into numerous subpopulations that may be genetically divergent, as has been shown for other snails (Selander and Kaufman 1975).

Pygmy Nuthatch

Pygmy nuthatches are cavity nesters associated with old growth ponderosa pine. Their diet is seeds and arthropods.

Conservation status is secure (Natureserve, 2011). The Northwest Forest Plan provides additional protection for this species, in matrix land allocations, by adding mitigation standards and guidelines for maintaining adequate numbers of large snags and green-tree replacements for future snags within the range of the nuthatch.

Logging, fire, human development, road construction degrade habitat for this species, due to loss of large trees and reductions in dead and defective trees that produce cavities for nesting (Kingery and Ghalambor, 2001). Pygmy nuthatches are affected by the removal of snags along roads for firewood and safety, and the edge effects of roads on their habitats (Wisdom, 2000). Roads and trails may influence habitat use, as well (Miller et al. 1998).

Hermit Thrush

Hermit thrushes are a focal species for multi-layered mixed conifer forests and for mixed conifer (late-successional) forests. Their breeding range is boreal and mountainous conifer forests north of Mexico. Migratory movements are to lower elevations and southward, and they winter in North and Central America. Hermit thrushes are omnivores that use arthropods, amphibians, reptiles and a variety of fruits. Snags are used for foraging, singing posts and cover.

They are one of the most widely distributed forest-nesting migratory birds in North America and the only forest thrush whose population has increased or remained stable over the past 20 years (Dellinger et al. 2012).

Hermit thrushes are associated with old growth (Haney, 1999), closed canopy forests and forest interiors (Niemi and Hanowski 1984) and forest interiors (Thomas 1979, Gillespie and Kendeigh 1982, Sedgwick 1987). They may be sensitive to forest management, particularly activities that fragment forest habitat. Clear cuts and burned areas are avoided by hermit thrushes. Fire has resulted in short-term avoidance of burned areas, but longer-term effects were dependent on intensity, scale and vegetation changes (Dellinger et al. 2012). Prescribed burning on the Wenatchee National Forest resulted in increased relative abundance 3 years post-burn, where 23-51% of the treatment unit was burned (Gaines et al. 2010).

They are less abundant at sites with human intrusions (Gutzwiller and Anderson 1999). One study found that although size of campgrounds and number of campsites did not affect the presence of hermit thrushes, campgrounds were found to reduce the probability of breeding either due to fewer attempts or reduced success, causing birds to abandon territories in campgrounds. The negative effects extended to the edge of campgrounds (Rosenberg et al. 2004).

Climate change and collisions with towers and buildings are threats to thrushes. Alteration of habitats (loss of understory and structural complexity) from fire, grazing, and winter recreational activities are also considered a conservation issue (Altman, 2000). Altman (2000) recommends retention of tracts of forest as unmanaged or lightly managed to ensure structural diversity for this species.

Dry Mesic Habitat

Methods

Access to dry and mesic habitat was measured by comparing miles of motorized routes occurring or proposed in each habitat type to compare effects of use of the transportation network- mortality by vehicle strikes, potential disturbance, displacement and avoidance, and edge effects.

Analysis Area

The analysis area is the dry and mesic habitat across the forest.

Existing Condition

The dry and mesic habitat types are the lowest elevation forest habitats, and comprise more than one-third of the forest.

Maintenance Level 1 Roads

There are 6,584 miles of roads and motorized trails bisecting this habitat type, including 2,190 miles of ML 1 roads. Use of these roads can disturb the Dry Mesic species and impact important sites, such as nest or den sites. The use also creates the potential for vehicle strikes, collection of young (falconry) and crushing of wildlife species. Motorized vehicles using maintenance level 1 roads are contributing to these impacts. The following table displays the miles of road and motorized trail in each subbasin.

Table *. Existing Motorized Access in Dry and Mesic Habitats

subbasin	***Total Motorized miles***
Chief Joseph	3
Kettle	175
Lake Chelan	183
Lower Yakima	1
Methow	1,408
Naches	969
Okanogan	527
Sanpoil	339
Similkameen	13
Upper Columbia-Entiat	856
Upper Skagit	6
Upper Yakima	767
Wenatchee	1,276
Forest totals	***6,584***

Cross Country Motorized Travel

Currently, cross-country travel could potentially occur on approximately 366,333 acres in dry or mesic habitat (considering land allocation, slope, vegetation, and accessibility), which is approximately 1/4 of the total dry or mesic habitat across the forest. This is reducing habitat effectiveness for species associated with the dry and mesic habitat types and potentially fragmenting habitat for species with low mobility, such as Chelan mountainsnails and blue-gray taildroppers. Cross country trails that develop from this use remove vegetation, becoming a barrier to movement for these species. There is also potential for crushing of snails during cross-country motorized travel. Motorized cross-country travel is not likely to be affecting western gray squirrels (through vehicle collisions) due to the lower speeds necessary off-road. It is unknown whether this use has any effect on the ability of falconers to collect goshawk chicks. Disturbance to species in the areas that receive cross-country use is likely occurring, causing displacement or avoidance of habitat.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is occurring in a fairly unrestricted manner in many parts of dry mesic habitat. The use is contributing to disturbance of species using this habitat, and potentially displacing some. It is also possible that the motorized access is fragmenting habitat and causing mortality to snails from crushing.

Environmental Consequences

Direct and Indirect Effects

The following table displays changes to motorized access on roads and motorized trails in dry and mesic habitats, from the current condition, alternative A.

Table *. Miles of Open Roads and Motorized Trails in Alternatives, and Comparative Changes

	Alternative A	*Alternatives B, C, and D*	
	Total Motorized miles	*Total Motorized miles*	*Decrease in Motorized Miles between Alternative A, and the Action Alternatives*
Chief Joseph	63	43	20
Kettle	176	99	77
Lake Chelan	183	161	22
Lower Yakima	1	1	0
Methow	1,408	812	596
Naches	969	803	166
Okanogan	527	276	251
Sanpoil	339	144	194
Similkameen	13	8	5
Upper Columbia-Entiat	856	501	355
Upper Skagit	6	3	3
Upper Yakima	767	608	159
Wenatchee	1,276	936	341
Forest totals	***6,584***	***4,395***	***2,190***

No changes are proposed to the open Forest road system where firewood cutting and danger tree removal occur (ML 2-5), so no change to snag levels are expected from travel management decisions.

Alternative A

Maintenance Level 1 Roads

Alternative A would not change motorized access to the dry and mesic habitat types from roads and motorized trails. Disturbance to species and important sites and potential for vehicle collisions would remain at the current levels.

Cross-country Motorized Travel

Cross-country motorized travel would continue, would reduce habitat effectiveness for species associated with the dry and mesic habitat types, and would potentially fragment habitat for species with low mobility, such as Chelan mountainsnails and blue-gray taildroppers, as the cross-country trails become more established and remove vegetation, becoming a barrier to movement for these species. Habitat fragmentation would also potentially affect pygmy nuthatches, which are sensitive to edge effects.

There is potential for crushing of snails during cross-country motorized travel. Considering land allocation, slope, vegetation, and accessibility, cross-country travel could potentially occur on approximately 366,333 acres in dry or mesic habitat, which is approximately 25% of the total dry or mesic habitat. Motorized cross-country travel is not likely to affect western gray squirrels (through vehicle collisions) due to the lower speeds necessary off-road. It is unknown whether this use has any effect on the ability of falconers to collect goshawk chicks.

Disturbance to species that may be sensitive to human presence such as Townsend's big-eared bats (at nursery roost sites) and hermit thrushes in the areas that receive cross-country use could occur and cause displacement or avoidance of habitat.

Motorized Access for Dispersed Camping

Corridors would not be designated with alternative A, and access for dispersed camping would continue in a fairly unrestricted manner. In time, new routes may be used, which would increase potential for crushing snails, fragmenting habitat and disturbing species through noise and human presence.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

Implementation of Alternative B, C, or D would reduce the miles of motorized roads and trails by approximately 33% (2,190 miles) by prohibiting motorized vehicles on maintenance level 1 roads. This would benefit dry mesic species by reducing the potential for human disturbance and displacement. Vehicle strikes and crushing mortality from motorized vehicles on maintenance level 1 roads would cease. Access for falconry would continue, by walking rather than driving, which could discourage the activity.

Cross Country Motorized Travel

Alternatives B, C, and D would close the forest to motorized cross-country travel (estimated at 366,333 acres (25%) in the dry and mesic habitats), which would substantially increase habitat effectiveness for species associated with the dry and mesic habitat types, by reducing potential for human disturbance. Closure to cross-country motorized travel would also reduce potential for fragmentation of habitat for pygmy nuthatches, Chelan mountainsnails and blue-gray taildroppers and reduce the potential for mortality by crushing over approximately 25% of the dry mesic habitat.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate corridors where access could occur on existing routes, on 28,943 acres in the dry and mesic habitat. Alternative C would designate 26,232 acres of corridors in dry mesic habitat, while Alternative C would designate 58,951 acres.

Table *. Acres and Percent of Corridors in Dry/Mesic Habitat, by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Corridors in Dry/Mesic Habitat	28,943	26,232	58,951
Percent of Total Dry/Mesic Habitat in Corridors	2%	2%	4%

Motorized vehicles would be restricted to using existing access routes within corridors, so very little vegetation damage would be anticipated. The access routes would continue to be potential barriers for snails, causing some habitat fragmentation. The potential impacts would be reduced with implementation of these alternatives, however, compared to Alternative A.

Alternatives B, C, and D would slightly increase habitat effectiveness for species associated with the dry and mesic habitat types by reducing the potential for fragmentation of habitat for Chelan mountainsnails and blue-gray taildroppers, and reducing the potential for human disturbance and displacement from habitat for species using this habitat type within corridors, including goshawks, Townsend's big-eared bats, western gray squirrels,pygmy nuthatches, and hermit thrushes.

Cumulative Effects

Geographic Boundary

The geographic boundary is the forested area in dry and mesic habitat types and the 4th field subbasins associated with this area, including the other land ownerships.

Temporal Boundary

The temporal boundary is the time since European settlement in Washington. Forested habitats in Washington were reduced in the 1800s and early 1900s through logging, fire, farming, and development. Forest management activities began affecting dry and mesic habitats in the early 1900s with timber harvest, fire suppression, and road and trail construction and use. These activities continue to affect dry and mesic habitats.

Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Past Actions

Altman (2000a, b) and Altman and Holmes (2000) noted that for the landbirds, the primary changes have been the loss of old forest habitat due to intensive timber harvesting, the change in composition of forest types and conditions of coniferous forest, and the degradation of habitats (e.g., ponderosa pine forest) from a number of factors including fire suppression, over-grazing, invasion of exotic vegetation and human development. On private land, forested areas were converted to agricultural use and urbanization occurred, resulting in habitat loss and fragmentation. Loss of snags through firewood and danger tree cutting has reduced nest and foraging sites for many species. The loss and alteration of historic vegetation communities has impacted landbird habitats and resulted in species range reductions, population declines, and some local and regional extirpations.

These changes have also affected habitats for other species associated with the dry and mesic habitats. Western gray squirrels experienced habitat losses in the 20th century from urbanization and other development, logging, fire exclusion, and historic over-grazing that have left the 3 remaining populations genetically isolated (Linders and Stinson, 2007). Townsend's big-eared bats may have been affected by past harvest of old-growth stands and use of pesticides which may have reduced their insect food source. Little is known about the Chelan mountainsnail or blue-gray tail-dropper, but activities that changed the moisture conditions of their forest habitat, such as logging and development may have caused changes in populations and distribution of these species. Of the focal species, the loss of snags degraded habitat for pygmy nuthatches and hermit thrushes.

Ongoing Actions
Ongoing actions that may affect the dry and mesic habitats and the species associated with them are firewood cutting and danger tree removal from recreation areas and along open roads, which would result in fewer snags and later, down wood. Snags are used for nest sites by white-headed woodpeckers, western gray squirrels and many other species. Firewood cutting is allowed along roads across much of the forest, except in late-successional reserves, riparian reserves and administratively withdrawn areas. Danger tree removal is practiced along the forest road network and in recreation and administrative sites.

Wildfire suppression is also ongoing, and allows denser forest to develop because understories continue to grow where they would have been reduced by wildfire. This would improve habitat for species associated with closed canopies, such as the hermit thrush, but would be less suitable for species like the white-headed woodpecker that use more open forest. In the longer term, fire suppression leads to fuel accumulation, which may result in more intense fires, in turn leading to loss of pre-fire snags and down wood. More intense wildfires over large areas may result in starvation for the snail species, since the snails have limited ability to make long-distance movements to forage. Fuels treatment projects are on-going across the forest to mitigate fuel accumulation.

Ecosystem management objectives incorporated into the Okanogan and Wenatchee Forest Plans from the Northwest Forest Plan (USDA and USDI, 1994) and Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales (1995)(Regional Forester's Amendment #2) establish direction for retention of large trees, snags and large down wood which mitigate the effects of current timber harvest on white-headed woodpeckers and other species that use these components.

The Peshastin and Chumstick project will decommission 52 miles of road in the Wenatchee subbasin. Approximately 39 miles will be decommissioned in the dry and mesic habitat. This will further reduce the potential for reduction of disturbance at sensitive sites, displacement, and mortality from collisions, crushing, hunting, and trapping.

Reasonably Foreseeable Future Actions
Future actions that are planned in and around the Okanogan-Wenatchee National Forest that would act cumulatively with travel management proposals, to affect dry and mesic habitats and species associated with this habitat type, are summarized in the table below. See Reasonably Foreseeable Actions (earlier in this chapter) for locations of these projects.

Table *. Reasonably Foreseeable Future Actions Potentially Affecting Dry Mesic Habitat

Project type	Potential negative or beneficial effect	Possible effect to species associated with dry and mesic habitats and associated species
Restoration- timber harvest, thinning, fuels reduction projects	Negative and Beneficial	Fragmentation of forest structure, loss of snags, down wood. May accelerate development of late, old structure, reduce risk of wildfire to important habitats, or aid in restoring ecosystem structure, function or components. Opens canopy, which is beneficial to some species associated with dry or mesic habitats and a negative effect to species preferring closed canopy.

Road, trail and motorized area construction, reconstruction, relocation and use.	Negative	May result in loss of large trees and snags. Increases or improves motorized access which can result in collisions, and may result in disturbance or avoidance of travelway and adjacent important habitat. Could be a barrier for snails (surveys required in appropriate habitat).
Road and trail decommissioning and closures	Beneficial	Reduces potential for disturbance, vehicle strikes, and loss of snags as danger trees or firewood.
Recreation and Mining	Negative	May result in loss of large trees and snags and additional disturbance by humans.

Large landscape plans, such as the Northwest Forest Plan, Regional Forester Amendment #2 and Okanogan-Wenatchee's Restoration Strategy provide guidance for management of landscapes which will benefit the species associated with dry and mesic habitats by conserving important habitat elements during future projects. Regional Forester Amendment #2 prohibits cutting of large trees (greater than or equal to 21 inch dbh) and provides for snag retention, which will benefit species using large trees, snags and down wood. Many future forest vegetation management activities are intended to restore ecosystem structure, function or components, reduce wildfire risk to important habitats, or improve forest health, and incorporate design or mitigation measures to reduce negative effects to species using late-successional elements. This would result in long-term benefits to these sensitive, MIS, and focal species. Additional protection is afforded to white-headed woodpeckers, pygmy nuthatches, black-backed woodpeckers and flammulated owls by the Northwest Forest Plan, which directs the retention of snags and green tree replacements to provide for the 100% population potential for these species during timber harvests.

The Washington Department of Natural Resources (WDNR) and several companies that own large blocks of timberland in Washington have developed Habitat Conservation Plans with the U. S. Fish and Wildlife Service, committing to long-term (50-100 year) plans to protect selected species of birds and mammals. Some of these plans have habitat management provisions likely to benefit species using snags, large trees and down wood in dry and mesic habitats.

Federal projects where threatened or endangered species are potentially present will undergo consultation with U.S. Fish and Wildlife Service and will include mitigation to reduce negative effects to threatened and endangered species. Those mitigations that would be implemented to reduce effects to spotted owls would also benefit species using late-successional habitats or structures such as large trees, snags and down wood. State actions go through a similar process.

Minimum Roads Analysis is currently being conducted in several watersheds across the forest, and decision documents stemming from these analyses would likely result in additional net reductions of open roads. Specifics are not known at this time for most of the analyses. The Chewuch Transportation Plan proposal would result in decommissioning of 118 miles of system road in the Methow subbasin. An estimated 84 miles passes through dry or mesic habitat. This would further reduce the potential for reduction of disturbance at sensitive sites, displacement, and mortality from collisions, crushing, hunting, and trapping.

Several other projects would have a net effect of reducing road densities by decommissioning roads across the forest over the next decade. Swauk Pine (Cle Elum RD), South Summit 2 (Methow Valley RD), Little Crow (Naches RD), Annie and Light (Tonasket RD) would result in net road reduction of approximately 111 miles. Other projects would add motorized trails (Naches, Little Crow learner loops 3.4 miles) and allow cross-country access (Cle Elum, Ferris Hard Rock mining project).

Non-federal actions that continue to affect this habitat type include agriculture, residential and urban development on private lands, including the expansion of the road network which has fragmented habitat and removed snags and large trees.

Cumulative Effects Summary

Species associated with dry and mesic habitats on the Forest have been affected by habitat loss, degradation and fragmentation due to timber harvest, fire suppression, firewood gathering and roads and trails that allow access and human disturbance. Travel management actions would reverse the negative trend by reducing access and disturbance. Large-scale plans such as the Northwest Forest Plan, Regional Forester's amendment #2, and the Restoration Strategy establish direction or guidelines for retention of important habitat components (snags, down wood, large trees). This beneficial effect to habitat is partially offset by increasing urbanization and road densities on private lands, another source of permanent habitat loss.

Alternative A

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternative A would be a reduction in the net motorized access to the Forest as a result of road decommissioning projects. Continued cross country motorized travel and use of maintenance level 1 roads would result in the improvements being concentrated around newly decommissioned roads, as opposed to the more wide-spread cumulative benefits expected with implementation of Alternative B, C, or D.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D would be reduction in the net motorized access to the Forest, which would reduce potential for fragmentation of habitat for Chelan mountainsnails and blue-gray taildroppers, reduce the potential for mortality by crushing or vehicle strikes, and reduce potential for human disturbance and displacement from habitat for species using this habitat type.

Determination for goshawks, western gray squirrels, Townsend's big-eared bats and bluegray tail droppers (sensitive species)

Alternative A may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Over time, additional routes are expected to develop from motorized cross-country travel, which could lead to habitat fragmentation and crushing (of snails) and disturbance to sensitive sites.

Alternatives B, C, and D would have a beneficial impact on these species, due to the closure of nearly 2,200 miles of maintenance level 1 roads and the closure of the forest to cross-country motorized travel over approximate 25% of the habitat, which would reduce disturbance to these species and dry/mesic habitats. It would reduce the potential for crushing and habitat fragmentation for bluegray taildroppers, access for collection, and disturbance to sensitive sites.

Compliance with Laws and Regulations

Alternative A does not comply with the Northwest Forest Plan for management of survey and manage species (blue-gray taildropper and Chelan mountainsnail). Continued cross country travel could result in additional habitat fragmentation and mortality by crushing, if it occurs where these species are found. It is not known where cross country travel would occur, so pre-disturbance surveys have not been completed.

It is unclear whether alternative A is consistent with NFMA or the Forest Plans' direction for sensitive species. Habitat for the blue-gray taildropper, a sensitive species, would not be protected from cross country travel. However, the species has not been found on the Okanogan Wenatchee National Forest. Alternative A would be consistent with the Migratory Bird Treaty Act.

Alternatives B, C, and D would be consistent with the National Forest Management Act, the Migratory Bird Treaty Act, and the Forest Plan standards and guidelines for the Okanogan and Wenatchee Forest Plans for sensitive species. Sensitive species would be protected through closure to cross-country travel and closure of ML 1 roads in the action alternatives B, C and D.

Alternatives B, C and D comply with the Northwest Forest Plan for survey and manage species. Habitat for these species is present, and action alternatives would prohibit cross country travel, which may fragment habitat and lead to mortality by crushing for these species.

Cold Moist Habitat

Regulatory Framework- see general Wildlife regulatory framework.

Cold Moist Habitat Species

The following table includes the sensitive, survey and manage, and landbird species associated with cold moist habitat.

Great gray owl	Sensitive, and Survey and Manage Species
Little Brown myotis	Sensitive Species
Brown creeper	Focal Landbird Species
Townsend's warbler	Focal Landbird Species
Olive-sided flycatcher	Focal Landbird Species

Fishers are proposed for Federal listing as threatened under the Endangered Species Act, and have been discussed in that section of this report.

Alternatives B, C, and D do not include ground-disturbing actions, and none of the alternatives (including alternative A) result in changes to snag levels across the forest, so no effects to species (other than fisher, above) are expected. Effects to cold/moist habitat will be displayed below.

Cold Moist Habitat

Existing Condition

On the Okanogan-Wenatchee National Forest, the cold, moist habitat type habitat is present in varying amounts across the forest subbasins. The table below displays the amount of habitat by subbasin.

Table *. Cold Moist Habitat by Subbasin

Cold, Moist Habitat by Subbasin (NFS land only)		
	Cold, Moist Habitat type (acres)	Portion of Subbasin with Cold, Moist Habitat

Chief Joseph	334	2%
Kettle	19,352	26%
Lake Chelan	121,630.0	30%
Methow	207,034	21%
Naches	247,107	45%
Okanogan	19,802	14%
Sanpoil	15,070	17%
Similkameen	79,968	38%
Upper Columbia-Entiat	85,001	29%
Upper Skagit	103,175	52%
Upper Yakima	281,331	57%
Wenatchee	360,255	46%
Forest totals:	***1,540,061***	***36%***

Maintenance Level 1 Roads

The following table displays the current amount of motorized and non-motorized access to this habitat type by subbasin. Motorized use on maintenance level 1 roads contributes to the reduction in habitat quality because of the risks of disturbance, displacement and mortality from vehicle collisions, hunting and incidental trapping.

Table *. Miles of Road and Trails Within Cold Moist Habitat by Subbasin

	Motorized Miles	***Non-motorized Miles***	***Total Miles of Access***
Chief Joseph	1	0	1
Kettle	86	2	88
Lake Chelan	51	105	156
Methow	199	199	398
Naches	555	201	756
Okanogan	72	5	77
Similkameen	6	99	104
Upper Columbia-Entiat	262	51	314
Upper Skagit	33	47	80
Upper Yakima	945	248	1,194
Wenatchee	608	351	958
Forest totals:	***2,882***	***1,310***	***4,193***

Cross Country Motorized Travel

Cross country motorized travel has the potential to reduce the quality of cold moist habitat by increasing the risk of vehicle collisions or incidental trapping. A rough estimate of the amount of cross-country travel potential in the cold moist habitat type is that 180,293 acres are potentially receiving cross-country motorized use. This is approximately 8.5% of the total cold moist habitat type.

Motorized Access for Dispersed Camping

Motorized access to dispersed camping occurs in a fairly unrestricted fashion within cold moist habitat. This has the potential to result in disturbance of the species and collisions, therefore reducing the quality of cold moist habitat.

Environmental Consequences

Direct and Indirect Effects:

The following table displays the miles of open road and motorized trail within cold moist habitat, and the changes from the current condition, alternative A.

Table *. Change in Motorized Access in Cold Moist Habitat by Alternative

	Alternative A/Existing Condition	***Alternative B,C and D***	***Decrease in Motorized Access Comparing Action Alternative to Existing and Alternative A***
	miles	***miles***	***miles***
Chief Joseph	1	1	0
Kettle	86	57	29
Lake Chelan	51	46	5
Methow	199	155	44
Naches	555	463	92
Okanogan	72	48	24
Similkameen	6	3	3
Upper Columbia-Entiat	262	183	80
Upper Skagit	33	32	1
Upper Yakima	946	770	175
Wenatchee	607	496	112
Forest totals:	***2,883***	***2,288***	***595***

Alternative A

Maintenance Level 1 Roads

Alternative A would not close maintenance level 1 roads, or change motorized access to the cold, moist habitat type from roads and motorized trails. The potential for disturbance, displacement and avoidance, and mortality by vehicle strikes would remain at the existing level.

Cross Country Motorized Travel

Cross country motorized travel would potentially continue on the estimated 180,293 acres of cool/moist habitat type. The existing impacts to habitat, including disturbance and displacement, and the risk of collisions with vehicles, would continue. This would continue to reduce the effectiveness of the habitat for the species that use this habitat type.

Motorized Access for Dispersed Camping

Alternative A would not designate corridors, and motorized access to dispersed camping would continue in a fairly unrestricted fashion. Potential for disturbance and collisions would remain at the present level in the short-term, but would likely increase over time.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

The closure of maintenance level 1 roads to motorized vehicles in Alternatives B, C, and D would reduce the motorized access from the current condition. This would improve cold moist habitat by reducing:
potential for human disturbance which could lead to displacement or avoidance of important habitats or rest and den sites, potential for mortality through vehicle strikes, access for hunting and trapping.

Cross Country Motorized Travel

Alternatives B, C, and D would close the forest to cross-country travel, which would increase habitat effectiveness for the species using cold moist habitat by reducing potential for human disturbance, displacement, and access for hunting and trapping. The estimated 180,293 acres of cool-moist habitat type currently open to cross country travel would no longer receive this use.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate corridors where motorized access could occur on existing routes, in 9,145 acres in the cold moist habitat, or approximately 0.6% of the habitat. Alternative C would designate 6,917 acres corridors in cold moist habitat type (0.4% of the habitat), while Alternative D would designate 23,060 acres (about 1.5% of habitat).

Table *. Acres and Percent of Corridors in Cold Moist Habitat, by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Corridors in Cold Moist Habitat	9,145	6,917	23,060
Percent of Total Cold Moist Habitat	0.6%	0.4%	1.5%

Implementation of any of these alternatives would benefit the cold moist habitat by reducing motorized access for dispersed camping compared to the effects of Alternative A. These alternatives would limit where the activity could occur, and, within the corridors, restricting motorized vehicles to established routes only, not farther than 300 feet from the road, and not closer than 100 feet to water.

Alternative D would designate more acres of corridors in cold moist habitat than Alternatives C or B, but the overall percentage of late successional habitat impacted by any alternative would be small. Within the corridors, however, motorized vehicle access would reduce the habitat quality because of displacement, disturbance, and the potential for mortality from vehicle collisions, hunting, and trapping.

Cumulative Effects

Analysis Area

Geographic boundary for Cumulative Effects- The geographic boundary is the forested area in cold, moist habitat types and the 4th field subbasins associated with this area, including the other land ownerships.

Temporal boundary- The temporal boundary is the time since European settlement in Washington. Forested habitats in Washington were reduced in the 1800s and early 1900s through logging, fire, farming, and development. Forest management activities began affecting cold, moist habitats in the early 1900s with timber harvest, fire suppression, and road and trail construction and use. Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Past Actions

Human actions that have had the greatest impact on species associated with cold, moist habitats are habitat loss and fragmentation from timber harvest and development of National Forest and other ownership lands. Poisoning of rodents and overgrazing of foraging areas, which reduced prey species, may also have affected great gray owls (Bull and Duncan, 1993).

In the Okanogan-Wenatchee National Forest, timber harvest and wildfire suppression have changed vegetation characteristics at the stand and landscape scale. Timber harvest reduced canopy closures, snags and down wood, structures important as nesting, roosting, perching and foraging sites. Wildfire suppression interrupted natural disturbance patterns and changed composition and structure of forested lands, later resulting in larger, more intense fires.

On private land, forested areas were converted to agricultural use and urbanization occurred, resulting in habitat loss and fragmentation.

Ongoing Actions

Ongoing actions that may affect cold moist habitat and the species associated with it are firewood cutting and danger tree removal from recreation areas and along open roads, which would result in less availability of snags and later, down wood. Snags are used for nest sites by great gray owls, brown creepers and Vaux's swift, and for singing and foraging perches for olive-sided flycatchers. Firewood cutting is allowed along roads, across the forest, except in late-successional reserves, riparian reserves and administratively withdrawn areas.

Wildfire suppression is also ongoing, which allows denser forest to develop. This would improve habitat for fishers, Townsend's warblers and brown creepers in the short-term, which are associated with closed canopies. In the longer term, fire suppression leads to fuel accumulation, which may result in more intense fires, resulting in canopy removal and less suitable habitat. Fuels treatment projects are on-going across the forest to mitigate fuel accumulation.

Ecosystem management objectives incorporated into the Okanogan and Wenatchee Forest Plans from the Northwest Forest Plan (USDA and USDI, 1994) and Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales (1994)(Regional Forester's Amendment #2, "Eastside Screens") establish direction for snags and large down wood which mitigate the effects of current timber harvest on fisher habitat.

The Peshastin and Chumstick project will decommission 52 miles of road in the Wenatchee subbasin. Approximately 10 miles will be decommissioned in the cold moist habitat. This will further reduce the potential for reduction of disturbance at sensitive sites, displacement, and mortality from collisions, crushing, hunting, and trapping.

Reasonably Foreseeable Future Actions

Actions that are planned in and around the Okanogan-Wenatchee National Forest that would act cumulatively with travel management proposals, to affect cold, moist habitats and species associated with this habitat type, are summarized in the table below. See Reasonably Foreseeable Actions (earlier in this chapter) for locations of these projects.

Project type	Potential negative or beneficial effect	Possible effect to species associated with Cold Moist Habitats?

Vegetation Management-timber harvest, thinning, fuels reduction projects	Negative and Beneficial	Simplification and fragmentation of forest structure, loss of snags, down wood, opening of canopy. May accelerate development of late, old structure, reduce risk of wildfire to important habitats, or aid in restoring ecosystem structure, function or components.
Road, trail and motorized area construction, reconstruction, relocation and use.	Negative	May result in loss of large trees and snags. Increases or improves motorized access which can result in incidental trapping and collisions, and may result in avoidance of travelway by prey species.
Road and trail decommissioning and closures	Beneficial	Reduces potential for disturbance, vehicle strikes and incidental trapping, and loss of snags as danger trees or firewood.
Grazing	Negative	Could result in loss of vegetation for rodent species used by great gray owls.
Recreation and Mining	Negative	May result in loss of large trees and snags and additional disturbance by humans.

Large landscape plans, such as the Northwest Forest Plan, the Eastside Screens and Okanogan-Wenatchee's Restoration Strategy provide guidance or direction for management of landscapes which will benefit the sensitive and focal species associated with cold, moist habitat by conserving important habitat elements. The East-side screen direction prohibits cutting of large trees (greater than or equal to 21 inch dbh) and provides for snag retention, which will benefit species using large trees, snags and down wood. Many forest vegetation management activities are intended to restore ecosystem structure, function or components, reduce wildfire risk to important habitats, or improve forest health, and incorporate design or mitigation measures to reduce negative effects to species using late-successional elements. This would result in long-term benefits to these sensitive and focal species.

The Washington Department of Natural Resources (WDNR) and several companies that own large blocks of timberland in Washington have developed Habitat Conservation Plans with the U. S. Fish and Wildlife Service, committing to long-term (50-100 year) plans to protect selected species of birds and mammals.   Some of these plans have habitat management provisions likely to benefit species using snags, large trees and down wood.

Federal projects will undergo consultation with U.S. Fish and Wildlife Service, and will include mitigation to reduce negative effects to threatened and endangered species. Those mitigations that would be implemented to reduce effects to spotted owls would also benefit species using late-successional habitats or structures.   State actions go through a similar process.

Minimum Roads Analysis is currently being conducted in several watersheds across the forest, and decision documents stemming from these analyses would likely result in additional net reductions of open roads. Specifics are not known at this time for most of the analyses. However, the Chewuch Transportation Plan proposal would result in decommissioning approximately 9 miles of road in the cold moist habitat type in the Methow subbasin.

Other projects that may involve road decommissioning in the cold moist habitat type include Little Crow Restoration (Naches), Swauk Pine Restoration (Cle Elum), Crawfish,Annie and Light projects (Tonasket). Little Crow also adds several miles of motorized trail, some of which may be in the cold moist habitat. These projects would result in a net reduction in motorized routes on the Forest.

Non-federal actions that continue to affect this habitat type include agriculture, residential and urban development on private lands, which has fragmented habitat and removed contiguous forest canopy.

Cumulative Effects Summary

While past actions of timber harvest and wildfire suppression, road and trail construction, loss, degradation and fragmentation of forest habitat and ongoing actions (use of the roads and trails, loss degradation, and fragmentation of forest habitat) have resulted in negative effects to species associated with this habitat type, the action alternatives would be beneficial to these species by reducing access that could result in disturbance and snag loss. This beneficial effect to habitat is offset by increasing urbanization and road densities on private lands, another source of permanent habitat loss.

Alternative A

The cumulative effects of the past, present, and reasonably foreseeable future actions and Alternative A would be a reduction of the net motorized access to the Forest as a result of road decommissioning associated with other projects. This would somewhat reduce potential for disturbance, displacement and avoidance of habitat near motorized routes, and reduce loss of snags and large woody debris, but to a lesser degree than the cumulative effect of Alternatives B, C, or D.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and alternatives B, C or D would be a reduction of the net motorized access to the Forest, which would reduce potential for vehicle strikes, reduce access for trapping, reduce potential for disturbance, displacement and avoidance of habitat near motorized routes, and reduce loss of snags and large woody debris.

Compliance with Laws and Regulations

Alternatives A, B, C and D would be consistent with the National Forest Management Act, Migratory Bird Treaty Act and Forest Plan standards and guidelines for the Okanogan and Wenatchee Forest Plans. Sensitive species would be protected by reduction of access through closure to cross-country travel and ML1 roads in alternatives B, C, and D but not in Alternative A.

Cold Dry Habitat

Introduction

The cold dry habitat type is the highest elevation forest type which includes alpine and subalpine habitats.

Regulatory Framework- see general Wildlife regulatory framework.

Cold Dry Habitat Species

The following table includes all sensitive, survey and manage, and landbird species dependent on cold dry habitat.

Cascade red fox	Sensitive Species
North American wolverine	Sensitive Species
Clark's nutcracker	Focal Landbird Species
Gray-crowned rosy finch	Focal Landbird Species
Hermit thrush	Focal Landbird Species

North American Wolverine

Wolverines are a sensitive species in Region 6 and were recently considered for listing as a threatened species under the Endangered Species Act. In August 2014, the Fish and Wildlife Service determined that the effects of climate change were not likely to place the wolverine in danger of extinction now or in the foreseeable future and the proposal for listing was withdrawn. In April, 2016, this decision was vacated by the Montana District Court, who found the decision against listing the wolverine as threatened to be arbitrary and capricious.

Wolverines (*Gulo gulo*) are wide-ranging carnivores that cover large areas during their annual movements (Hornocker and Hash 1981, Banci 1994, Moriarty et al. 2009, Inman, 2009, Copeland and Yates 2006). They historically occurred throughout the subalpine coniferous regions of North America and in the western mountain regions as far south as California (Hash 1987, Banci 1994, Aubry et al. 2007) and in the Great Lakes region (deVos, 1964, Aubrey et al. 2007), where snow cover persisted through the spring (Aubrey et al. 2007). The range of wolverines has declined by as much as 37% (Laliberte and Ripple 2004), partly due to reductions in distribution of prey since the mid-1800s (Lofroth, 2007) and human activities such as mining, trapping, high elevation sheep grazing, and poisoning. (Aubrey et al. 2007). Wolverine population and range declines in central and eastern Canada have been attributed to human exploitation (van Zyll de Jong 1975).

Wolverines are largely scavengers, and use a wide variety of small mammals, birds, carrion, fruit, insects and berries. Carrion constitutes a large portion of wolverine diets, especially in winter (Hornocker and Hash 1981; Hash 1987; Banci 1994). Home ranges of wolverines are large, and vary greatly in size depending on availability of food, gender and age of the animal, and differences in habitat quality (USFWS, 2010). In the lower 48 state, adult female home ranges varied from 55 square miles in Glacier National Park (Copeland and Yates 2006) to 148 square miles in central Idaho (Copeland, 1996). Male home ranges varied from 193 square miles in Glacier National Park (Copeland and Yates 2006) to 588 square miles in central Idaho (Copeland, 1996).

Female wolverines move to higher-elevation environments for denning and rearing kits (Magoun and Copeland 1998, Krebs and Lewis 2000, Lofroth 2001), often locating dens in avalanche debris or large talus. Copeland (1996) described denning habitat as subalpine cirque areas with large talus or fallen trees. Den sites have consistent snow cover in late winter, are generally associated with low levels of human activity, and are not associated with high densities of ungulate prey and other predators (Magoun and Copeland 1998, Krebs and Lewis 2000, Lofroth 2001, Aubry et al. 2007).

Several studies found that wolverine habitat selection, particularly that of females, is negatively influenced by human activity, including roads, infrastructure, and backcountry recreation (May et al. 2006, Krebs et al. 2007). Rowland et al. (2003) and Carroll et al. (2003) concluded that roads and human density were important factors explaining current wolverine distributions. Banci (1994) described activities that appear to most adversely affect wolverines as those that fragment habitat, e.g. logging, human and recreation development, oil and gas development and others that increase access. However, Copeland et al. (2007) found that wolverines preferred northerly aspects, had no attraction to or avoidance of trails during summer, and avoided roads and ungulate winter range. Their study indicated nonuse of areas near roads, but because most roads occurred at lower elevations and on the periphery of the study area, this may have been due to unequal availability across the study area. It was not uncommon to find study animals near trails and active campgrounds during summer in their study. Copeland et al. (2007) concluded that Central Idaho wolverine presence within high-elevation communities throughout the year indicated preference for subalpine habitats rather than avoidance of man-made features. They concluded that wolverine may be impacted by management practices that influence subalpine communities, particularly those that reduce the presence and opportunity for carrion availability.

Major causes of death appear to be hunting, trapping and starvation (Krebs et al. 2004, Squires et al. 2007, Persson et al. 2009). Low reproductive rates, limited range and distribution and large home ranges, lead to low resilience to trapping or hunting pressure (Bowman et al. 2010).

Climate change may limit wolverines through changes in snow conditions (Aubry et al. 2007, Copeland et al. 2010). Copeland et al (2010) concluded that reduction in spring snow cover would likely reduce habitat and connectivity for wolverine. Climate change is predicted to further fragment habitat for wolverines, and result in longer distances between habitat patches and gross habitat loss (USFWS, 2010). This reduction in connectivity would result in reduction in genetic diversity and in the ability for recolonization, and is a threat to the population.

For wolverine, the primary threat is considered to be habitat modification and loss from climate change (USFWS, 2010). However, human activities in wolverine habitat and the limited trapping in the contiguous U.S. may cumulatively result in reduced habitat for wolverines, although the evidence at this time does not suggest they are a current threat by themselves (USFWS, 2010). Human activities and trapping are considered secondary threats.

Cascade Red Fox

The Cascade red fox was added to the Regional Forester's Sensitive Species list for Region 6 in 2015. The following information is taken from the species information sheet compiled by Jocelyn Akins (2015), unless noted otherwise.

Cascade red fox is a high-elevation subspecies of red fox (Vulpes vulpes) that inhabits the upper forest, subalpine parkland, and alpine areas of the Cascade Range. It is only found in Washington where it has been documented from 2500' elevation, but primarily occurs above 4500' on federal lands, especially in Wilderness areas. It appears to remain at high elevations during winter where it can avoid predation and competition from other carnivores.

Small mammals such as voles, gophers, squirrels, and rabbits, and ungulate carcasses are likely its main prey items with the addition of plants and insects during summer (Aubry 1983). Its survival depends on the availability of subalpine meadows, high elevation tree copses, and mountain hemlock and subalpine fir dominated forests where prey and protection is found. Cascade red fox was historically distributed throughout the Cascade Range from the Canadian border to the Mt Adams area (Aubry 1983). However, trapping, and distributional data from trappers records for this elusive carnivore, was not common so the extent of their abundance throughout the Cascades is unclear. Populations were reduced throughout their range most likely due to predator control aimed at larger carnivores, and from fur trapping and overgrazing to a lesser extent (Perrine et al. 2010, Sacks et al. 2010).

Recent extensive surveys were conducted in southern Washington where Cascade red fox is well distributed on the Gifford Pinchot National Forest on the Indian Heaven, Mt Adams, and Goat Rocks Wildernesses (though not on Mt St Helens), and at the Mt Rainier National Park. In recent decades, confirmed sightings have been extremely rare north of these sites (K. Aubry, unpublished data). Surveys targeting other carnivores have yielded only 5 detections in the Central Cascades between I-90 and the North Cascades Highway 20 during the past 30 years, all on the OWNF, and none north of Highway 20 since 1981.

Cascade red foxes mate in January/February and pups are born in late March/April (Aubry 1983; M. Reid, J. Akins, unpublished data). Pups are provisioned by both the female and the male, and emerge from the natal den at approximately 12 weeks. Though only a few dens have been described, they are generally located at or below tree line beneath large conifers or boulders. Adults have been observed relocating pups to a second den, abandoning the natal den for reasons that are unclear. Cascade red fox varies in its sensitivity to humans with individual behavior ranging from relatively comfortable around human habitation to being quite timid and avoiding remote survey stations.

While there is a lack of information on the basic ecology of the Cascade red fox, there are several potential impacts of various activities on Forest lands to their survival. These include:

Commercial thinning: A network of openings in the mid-elevation forest due to timber extraction weakens the barrier between lowland, and subalpine and alpine habitats. Coyotes, typically a lowland species, have undergone significant range expansions during the past century due to the extirpation of the grey wolf and to land-use changes such as road building and timber extraction throughout the Cascades foothills (Parker 1995). Coyotes are a major source of mortality and competition for red foxes (Voigt and Earle 1983, Dekker 1989, Sargent and Allen 1989, Gosselink et al. 2007). While timber extraction may have a negative, indirect impact on foxes, due to coyote movements, no effects have yet been documented.

Prescribed fire: In the short-term, forest fires drive wild canids from an area with them generally returning two to three years post-burn when small mammal populations have increased (Ballard et al. 2000, Cunningham et al. 2006). In the long-term, it is expected that restoring natural fire cycles and reducing fuel loads will ultimately improve fox habitat as these activities increase small mammal abundance (Fisher and Wilkinson 2005).

Road building: Roads have three potential impacts on the Cascade red fox. The first is direct mortality due to vehicle collisions. Dispersing foxes and those with home ranges adjacent to roads are most at risk as has been observed in young foxes near human habitation at Mt Rainier National Park (M. Reid, pers. comm.). Secondly, major roads may create a barrier to connectivity, which reduces gene flow, resulting in loss of genetic diversity and ultimately lower reproductive success (Hedrick 2011). Thirdly, roads may promote movement of coyotes into Cascade red fox habitat. New construction and maintenance of secondary Forest roads is likely to be minimal and should have a minimal though unknown impact on the Cascade red fox.

Grazing: Grazing has a significant negative effect of vole, mouse, and gopher species – primary food sources for Cascade red fox – in subalpine meadows as it reduces grass cover, which is a strong indicator of prey abundance (Leege et al. 1981, Moser and Witmer 2000, Craig et al 2014). Extensive grazing also plays a significant role in the reduction of subalpine meadows due to tree and shrub invasion (Franklin et al. 1971), which reduces the extent of foraging grounds for foxes. By contrast, grazing the lower elevations of Cascade red fox distribution – in the mid-elevation forest – is likely to have significantly less impact on small mammals as the forest provides other types of cover such as a dense, shrub understory, and additionally, these prey populations are naturally lower here compared to subalpine and alpine habitats (Gunther et al. 1983). It is expected that cattle grazing will have a negative impact on Cascade red fox in the subalpine only.

Winter recreation: Snowmobiling and backcountry skiing create packed snow routes that coyotes use for travel (Gese et al. 2013). Coyotes do not have the same morphological adaptations for deep snow as montane red foxes, and may be using these packed trails to access montane habitats more easily. They are now present during winter in montane red fox habitat where they historically were absent or scarce (B. Sacks 2013, J. Akins 2013, unpublished data), however, it is unclear whether they outcompete foxes in snow. The direct impact of winter recreation on Cascade red fox is unknown.

Clark's Nutcracker

Clark's nutcrackers are a focal species for whitebark pine old growth habitats in the East-slope Cascades province (Altman, 2000). Clark's nutcrackers are found in the high montane areas of western U.S and Canada and prefer conifer forests dominated by one or more species of large-seeded pines, such as whitebark pine (Tomback, 1998). They forage on seeds, storing them for overwinter use, and play an important role in seed dispersal for several pine species. Other foods used include insects, acorns, berries, snails and carrion. Breeding habitats include a variety of forest communities including ponderosa pine, Douglas fir, grand fir, and mixed conifer subalpine. Summer habitats are higher elevation subalpine communities, and are open or semi-open. The birds move to lower elevations in the fall.

Clark's nutcrackers are not currently listed as a threatened or endangered species. Populations are considered secure or apparently secure across its range (Natureserve, 2011). However, forest succession caused by fire suppression, and insect and disease outbreaks affecting whitebark pine have resulted in a major reduction of high-elevation habitat for nutcrackers (Tomback,1998). Conservation strategies (Altman, 2000) for the species include limiting human and cattle access to whitebark pine cover types.

Gray-crowned Rosy Finch

Gray-crowned rosy finches are focal species for alpine habitats. They are ground feeders that use seeds, insects and vegetation in their diet. They are generally found in alpine habitats, often near snowfields, glaciers, talus, rock and cliffs, at or above timberline (Gabrielson and Jewett 1940, Gabrielson and Lincoln 1959, Bent 1968, Kessel 1989). Breeding sites are remote.

The species is wide-spread and abundant, with populations stable or increasing (Macdougall-Shackleton et al. 2000). The population is considered secure (Natureserve, 2011). Grazing and recreational activities have the potential to degrade habitat, and the Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington (Altman, 2000) recommends that human access and grazing in alpine habitats be restricted or eliminated, and OHV use during the breeding season be eliminated.

Hermit Thrush

See Dry Mesic habitat, above, for species discussion. The hermit thrush is also a focal species for subalpine habitats.

Cold Dry Habitat

Methods

Access to the cold dry habitat was measured by:

1. comparing miles of motorized routes in the cold dry habitat type by alternative.
2. comparing the potential area of motorized cross-country use.

In addition, a scan density analysis was also used to compare security habitat levels at the larger subbasin scale to assess effects to wolverine.

Analysis Area

Two areas were used for analysis: the cold, dry habitat across the forest and the subbasins associated with the habitat. Subbasins were also used to approximate the extensive home range of a wolverine.

Existing Condition

The cold dry habitat type is found on approximately 660,305 acres in ten subbasins. This is about 15 % of the forest. The following table displays the cold dry habitat by subbasin.

Table *. Cold, Dry Habitat by Subbasin (NFS land only)

	total acres	cold dry habitat	Proportion of subbasin in Cold Dry habitat
Chief Joseph	17,394	0	0%
Kettle	74,018	132	0%
Lake Chelan	405,236	88,528	22%
Methow	1,000,520	182,649	18%
Naches	548,731	57,512	11%

Okanogan	145,863	2,377	2%
Sanpoil	89,414	0	0%
Similkameen	212,204	86,844	41%
Upper Columbia-Entiat	289,871	33,318	12%
Upper Skagit	198,598	51,805	26%
Upper Yakima	494,012	30,556	6%
Wenatchee	782,673	126,585	16%
forest	***4,258,534***	***660,305***	***15%***

Maintenance Level 1 Roads

There are 110 miles of motorized roads and trails in the cold, dry habitat type, and 582 miles of non-motorized trails. Motorized vehicles can disturb or displace species using this habitat, and can result in mortality from collisions with vehicle. Motorized use of maintenance level 1 roads contributes to these effects.

The scan density analysis for the watershed is displayed below. The scan density analysis classifies road and motorized trail densities by subbasin, in the cold, dry habitat. Outputs of the model are the amount and location of areas with no open roads or motorized trails, open road and motorized trail densities (Gaines et al. 2003) of 0.1 to 1.0 mile per square mile, 1.1 to 2.0, and more than 2.0 miles per square mile. The area with less than 1 mile per square mile of roads and motorized trails is referred to as security habitat and is displayed below.

Table *. Security Habitat within Cold Dry Habitat by 4th Field HUCs

	Security Habitat (1 mi./sq.mi. or less)	
Subbasin	***acres***	***%***
Kettle	78	59%
Lake Chelan	84,0196	95%
Methow	178,762	98%
Naches	52,479	91%
Okanogan	2,357	99%
Similkameen	86,569	100%
Upper Columbia-Entiat	24,163	72%
Upper Skagit	50,167	97%
Upper Yakima	25,586	84%
Wenatchee	123,383	97%
Forest totals:	***627,562***	***95%***

Cross Country Motorized Travel

Cross-country motorized travel is currently allowed across the forest, and potentially could occur (based on access, land allocation, vegetation and slope) on 22,381 acres, approximately 3% of the cold dry habitat type. This activity is potentially degrading habitat by disturbing or displacing species, and causing mortality from collisions, hunting, and trapping.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is occurring in a fairly unrestricted pattern across the forest, however there is only a limited amount of this activity occurring in cold dry habitat. Much of this habitat is located in high elevation areas closed to motorized vehicles, such as Wilderness areas, or inaccessible to wheeled motorized vehicle due to snow cover. Any motorized access for dispersed camping could be displacing or disturbing species using this habitat, and potentially leading to mortality from collisions, hunting or trapping.

Environmental Consequences

Direct and Indirect Effects

Alternative A

Maintenance Level 1 Roads
Alternative A would not close maintenance level 1 roads to motorized vehicles. The potential for disturbance to wildlife species, avoidance or displacement from important habitats, and potential for collisions with vehicles would continue. Security habitat across the forest would remain at approximately 95% in the cold dry habitats.

Cross Country Motorized Travel
Alternative A would not close the forest to motorized cross-country travel. Over time, it is likely that more unauthorized routes would be created, which would reduce habitat effectiveness. It is not possible to predict when or where these unauthorized routes would be created. However, most cold dry habitat is high elevation Wilderness areas, where this use is already prohibited. Cross-country motorized travel could occur on an estimated 22,381 acres, approximately 3% of the cold dry habitat. This could increase recreational disturbance, which may reduce nesting opportunities for hermit thrushes and degrade habitat for gray-crowned rosy finches. Most wolverine habitat is high elevation Wilderness areas, where this use is already prohibited, so this effect would likely be minor for wolverines.

Motorized Access for Dispersed Camping
Corridors would not be designated with Alternative A, and access for dispersed camping would continue in a fairly unrestricted manner. Forestwide, it is likely that additional routes would be developed over time, potentially resulting in increased disturbance, displacement or avoidance of habitats and habitat degradation which would influence use of the area by associated species. However, this effect would be limited in the higher elevation habitats where motorized access is restricted by terrain, snow cover, laws, and often by land allocation.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Road
Road access to cold dry habitat would decrease by about 4 miles (4% of the motorized system routes in the habitat) with implementation of Alternative B, C, or D by closing maintenance level 1 roads to motorized vehicles. For Clark's nutcrackers, gray-crowned rosy finch, and hermit thrushes, this would slightly reduce potential for disturbance to nests or foraging areas, reduce potential for displacement or avoidance of areas near roads and trails, and reduce potential for collisions with vehicles. This would be consistent with the conservation strategies (Altman, 2000) for Clark's nutcrackers and gray-crowned rosy finches, which recommend reduction of access to limit disturbance and potential habitat degradation.

For wolverines, this could slightly reduce potential for displacement or avoidance of areas near roads and trails, disturbance to den sites, and effects to their carrion prey base. Security habitat (areas of less than 1 mile per square mile road densities) would increase or remain constant in Alternative B in each subbasin. An increase in security habitat would reduce the potential for displacement or avoidance of areas near roads and motorized trails, disturbance to den sites, and negative effects to their carrion prey base. Overall access to wolverine habitat would decrease slightly across the forest, which would decrease potential for disturbance, avoidance and displacement from important habitats for wolverine and their prey, and access for hunting and trapping.

Cross Country Motorized Travel
Cross-country motorized use would be prohibited with implementation of Alternative B, C, or D, further reducing access to this habitat type. This would increase habitat effectiveness on an estimated 3% of the total cold dry habitat. Prohibiting cross-country motorized travel would decrease potential for recreational disturbance and habitat degradation, reduce potential disturbance to nest or den sites and other important habitats and would be consistent with the conservation strategies of limiting access and OHV use for Clark's nutcrackers and gray-crowned rosy finches.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

There would be approximately 140 acres of corridors in cold dry habitat with implementation of Alternative B, or approximately 0.02% of the total cold dry habitat type. Alternative C would designate approximately 138 acres of corridors in cold dry habitat (0.02% of the habitat type), while Alternative D corridors would designate approximately 381 acres (0.05% of the habitat type).

Table *. Acres and Percent of Corridors in Cold Dry Habitat, by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Cold Dry Habitat in Corridors	140	138	381
Percent of Total Cold Dry Habitat	0.02%	0.02%	0.05%

Implementation of any of these alternatives would benefit the cold dry habitat by reducing motorized access for dispersed camping compared to the effects of Alternative A. These alternatives would limit where the activity could occur, and, within the corridors, restricting motorized vehicles to established routes only, not farther than 300 feet from the road, and not closer than 100 feet to water.

Alternative D would designate more acres of corridors in cold dry habitat than Alternatives C or B, but the overall percentage of cold dry habitat impacted by any alternative would be very small. There would be a possibility that motorized access for dispersed camping in corridors in cold dry habitat could disturb or displace species.

Cumulative Effects

Geographic Boundary
The geographical boundary is the 10 subbasins (4th field HUCs) where high-elevation habitats occur. The subbasins were chosen to represent the extensive home range of a wolverine. Considering all the subbasins together provides for connectivity between their home ranges.

Temporal Boundary
The temporal boundary is the time since European settlement in Washington. Access for trapping, habitat loss and degradation affecting distribution of wildlife species have influenced populations since settlement of the western United States. Forest management activities began affecting cold dry habitat in the early 1900s with the development of the road and trail network and fire suppression.

Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as actions stemming from minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Trends

Road densities in the Interior Columbia basin have substantially increased in the past several decades and are estimated to be moderate to high in most Ecological Reporting Units (ERUs) (Hann and others 1997) including the units encompassing the Okanogan-Wenatchee National Forest. Over the last decade or more, Forest activities have tended to not construct permanent roads, rather to construct temporary roads that would receive short-term limited use, and to decommission or close roads, both to mitigate resource concerns and to reduce maintenance costs. Moreover, the human population in the basin has increased and is estimated currently at 3 million (McCool et al.1997).

Past Actions

The primary changes for landbirds have been the loss of old forest habitat due to intensive timber harvesting, the change in composition of forest types and conditions of coniferous forest, and the degradation of habitats from a number of factors including fire suppression, over-grazing, invasion of exotic vegetation and human development (Altman, 2000 and Altman and Holmes, 2000). Physical consequences of these alterations include changes in structural diversity, reductions in habitat patch size and increases in fragmentation, and reductions in the amount of old forest (Altman, 2000). Loss of snags through firewood and danger tree cutting has reduced nest sites, cover, perching, singing and foraging sites for many species. The loss and alteration of historic vegetation communities has impacted landbird habitats and resulted in species range reductions, population declines, and some local and regional extirpations (Altman, 2000). Consequences for bird populations vary by species; favoring those associated with younger and denser forests and adversely affecting those associated with older forests and more open conditions (Altman, 2000). These changes have occurred to a lesser degree in the cold dry habitats than in the lower elevation habitats. Road construction, trail construction, mining, recreation and grazing have been the primary past actions affecting the cold dry habitat on Forest lands. Most of the cold dry habitat is in federal ownership, so private actions have been limited.

Past actions that have continuing effects on the wolverine population on the forest today include:

- Trapping and predator control efforts (aimed at wolves) have been a major cause of wolverine mortality and have played a role in the population decline (USFWS, 2010). Except for Alaska, and a limited harvest in Montana, wolverine populations are no longer harvested.
- Construction and use of roads and trails has reduced security habitat and has facilitated access for trapping.
- Human activity in wolverine habitat, particularly during denning (February to April) may result in den abandonment and moving of young to new sites. The U.S. Fish and Wildlife Service twelve month status review (2010) concluded that dispersed recreation, by itself, is not a threat to wolverines in the contiguous United States, but that this potential threat may act in concert with other threats to contribute to wolverine declines.
- Activities that have fragmented habitat such as logging, recreation development, human settlement, etc. have affected wolverines (Banci, 1994 in Ruggiero et al. 1994).

Ongoing Actions

Ongoing actions may act cumulatively with the proposed actions to affect the focal landbirds and other species associated with the cold dry habitats.

Firewood cutting and danger tree removal is ongoing, which would result in less availability of snags and later, down wood along open roads in cold dry habitats. Snags are used by three-toed woodpeckers and hermit thrushes and are important to many other species. Firewood cutting is allowed along roads across much of the forest, except in late-successional reserves, managed late-successional reserves, the adaptive management area, riparian reserves and administratively withdrawn areas. Danger trees are removed along the forest road network and in recreation and administrative sites.

Wildfire suppression is also ongoing, and allows denser forest to develop because understories continue to grow where they would have been reduced by wildfire. This has improved habitat for species associated with closed canopies, such as the hermit thrush, but has degraded habitat for species that use more open forest. In the longer term, fire suppression leads to fuel accumulation, which may result in more intense fires, in turn leading to loss of pre-fire snags and down wood.

On-going livestock grazing may also effect vegetation by removing cover that is important for ground-nesting and other uses. However, grazing is limited in the higher elevation cold dry habitat types and many allotments in these habitat types have been closed or vacated. The remote nature and limited road access to the cold dry habitats results in little actual livestock use occurring, even if the habitat is included in an allotment.

Mining may result in loss of snags as danger trees, human access and disturbance, and loss of large trees for mining structures.

Ecosystem management objectives incorporated into the Okanogan and Wenatchee Forest Plans from the Northwest Forest Plan (USDA and USDI, 1994) and Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales (1995)(Regional Forester's Amendment #2) establish direction for retention of large trees, snags and large down wood which mitigate the effects of current timber harvest on hermit thrushes, woodpeckers, and other species that use these components.

Human use and disturbance to wolverines can result from winter and summer recreation, housing and industrial development, road corridors, logging or mining (USFWS 2010). In the contiguous United States, these human activities and developments often occur within or immediately adjacent to wolverine home ranges or in a broader range of habitats that are occasionally used by wolverines during dispersal or exploratory movements, habitats that are not suitable for the establishment of home ranges and reproduction (USFWS 2010). In the wolverine habitat on Okanogan-Wenatchee National Forest, recreational use and access is likely the most common disturbance. Residential development, logging and mining occur adjacent to areas known to be used by wolverines on the forest.

Trapping is no longer allowed in the contiguous U.S., except for a limited harvest in Montana.

Intensive vegetation management activities such as logging and fuels reduction activities are ongoing. While these activities are not considered a threat to wolverine populations by the U.S. Fish and Wildlife Service (2010), they may affect prey items for wolverine, particularly deer and elk, which are an important carrion food source. These activities may have a short-term disturbance or displacement effect, but would increase forage in the longer term, potentially a benefit for ungulate prey species.

Reasonably Foreseeable Future Actions

Future actions that are planned in and around the Okanogan-Wenatchee National Forest that could act cumulatively to affect species associated with cold dry habitat are summarized in the table below. See Reasonably Foreseeable Future Actions (earlier in this chapter) for locations of these projects.

Table *. Reasonably Foreseeable Future Actions Potentially Affecting Cold Dry Habitat

Project type	***Potential negative or beneficial effect***	***Possible effect to species associated with cold dry habitat?***
Trail relocation and use.	Negative, but generally mitigated.	May result in loss of large trees and snags. Increases or improves nonmotorized access which can result in disturbance or avoidance of travelway and adjacent important habitat.

Restoration- timber harvest, thinning, fuels reduction projects	Both	Reduction of canopy would increase forage for ungulates (important carrion food) and smaller prey items (hares etc.). Burning stimulates growth of understory vegetation (grass, shrubs) for prey species. May fragment non-habitat areas used for dispersal and exploratory movements by wolverine. Most vegetation management projects have limited activity in this habitat type.
Road, trail and motorized area construction, reconstruction, relocation and use.	Negative, mitigated as necessary.	Increases or improves motorized access which can result in poaching and collisions, range expansion from competitors (coyotes) and may result in avoidance of travelway by prey species. Larger roads may fragment habitat and may be a barrier to dispersal and exploratory movements. May result in loss of snags and degrade habitat adjacent to open roads. No projects proposed in cold dry habitat at this time.
Road and trail decommissioning and closures	Beneficial	Reduces potential for disturbance, collisions, poaching, and may increase security habitat for wolverine , prey species and other wildlife associated with cold dry habitats. No projects proposing this in cold dry habitat at this time.
Weed treatments	Beneficial	Reduces non-native species which compete with native species used by deer and elk (carrion prey items).

Federal projects would undergo consultation with U.S. Fish and Wildlife Service for threatened, endangered and proposed species if habitat for these species is affected, and would include mitigation to reduce negative effects to listed and sensitive species. State actions go through a similar process. Any future changes to the motorized access system on the Forest would follow mitigation measures designed to reduce the potential for disturbance at active den sites or other negative effects to wolverine and lynx, which would reduce disturbance to other species associated with the cold dry habitat as well.

Large landscape plans, such as the Northwest Forest Plan, Regional Forester Amendment #2 and Okanogan-Wenatchee's Restoration Strategy provide guidance for management of landscapes which will benefit the species associated with cold dry habitats by conserving important habitat elements during future projects. Many future forest vegetation management activities are intended to restore ecosystem structure, function or components, reduce wildfire risk to important habitats, or improve forest health, and incorporate design or mitigation measures to reduce negative effects to species using late-successional elements. This would result in long-term benefits to many species.

Cumulative Effects Summary

Alternative A

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternative A would be a reduction in the net motorized access across the Forest, but to a substantially lesser degree than with Alternative B, C, and D due to the continuation of motorized cross country travel. The potential for disturbance, avoidance and displacement for focal landbird species would be reduced by road closures and decommissioning in other reasonably foreseeable future actions, however the continued motorized use of maintenance level 1 roads with Alternative A would lessen the potential improvements.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and alternatives B, C or D would be a reduction in net motorized access to the Forest, which would reduce potential for disturbance, avoidance and displacement for focal landbird species and reduce access for hunting, disturbance at den sites, and increase security habitat and habitat effectiveness for wolverine.

Alternative B, C and D would be beneficial to associated species by reducing potential for disturbance, avoidance and displacement. Other forest road actions in the next 10 years are likely to result in an overall reduction in roads. Outside the forest boundaries, the trend is expected to be increased roads on private lands. However, much of the cold dry habitat is managed by Federal agencies and is protected by management status such as wilderness, national park or other status that provides some protection (USFWS 2010) to this habitat type.

While past actions of trapping, predator control, road and trail construction, human development of private lands, and ongoing actions (use of the roads and trails) have resulted in adverse effects to wolverine populations, Alternative B, C, or D would be beneficial to wolverines by providing additional and more effective security habitat through the closure of motorized cross country travel. Wolverine habitat is generally managed by Federal agencies and much is protected by management status as wilderness, national park or other status that provides some protection, and land management activities (vegetation management) in wolverine habitat other than recreation are not considered a threat to the wolverine population in the contiguous United States (USFWS 2010).

Determination for Sensitive Species (Wolverines and Red Fox)

Alternative A may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Alternative A is expected to result in additional trail development over time with continued motorized cross-country use, however this would likely be very limited in the cold dry habitat type due to land allocations and terrain.

If the wolverine is listed as threatened, the determination for alternative A would be may affect (due to potential for additional trail development from cross country use), not likely to adversely affect wolverines (due to the small portion of the habitat where this could occur).

Alternatives B, C, and D may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. A slight beneficial impact to wolverines and red fox may occur as a result of reduced access for hunting and disturbance at den sites, and increased security habitat and habitat effectiveness.

If the wolverine is listed as threatened, the determination for alternatives B, C, and D would be may affect, not likely to adversely affect wolverines, due to potential for a small benefit from closure of 4 miles of ML 1 roads and closure to cross country motorized use on approximately 3% of the cold dry habitat.

Compliance with Laws and Regulations

Alternative A would be consistent with the National Forest Management Act, Forest Plans and the Migratory Bird Treaty Act. Alternative A does not follow recommendations from the Landbird Conservation Strategies to reduce access and OHV use, however the amount of the habitat affected is small.

Alternatives B, C, and D would be consistent with the Migratory Bird Act and recommendations from the Landbird Conservation Strategies, because they would reduce access and OHV use in habitats used by Clark's nutcrackers and gray-crowned rosy finches. There are no Forest Plan standards and guidelines relevant to the cold dry habitats or to these species, which are not sensitive species, federally listed species, or MIS. For wolverine and red fox, the travel management actions comply with the National Forest Management Act and Forest Plan direction to protect sensitive species. If wolverines are listed as threatened, alternatives B, C, and D comply with the Endangered Species Act, because they reduce potential effects to wolverines from cross country use.

Riparian and Wetland Habitats

Introduction

Riparian and wetland habitats are the water-influenced habitats along streams, rivers, lakes, ponds and other water bodies. They make up a minor proportion of the terrestrial habitat but are some of the most productive and diverse areas. These habitats are important to a wide variety of wildlife species and are used disproportionately more than they are available (Thomas et al. 1979). Many wildlife species are either directly dependent on riparian and wetland habitats or utilize them more than other habitats.

Regulatory Framework- also see general Wildlife regulatory framework.

Although the original Okanogan and Wenatchee Forest Plans contain management direction for riparian and wetlands, that direction was replaced by the Northwest Forest Plan, PACFISH and INFISH, unless the original plans were more restrictive. The Northwest Forest Plan, PACFISH and INFISH establish Riparian Reserves or Riparian Habitat Conservation Areas around water bodies that prohibit and regulate activities that retard or prevent attainment of Aquatic Conservation Strategy objectives (Northwest Forest Plan area) or Riparian Management Objectives (rest of area). The default widths for these land allocations are 300' on either side of a fish-bearing stream, 150'on either side of a permanent nonfish-bearing streams, 150' around wetlands greater than one acre, 300' around lakes and ponds and 100' from intermittent streams and wetlands less than one acre (Northwest Forest Plan area and key or priority watersheds on the rest of the area, non-key or non-priority watersheds 50').

Bald and golden eagles are protected by the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. 688 [a]; 50 C.F.R. 22). The U.S. Fish and Wildlife Service has issued National Bald Eagle Management Guidelines to advise landowners and land managers of when protective measures may be required to minimize effects to the species. These guidelines provide recommendations to avoid disturbance at nesting, communal roosting and foraging areas, and suggest additional recommendations to benefit bald eagles.

Riparian and Wetland Habitat Species

The following table includes all management indicator, sensitive, survey and manage, and landbird species associated with or dependent on riparian and wetland habitat that may be affected by travel management alternatives.

Beaver	Management Indicator Species
Ruffed Grouse	Management Indicator Species
Common loon	Sensitive Species
Bald eagle	Sensitive Species
Harlequin duck	Sensitive Species
Western pond turtle	Sensitive Species
Puget Oregonian	Sensitive Species
Zigzag darner	Sensitive Species
Subarctic darner	Sensitive Species
Subarctic bluet	Sensitive Species
Boreal whiteface	Sensitive Species
Puget Oregonian	Survey and Manage Species

Columbia Oregonian	Survey and Manage Species

Beaver

Beavers were selected as a management indicator species for deciduous and riparian ecosystems (USFS 1990) for the Wenatchee portion of the forest. Beavers are associated with deciduous tree and shrub communities (Natureserve, 2010) and are considered a keystone species because of its effects on aquatic and riparian ecosystems (Naiman et al. 1986).

Beavers are widely distributed across North America, from northern Mexico to northern Canada and Alaska. They occur throughout Washington along permanent streams, rivers, and lakes. Beaver habitat is common and widely distributed on the Okanogan-Wenatchee National Forest.

Beavers are a keystone species that alter the aquatic and riparian ecosystems they inhabit (Naiman et al. 1986). They eat woody vegetation fall through spring, and a variety of aquatic and terrestrial vegetation foods during the summer. Beavers occupy permanent sources of water of almost any type. They prefer low gradient streams, ponds, and small mud-bottomed lakes with dammable outlets (Slough and Sadleir 1977, Beier and Barrett 1987, Novak 1987a, McComb et al. 1990).

Beaver habitat was modeled for the Wenatchee National Forest using a habitat suitability model developed by the U.S. Fish and Wildlife Service (Allen 1983). This model indicates that there is currently 177,118 acres of habitat distributed across 32 of the 34 watersheds in the Wenatchee National Forest. Because the beaver is not an MIS for the Okanogan portion of the forest, the habitat suitability model has not been run. However, habitat for beaver is abundant on the Okanogan and beavers have been re-introduced in many streams in the Methow subbasin.

Conflicts with human infrastructure (roads and buildings) when beaver alter water regimes can lead to their removal. However, there are few threats to beaver populations and once established in an area, beavers are difficult to eliminate (NatureServe 2010). In the Eastern Cascades, fire suppression has likely slowed the development of suitable beaver habitat that was historically a cyclic occurrence following large fires.

Humans are the primary threat to beavers across much of their range, although in some areas, wolves may prey on beavers, particularly if ungulate populations are low (Voight et al. 1976, Shelton and Peterson 1983). In some areas, beaver mortality has been caused by tularemia (a bacteria). However, most unexploited populations have a low mortality rate (less than 5- 7%), and can grow quickly in areas with abundant resources (Natureserve 2010).

Road and motorized trail-associated factors that may affect beavers, their habitat or populations include trapping, disturbance, displacement, habitat loss or fragmentation, collisions and other negative interactions with humans (Gaines et al 2003).

Beavers are considered secure through most of their North American range, including Washington State (NatureServe 2016). The Natureserve (2016) global short-term trend for beaver is increasing (increase of >10%).

Beavers are classified as a small game furbearer by the Washington Department of Fish and Wildlife, and there is an open trapping season from November 1st through March 31st, with an unlimited bag limit (WDFW 2008). However, use of body-gripping traps has been illegal since the mid-1990s, and it is likely that beaver trapping, other than for removal of nuisance beavers, is no longer wide-spread in the state. Because they have high population growth rates and often experience compensatory mortality, the risk of over-exploitation is low.

Based on population trends, habitat assessment, and risk factors, the viability outcome for beaver is a “B/C” which means that populations and habitat are widely distributed, but highly dispersed with some areas exhibiting lower abundance, and isolation. There is opportunity for subpopulations on most of the planning area to interact, but some subpopulations are so disjunct or of such low density that they are essentially isolated from other populations.

Ruffed Grouse

Ruffed grouse are a management indicator species for riparian and deciduous habitats on the Okanogan and Wenatchee National Forests.

Ruffed grouse are distributed across North America in forested areas from the Appalachian Mountains in the east, across Canada into Alaska, and south in the Rocky, Cascade, and Coastal Mountains in the western United States (Rusch et al. 2000). They are widespread and a fairly common resident in deciduous and mixed-conifer forests and shrublands throughout Washington (Schroeder, 2005). In the eastern Cascades they occur from low elevations along riparian corridors into the grand fir zone, but are mostly absent from riparian corridors below the ponderosa pine zone (Smith et al. 1997, Schroeder 2005).

Ruffed grouse are closely tied to early successional deciduous habitats (Wiggins 2006), and closely associated with quaking aspen woodlands year-round in northern and western U.S. and throughout much of Canada (Dorney 1959, Gullion and Marshall 1968, Rusch and Keith 1971, DeStefano 1982, Theberge and Gauthier 1982, Stauffer and Peterson 1985). Marshall (1946) found ruffed grouse primarily in Douglas-fir and ponderosa pine, with a strong tendency for females with broods to use riparian areas during summer. In a broad-scale study of breeding bird habitat relationships in western Montana and northern Idaho, ruffed grouse occurred most frequently in aspen (12%), followed by ponderosa pine (7%), and riparian shrub (6%) habitats (Hutto and Young 1999). However, the majority of these observations were made in or near riparian corridors, suggesting that riparian woodland (especially aspen) is the key habitat for ruffed grouse in the west.

Adult ruffed grouse eat seeds, fruits, leaves, buds of trees and shrubs, and insects. Young birds eat mainly insects and spiders (NatureServe 2011).

Giroux et al. (2007) found that roadsides provided edge habitat important to broods for food and cover. In their study, grouse locations were significantly closer to roads and forest harvest units 2 to 20 years old, where sapling, shrub, and herbaceous plant species richness were greater, than to random locations. While roads and trails provide access for hunting of grouse, hunting may have a compensatory effect on ruffed grouse populations, taking surplus birds that would otherwise die of natural causes.

Ruffed grouse habitat was modeled as Riparian Habitat Conservation Areas and Riparian Reserves on the Okanogan and Wenatchee National Forests. This model indicates there are currently 193,891 acres of habitat distributed across 25 of 25 watersheds in the Okanogan National Forest, and 276,457 acres of habitat distributed across 32 of 34 watersheds in the Wenatchee National Forest. Upland deciduous habitat cannot be mapped at the Forest-wide scale because of the small stand size and patchy distribution. Average home range size of a brood is estimated at about 40 acres (16 hectares).

Ruffed grouse are closely tied to early-successional deciduous habitats, and the degradation or loss of such habitats constitutes a threat to the viability of local populations (Wiggins 2006). Fire suppression has resulted in loss of early successional habitat used by ruffed grouse. Logging increases early-successional habitat used by ruffed grouse. Pesticide use that reduces insect abundance could affect chick survival.

Conservation status for the ruffed grouse is secure in Washington state and most of North America. Ruffed grouse are hunted with harvests controlled by bag limits, season lengths, and area closures, though most mortality in ruffed grouse is caused by predators (Rusch et al. 2000).

The viability outcome for the ruffed grouse is an "A" on the Okanogan and Wenatchee National Forests, which means that habitat is widely distributed and abundant, and risk factors are not influencing habitat occupancy or demographic performance.

Common Loon

Common loons are a sensitive species for Region 6. The common loon nests on lakes in forested environments that are large enough to accommodate fish and other aquatic prey sources, as well as providing enough room for these birds to take flight (Finch 1991). Loons are susceptible to human disturbance from recreationists and development of their breeding areas.

Nests are built in terrestrial or aquatic vegetation, on the bare ground, sand, or partially submerged logs. Nests are generally adjacent to the shoreline. Small islands are preferred for nesting, and those areas with some overhead protection and adequate depth to facilitate underwater approaches/escapes. Protection from wind and wave action are also characteristics of successful nests. Breeding areas are reused by birds in succeeding years. Lakes usually have high clarity that makes it easy to spot underwater prey, primarily fish, although insects, amphipods, amphibians, and mollusks may also be eaten (NatureServe 2016). Loons reoccupy breeding areas after ice-off, generally around mid-March or into April. Eggs are laid approximately a month later, usually around May.

Impacts to the sustainability of common loon populations from climate change are unknown, but potential changes could include warmer environments that could increase the accumulation of mercury in loons (causing behavioral changes) (Moore et al. 1998), changes in marine near-shore fish availability (Klyashtorin 1998), and hydrologic changes associated with abnormal summer weather events.

The wide-scale trend for common loon habitat is not described in Wisdom et al. 2000, although the conservation status for common loons is listed as "imperiled" in the state of Washington (NatureServe 2016).

Road and recreation trail factors associated with loons include disturbance during nesting and displacement from habitat (Gaines et al. 2003).

Bald Eagle

Bald eagles are a sensitive species for the Okanogan Wenatchee National Forest. Since de-listing as a threatened species, consultation with U.S. Fish and Wildlife Service is no longer required. However, additional protection is provided by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act of 1940.

Bald eagles can be found year-round along rivers, lakes and larger fish-bearing streams on the Okanogan Wenatchee National Forest. Nests in Washington are typically in uneven-aged, coniferous stands with an old-growth component and territories may have several alternate nests (USFWS 1986). Large, emergent trees and snags are also important perch sites during the breeding season. Breeding habitat is usually within a few miles of a lake or river where the eagles can prey on fish or waterfowl, although other prey may additionally be taken. Nest trees are typically the largest ones within a stand, although nests may also be located on cliffs. Bald eagles will generally choose areas away from human disturbance. Winter habitat may be near open water, although eagles also winter where other food sources are available. Non-aquatic foods are carrion from ungulates and other animals. Winter roosts may be up to 20 miles away from the food source and may be partially dependent on warmer microsite conditions. Roost trees and nest trees may be used for many years and both types are usually the larger, more accessible trees in a stand (NatureServe 2016). Foraging eagles wander widely in search of food, and places where dead deer could occur are widespread across the forest.

The conservation status for bald eagles is listed as "apparently secure" in the state of Washington (NatureServe 2016).

Road and motorized trail-associated factors that may affect bald eagles, their habitat or populations include poaching, collisions, and displacement from habitat and avoidance of travelways (Gaines et al. 2003).

Harlequin Duck

The harlequin duck is a sensitive species for Region 6. Harlequin ducks nest on inland streams and rivers that are medium in size, low in gradient, have plenty of rapids and riffles, dense shrubby riparian areas, and rocky/woody debris. Harlequin ducks will nest on islands or other stream banks that are free of human disturbance, usually within approximately 100 feet of the stream. Suitable habitat has overhanging vegetation, woody debris for nesting and brood-rearing, in-stream woody debris and rocks for resting, and plenty of crustaceans, mollusks, aquatic insects, and fish for foraging (NatureServe 2016). They arrive at their nesting grounds in the spring and winter along the coast.

The known range of the species includes north-central Washington (Dunn and Alderfer 2006, Sibley 2000), including the western portions of Okanogan County (Lewis and Kraege 2004).

The harlequin duck is listed as "imperiled" in the State of Washington by NatureServe (NatureServe 2016). Declines in numbers have likely been due to overhunting, disturbance, and habitat loss (Robertson and Goudie, 1999). Oil spills and fishing nets are also known to kill harlequins (Robertson and Goudie, 1999). Logging is probably the main source of breeding habitat loss, because of riparian degradation and changes to streams that cause declines in invertebrate prey (Breault and Savard 1991, Crowley and Patten 1996). Other activities that change stream flow or abundance of invertebrate prey items, such as mining and hydroelectric dams, may also affect harlequins on their breeding grounds. Shoreline development, aquaculture, and algae-harvesting are concerns on wintering grounds (Robertson and Goudie, 1999).

Harlequin ducks may be sensitive to human disturbance, and human activity probably reduces reproductive success (Cassirer and Groves 1991). One study found that breeding rates were lower on a stream with a trail next to it than a similar stream which was relatively inaccessible (Cassirer and Groves 1991).

Western Pond Turtle

The Western pond turtle is a Region 6 sensitive species suspected to occur on the Okanogan-Wenatchee National Forest. Its range is western Washington state or British Columbia to California. Two populations have been documented in the Columbia River Gorge, with the remaining Washington populations in Skamania County. In 1999, 250 to 350 Western pond turtles were known to remain in the wild in Washington (Hays et al. 1999).

The Western pond turtle is a freshwater aquatic turtle that disperses widely across the terrestrial landscape (Holland, 1994). This turtle is considered "vulnerable" (Natureserve 2010), due to declines in distribution and abundance. The global short-term trend for the species is a decline of 10-30% (Natureserve, 2016).

Vehicles have been reported to be a leading cause of mortality to western pond turtles (Holland 1994). Turtles may interrupt important behaviors such as basking when approached too closely by humans (Bury and Germano 2008). Turtles are also vulnerable to collection as pets, shooting, and incidental capture during recreational fishing (Holland 1994). Localized threats to their habitat include habitat degradation from contaminant spills, grazing and off-road vehicle use (USFWS, 1993). Natureserve (2016) recommends protection of riparian corridors utilized by turtles for feeding, nesting, and overwintering/estivation from road construction, grazing and off-road vehicle use.

Puget Oregonian

The Puget Oregonian is a terrestrial snail that uses late successional and old forests, as well as riparian areas and lower and mid elevations (NatureServe 2016). The range of this species includes western Washington Cascades (Burke 1999).

It can be found on sites with high percent canopy cover, often near big-leaf maple and sword-fern. Moist sites provide habitat near seeps, springs, hardwood debris, leaf litter, talus, and downed-wood. Juveniles can be found under mosses on big-leaf maple trunks (Kelley et al. 1999). The diet of Puget Oregonians is unknown, but they are probably fungivores and herbivores (Natureserve 2016).

Threats to the species include habitat loss, degradation, and fragmentation of old growth forest habitats. The Puget Oregonian is listed as "imperiled" in the State of Washington by NatureServe (NatureServe 2016) because of its association with old growth forests. Risk factors associated with roads and motorized trails have not been identified for this species or the Puget Oregonian, but are likely to be similar to the landsnails- potential barriers and habitat fragmentation from new roads and trails. Crushing from off-road vehicle use is also a possibility.

Zigzag Darner, Subarctic Darner, Subarctic Bluet and Boreal Whiteface

The following information about these species is taken from the Interagency Special Status Species Program Fact Sheets (most recent versions were compiled by Sarah Foltz Jordan, 2008 and 2011).

The zigzag darner, subarctic darner, subarctic bluet and boreal whiteface lay eggs in plant tissue, and the majority of their life cycle is spent as aquatic larvae. They inhabit high elevation boreal fens and bogs. The subarctic bluet may also inhabit shrublands. Larvae prey on aquatic invertebrates and small vertebrates. Adults feed on flying insects.

Global conservation status for these species is "secure", but they are either unranked or imperiled in most of the states where they occur. They are generally widespread across Canada, but more patchily distributed in the northern United States, which is the southern edge of their range.

The zigzag darner has been located mostly at high elevation on Forest Service land, and has been found at Fish Lake on the Okanogan-Wenatchee National Forest. The subarctic darner has been found at four sites in Washington, including one site on forest (Fish Lake). The habitat at the Fish Lake site dried up in the early 2000's, and subarctic darners have not been found there since that time. Subarctic bluets have been found at two known sites in Washington, on the Colville National Forest, and it may occur on the Okanogan National Forest, as well. However, information is insufficient to consider this species as "suspected" to occur. The known sites were at elevations of 4,550 and 5,052 feet. The boreal whiteface has been found at one site in Okanogan County, not on Forest Service land, but it is suspected to occur on the Forest.

Threats to these species include drought and associated water level changes, human disturbance and livestock grazing. Climate change may shift the species' distribution northward, increase severity of droughts and flooding and could impact dragonflies, damselflies and their habitat negatively. Because the larvae are dependent on vegetation for foraging sites and protection from predators, alteration or degradation of habitat by herbicide use, recreational development, and pollution could also pose a threat.

Minimizing disturbance to the aquatic habitat is recommended, including keeping these areas free of roads and trails (ISSSSP Species Fact Sheets, 2007).

Columbia Oregonian

The Columbia Oregonian is a terrestrial snail found in south-central Washington. This species is found in moist areas within 100 meters (328.1) feet of streams, seeps, and springs, including riparian areas in shrub-steppe habitats. Other habitat components include talus, leaf litter, shrubs, logs, or other debris in moist sites. Little is known about the species.

The Columbia Oregonian is listed as "critically imperiled" in the State of Washington by NatureServe (NatureServe 2016). On the Okanogan-Wenatchee National Forest, its range is believed to be the Naches Ranger District.

Risk factors associated with roads and motorized trails have not been identified for this species but are likely to be similar to the landsnails - potential barriers and habitat fragmentation from new roads and trails. Crushing from off-road vehicle use is also a possibility.

Focal Landbirds

There are no focal landbirds associated with riparian and deciduous habitats that may be affected by travel management actions. Conservation strategies for the Lewis' woodpecker and the red-naped sapsucker are to retain snags, which would not be affected by the travel management alternatives, since danger tree cutting is not practiced on ML 1 roads and would not occur on routes in corridors.

Riparian and Wetland Habitat

Methods

Effects of travel management alternatives on riparian and wetland habitats were analyzed by comparing the miles of motorized routes through the riparian and wetland reserves and RHCAs, by comparing the amount of potential snag loss from addition of unauthorized roads to the forest system, and by comparing the area where motorized camping would be allowed (corridors), for each alternative.

Analysis Area

The analysis area is the riparian and wetland areas across the forest, defined by the default land allocation widths for the Northwest Forest Plan Riparian Reserves, PACFISH and INFISH Riparian Habitat Conservation Areas.

Existing Condition

The terrestrial habitat component of the Riparian Reserves and Riparian Habitat Conservation Areas is estimated at 494,376 acres (12%) of the forest. This is the area adjacent to the streams, rivers, lakes, ponds, wetlands and other waterbodies that is defined by the Riparian Reserve or Riparian Habitat Conservation Areas. This calculation does not include the actual open water habitat for the standing water bodies.

Maintenance Level 1 Roads

Currently, there are 1,496 miles of motorized trails and roads in these riparian and wetland land allocations along streams and rivers on the Okanogan-Wenatchee National Forest that are open for use by some type of motorized vehicle. Motorized vehicle use on maintenance level 1 roads contributes to the potential for disturbance, displacement, avoidance of important habitats, collisions/crushing and hunting/trapping/poaching, that could affect bald eagles, harlequin ducks, common loons, Western pond turtles, beavers, ruffed grouse, Columbia Oregonian, Puget Oregonian and other riparian or wetland-associated species.

Cross Country Motorized Travel

Cross-country motorized travel is currently allowed and could potentially occur (based on vegetation, topography and access) on an estimated 79,255 acres of terrestrial habitat within the riparian and wetland land allocations. This represents about 16% of the total terrestrial habitat within the riparian and wetland allocations. This activity is degrading riparian and wetland habitat because, as with motorized vehicle use on roads, it creates the potential for disturbance, displacement, avoidance of important habitats, collisions/crushing and hunting/trapping/poaching, that could affect bald eagles, harlequin ducks, common loons, Western pond turtles, beavers, ruffed grouse, Columbia Oregonian, Puget Oregonian and other riparian or wetland-associated species.

Motorized Access for Dispersed Camping

Many riparian and wetland areas near open roads are popular dispersed camping areas. On the Okanogan-Wenatchee National Forest, there are 301 inventoried access routes (that are not currently system roads or trails, or roadside parking within 30' of a road) to dispersed recreation sites within riparian and wetland buffers. The effects to wildlife species from motorized access to dispersed camping are disturbance to important habitats, loss of vegetation as camp sites are established or grow, and displacement and avoidance of riparian and wetland habitats where disturbance is occurring.

Environmental Consequences

Direct and Indirect Effects

Alternative A

Maintenance Level 1 Roads

Alternative A would not change motorized road and trail access to riparian and wetland areas. Potential for disturbance, displacement, avoidance of important habitats, collisions/crushing and hunting/trapping/poaching, that could affect bald eagles, harlequin ducks, common loons, Western pond turtles, beavers, ruffed grouse, Columbia Oregonian, Puget Oregonian and other riparian or wetland-associated species from motorized use in these areas would continue. Increased disturbance to important riparian and wetland habitats would be likely over time, as recreation use is expected to increase and is generally concentrated in these areas.

Cross Country Motorized Travel

Cross-country motorized travel would continue, and could result in additional trails, vegetation loss, and reduction in habitat effectiveness. Cross-country motorized travel is probably the only direct effect to the snail species, as they are susceptible to crushing, but are not likely to be found on roads and trails due to the lack of vegetation and moisture. The motorized access would continue to degrade riparian and wetland habitat because of the potential for disturbance, displacement, avoidance of important habitats, collisions/crushing and hunting/trapping/poaching, that could affect bald eagles, harlequin ducks, common loons, Western pond turtles, beavers, ruffed grouse, Columbia Oregonian, Puget Oregonian and other riparian or wetland-associated species.

Motorized Access for Dispersed Camping

Implementation of Alternative A would allow motorized access to dispersed camping to continue within riparian areas with few restrictions and would potentially result in continued loss of riparian vegetation and increased human disturbance as sites expand over time and recreational use increases. For wildlife species, this could result in a reduction in available habitat and a reduction in habitat effectiveness. People would continue to drive in an unregulated fashion, resulting in damage to riparian vegetation and disturbance to riparian area dependent species.

Effects Common to Alternatives B, C, and D

Reduction in access in comparison with the current condition and Alternative A from closure to cross-country motorized use, closure of ML 1 roads and designation of corridors would improve habitat effectiveness and quality.

Maintenance Level 1 Roads

Alternatives B, C, and D would close maintenance level 1 roads to motorized vehicles, improving habitat for riparian and wetland habitat dependent species by reducing disturbance at sensitive sites (particularly for bald eagles, harlequin ducks and common loons), reducing direct mortality from collisions or crushing (Columbia Oregonian, Western pond turtle), reducing motorized access for hunting, poaching, or trapping (beaver, ruffed grouse), displacing from or avoidance of important habitats.

Alternatives B, C, and D would reduce motorized route mileage in the Riparian Reserves and RHCAs by 317 miles (21%) because of closing maintenance level 1 roads to motorized use, a notable reduction in motorized use from the current condition. These areas could still be accessed by non-motorized means. However, due to the long distances involved in many cases, it is likely that this motorized reduction would improve habitat conditions- especially the potential for disturbance at nest sites.

Cross Country Motorized Travel

Alternatives B, C, and D would close the Forest to cross-country motorized travel. This would would reduce disturbance, avoidance and displacement from important habitats, and would reduce potential for crushing snails or turtles. The estimated 79,255 acres (16%) of the riparian and wetland buffers currently open for cross-country motorized use would be closed with implementation of Alternative B, C, or D. The closure would eliminate future vegetation loss created by off-road vehicle use. This would be an important and substantial improvement in riparian habitat conditions.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would include designate approximately 4,546 acres of corridors in riparian/wetland abitat (0.9% of the Riparian Reserve/RHCA habitat). Alternative C corridors would designate 2,621 acres of corridors in riparian reserve/RHCA habitat (0.5% of the riparian habitat on the forest), while Alternative D would designate 11,786 acres (2.4% of the riparian habitat on the forest).

Table *. Acres and Percent of Corridors in Riparian Habitat, by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Riparian Habitat in Corridors	4,546	2,621	11,786
Percent of Total Riparian Habitat	0.9%	0.5%	2.4%

Motorized vehicles could still disturb or displace species with implementation of Alternative B, C, or D, however there would be a reduction from the existing condition, or the effects of Alternative A. Within the corridors, motorized vehicles would be restricted to only using established routes, and not travel farther than 300 feet from roads, and not closer than 100 feet to water. This setback would reduce disturbance to wildlife species and reduce the potential for negative effects. The amount of riparian and wetland habitat that would potentially experience disturbance would be a much smaller area than what is currently being used, since currently there is no restriction on motorized access to dispersed camping.

This reduction in access would reduce disturbance at sensitive sites (particularly for bald eagles, harlequin ducks and common loons), reduce direct mortality from collisions or crushing (Columbia Oregonian, Western pond turtle), reduce motorized access for hunting, poaching, or trapping (beaver, ruffed grouse), and reduce potential for displacement from or avoidance of important habitats.

Cumulative Effects

Geographic Boundary

The geographic boundary is the Riparian Reserves and Riparian Habitat Conservation Area land allocations across the forest and the subbasins (4th field HUCs) where these habitats occur, including the other land ownerships within the subbasins.

Temporal Boundary

The temporal boundary is the time since European settlement in Washington and extends to about ten years into the future. Habitat loss and degradation affecting distribution of wildlife species have influenced populations since settlement of the western United States. Forest management activities began affecting riparian and wetland habitats on the National Forests in the early 1900s with the development of the road and trail network and fire suppression.

Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as actions stemming from Forest Plan revision are likely to change management direction within about 10 years.

Trends

Road densities in the Interior Columbia basin have substantially increased since European settlement and are estimated to be moderate to high in most Ecological Reporting Units (ERUs) (Hann and others 1997) including the units encompassing the Okanogan-Wenatchee National Forest. Snag densities have been reduced by cutting as firewood and danger trees. According to Washington Department of Fish and Wildlife information (1997), at least 50% and as much as 90% of riparian habitat in Washington has been lost or extensively modified (Knutson and Naef, 1997).

Past Actions

Since European settlement of the area, riparian and wetland habitats have been degraded by timber harvest, fire suppression, grazing, firewood cutting, and recreation uses. Roads and trails often traverse riparian areas.

On-going Actions

Recreation activities, fire suppression, grazing and the use of roads and trails in riparian and wetland habitats are on-going. However, the Northwest Forest Plan, PACFISH, INFISH, and the Wenatchee and Okanogan National Forest Land and Resource Management Plans establish management direction for activities in riparian areas and designate buffers along streams and wetlands. All activities in the Northwest Forest Plan land allocation must not retard or prevent attainment of Aquatic Conservation Strategy objectives, which means that the agency must manage the riparian and wetland-dependent resources to maintain the existing condition or implement actions to restore conditions. PACFISH and INFISH direction is similar, and include managing vehicles and motor vehicle use in a manner that does not retard or prevent attainment of Riparian Management Objectives (RMOs). This riparian and wetland management direction has been mitigating effects to species that use riparian and wetland habitats since 1994-1995, and will continue to do so until new riparian and wetland management direction is established under the revised Forest Plan.

The Peshastin and Chumstick project will decommission 52 miles of road in the Wenatchee subbasin. Approximately 7 miles will be decommissioned in the riparian wetland habitat. This will further reduce the potential for reduction of disturbance at sensitive sites, displacement, and mortality from collisions, crushing, hunting, and trapping.

Non-motorized uses also cause disturbance to some species. Bald eagles may be more sensitive to humans on foot (Grubb and King 1991, Hamann et al. 1999, Skagen et al. 1991, Stalmaster and Newman, 1978). Harlequin ducks are also sensitive to human presence, and were found to use stream habitats that were inaccessible by humans more than expected (Ashley, 1994). Common loons were displaced from nests by campers and canoeists (Ream, 1976).

Reasonably Foreseeable Future Actions

Minimum Roads Analysis is currently being conducted in several watersheds across the forest, and decision documents stemming from these analyses would likely result in additional net reductions of open roads. Specifics are not known at this time for most of the analyses. However, the Chewuch Transportation Plan proposal would result in decommissioning 118 miles of system road in the Methow subbasin. Approximately 20 miles would be decommissioned within riparian buffers. This would further reduce the potential for reducing cavity nest sites, or increasing disturbance, poaching, displacement and avoidance, collisions and crushing.

Other projects planned within the riparian and wetland habitat across the Forest are listed below. The purpose of these projects is to improve riparian, wetland and aquatic conditions.

Table *. Reasonably Foreseeable Future Actions Potentially Affecting Riparian/ Wetland Habitat		
Project type	***Potential negative or beneficial effect***	***Possible effect to species associated with riparian and wetland habitat?***
Riparian/Aquatic Restoration- construction and reconstruction of bridges, culvert removals and replacements, addition of large woody debris, boulders, streambank vegetation, and restoration of side channel habitat. Rerouting of camping and roads that are having negative effects on riparian.	Beneficial	Restores structure, connectivity and function of riparian area and allows for improved aquatic organism passage. Projects planned on and adjacent to Forest in Cle Elum, Naches, Methow, Wenatchee River, Conservation Districts, Colville and Yakama tribes, other agencies and private partners.
Beaver re-introduction	Beneficial	Restores habitat and water table. Projects ongoing on Methow district, planned for Colville Reservation.
Outfitter-Guide Permits	Beneficial	Would require prior approval for campsites used by pack and saddle outfitters to prevent resource damage on Chelan, Methow and Tonasket districts.
Allotment Management Plan Revisions	Beneficial	Adjust grazing practices where needed in riparian and wetland habitats. Planned in Methow subbasin.

In the Lake Chelan subbasin, the Holden Mine Remediation clean-up project will impact wetlands and riparian areas. A barrier wall which will extend underground will change hydrology of the area and dewater a contaminated wetland. A planned quarry may also affect wetlands. A portion of Railroad Creek will be rerouted to avoid exposure to mine tailings.

The Yakima Basin Integrated Water Management Plan identifies a comprehensive approach to water resources and ecosystem restoration improvements in the Yakima River basin. Projects include the expansion of the Bumping Lake reservoir, which would flood shrub-steppe and old growth habitats, and have negative effects on species using those habitats. Land acquisition and other mitigations would be part of the project, and would reduce effects to listed species. The Plan is designed to improve riparian areas and floodplain habitat.

Forest projects such as vegetation management projects, may have riparian and wetland habitat within their boundaries. However, all projects must meet the objective of not retarding or preventing attainment of the Riparian Management Objectives (PACFISH and INFISH) or Aquatic Conservation Strategy objectives (Northwest Forest Plan). Mitigation measures would be in place to assure this, so these projects would not have a negative effect on riparian resources or associated species.

Several other Forest projects would have a net effect of reducing road densities by decommissioning roads across the forest over the next decade. Swauk Pine (Cle Elum RD), Mission (Methow Valley RD), Little Crow (Naches RD), Annie and Light (Tonasket RD) would result in net road reduction of approximately 111 miles. Some of the decommissioning may be targeting roads in riparian reserves or RHCAs. Other projects would add motorized trails (Naches, Little Crow learner loops 3.4 miles) and allow cross-country access (Cle Elum, Ferris Hard Rock mining project).

Cumulative Effects Summary

Alternative A

The cumulative effect of Alternative A and the past, present, and reasonably foreseeable future actions would be an improvement in riparian/wetland habitat for the species that depend on it, but to a much lesser degree than Alternatives B, C, or D. The reasonably foreseeable future actions would reduce road mileage in riparian/wetland areas, but this positive effect would be offset by the continued motorized cross country travel, and unregulated motorized access for dispersed camping.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D would be a substantial improvement in riparian area habitat across the forest. There would be a reduction in the net motorized access within riparian areas, which would reduce disturbance at sensitive sites (particularly for bald eagles, harlequin ducks and common loons), reduce direct mortality from collisions or crushing (Columbia Oregonian, Western pond turtle), reduce motorized access for hunting, poaching, or trapping (beaver, ruffed grouse), and displacement from or avoidance of important habitats.

Sensitive Species Determinations (bald eagles, harlequin ducks, common loons, Western pond turtle, and Puget Oregonians, zigzag darners, subarctic darners, subarctic bluets and boreal whiteface)

Alternative A may impact individuals or habitat (due to continued cross country motorized use), but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (because approximately 84% of the habitat would not be affected by cross country use). Continued trail development as a result of motorized cross-country use is expected, and could degrade riparian and wetland habitats through vegetation loss. Use of new trails and areas could result in noise disturbance, displacement or avoidance of habitat, or mortality of individuals.

Alternatives B, C, and D would have a beneficial impact on sensitive species associated with riparian and wetland habitat, due to a measureable benefit- an estimated 21% decrease in open motorized routes in riparian areas and closure to cross-country motorized travel in riparian buffers that could affect almost 80,000 acres, 16% of the habitat. These actions would decrease potential for disturbance, avoidance, poaching, collisions/crushing/collecting, and displacement.

Management Indicator Species Determination- Beaver and Ruffed Grouse

Alternative A would have a small negative impact due to continued development of additional routes through motorized cross-country use, which could occur on an estimated 16% of the habitat. Because 84% of the habitat would continue to be available, and these species are common and widespread, continued viability of beaver and ruffed grouse is expected across the Forest.

Alternatives B, C, and D would improve conditions for Management Indicator Species for beaver and ruffed grouse, across the Forest. Road closures and closure to cross-country travel would result in less disturbance and less access for hunting/poaching/trapping. None of the alternatives would contribute to a negative trend in viability on the Okanogan-Wenatchee National Forest for MIS.

Compliance with Laws and Regulations

Alternative A is expected to result in additional trail development over time due to continued motorized cross-country use. If these new trails occur in areas used by bald eagles for nesting, foraging or roosting areas, there is the possibility for disturbance, which means that alternative A would not be consistent with the Bald and Golden Eagle Protection Act, which prohibits "taking" bald eagles. (The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb'' means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause injury to an eagle, a decrease in its productivity, or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior). The National Bald Eagle Guidelines provide guidance for land managers and landowners for applying the Act and avoiding negative effects to eagles. These guidelines recommend avoiding disturbance at nesting, roosting and foraging areas and recommend not operating off-road vehicles within 330'-660' of a nest during the breeding season. Alternative A may require mitigation to be consistent with the Bald and Golden Eagle Protection Act.

Alternative A is not consistent with Forest Plan direction to protect sensitive species in riparian and wetland areas. It is not consistent with the Northwest Forest Plan because pre-disturbance surveys were not completed for survey and manage species. Cross country motorized travel would continue if alternative A is selected, and could occur in habitats for Puget or Columbia Oregonians. It is unknown where this use would occur.

Alternative A is consistent with the Migratory Bird Treaty Act, which prohibits pursuing, hunting, shooting, wounding, killing, trapping, capturing, possessing, or collecting migratory birds. The addition of new trails in riparian and wetland areas is most likely to result in disturbance rather than physical harm, due to lower speeds on unmaintained trails. The alternative is also consistent with the National Forest Management Act, because viability of species associated with wetlands and riparian areas is likely to be maintained across the Forest.

Alternatives B, C and D are consistent with the National Forest Management Act, the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and Okanogan and Wenatchee Forest Plans standards and guidelines for sensitive species and MIS, and the Northwest Forest Plan. Alternatives B, C and D reduce access to riparian and wetland areas and better protect species.

Cliff/Talus Habitats

Cliffs and talus (the accumulation of broken rock at the base of steep slopes) provide unique wildlife habitats that are not associated with a specific plant community. While these habitats comprise a small part of the total land base, they are important sites for feeding and reproduction of many species of amphibians, reptiles, birds, bats, and mammals, and tend to concentrate a variety of wildlife into relatively small areas (Thomas et al., 1979). High cliff systems and deep, large talus slopes provide protection for wildlife from humans because they are difficult to access.

Unlike vegetation-associated habitat types, most cliff and talus habitats are not easily changed or destroyed by management actions, other than road construction or use of talus for rock sources. There is a limited amount of motorized vehicles use in these habitats due to their steep topography and rough terrain. However, OHV use does occur on some talus slopes and is of potential concern for species using the interstitial spaces between rocks, such as the larch mountain salamander, a sensitive species and a survey and manage species.

Cliff/Talus Species

The following table includes all management indicator, sensitive, survey and manage, and landbird species dependent on cliff/talus habitat.

American peregrine falcon	Sensitive Species
Larch mountain salamander	Sensitive, Survey and Manage Species

Grand Coulee mountainsnail	Strategic Species
Shiny tightcoil	Sensitive Species
Prairie falcon	Focal Landbird Species

American Peregrine Falcon

Peregrine falcons are a Region 6 sensitive species whose range extends from Washington and British Columbia to central California. Peregrines generally use cliffs for nesting near bodies of water that provide habitat for waterfowl and other potential prey species (Finch 1991). Prey includes waterfowl, small migratory birds, lizards, small mammals, and fish, although waterfowl constitute their primary food source. Falcons may hunt a mile or more away from their nests (NatureServe 2016).

Peregrine falcons experienced a dramatic decline in population nationwide in the 1960s and 1970s, due to the effects of the pesticide DDT on eggshell thickness. They were federally listed as an endangered species in 1970 under the Endangered Species Conservation Act of 1969, underwent recovery, and were removed from the list in 1999. They are considered "imperiled" in Washington.

Responses of breeding pairs to human activities is varied, and depends on individual characteristics, time of breeding cycle, and environmental circumstances (Cade, 1960 bna). Pairs in urban areas or frequently visited sites become habituated to close human activities. Eyries have been abandoned due to human encroachments or increased levels of nearby activity (Hickey 1942, 1969; Bond 1946 BNA), however, rock-climbing and research activity at eyries is not usually detrimental when reasonable precautions are taken (Olsen and Olsen 1978, Cade et al. 1996 bna).

Several nests have been documented on forest, on the Methow Valley and Wenatchee River Ranger Districts.

Larch mountain salamander

The larch mountain salamander is a Region 6 sensitive species and a "survey and manage" species. Larch mountain salamander habitat consists of talus, scree, gravelly soils and other areas of accumulated rock where interstitial spaces exist between the rock and soil (Crisafuli 1999). It is found in isolated populations on steep slopes with talus/rocky outcrops or in late seral forest conditions, or combinations of rocky substrates, soils, and vegetation that provide suitable cool, moist microhabitat conditions (Crisafulli et al. 2008). Adults feed on invertebrates (snails, earthworms, etc.), but juveniles forage on smaller prey such as mites (NatureServe 2008).

The larch mountain salamander is listed as "vulnerable" in the State of Washington by NatureServe (NatureServe 2008). Threats to the species are logging or removal of talus for road or trail construction, residential development and talus mining (NatureServe, 2012, WDFW, 2011). These activities may affect canopy closure, disturb substrates and soils, and alter microhabitats, microclimates and resources.

Currently, larch mountain salamanders have been found in several sites on the forest. Known sites on the Forest occur between 3,000 and 4,200 feet in elevation; occur in the annual precipitation above 60 inches; and in talus adjacent to old forest. Some of these sites are in old-growth coniferous forest without significant exposed rocky area. In these habitats, important microhabitat includes woody debris, leaf litter and rocks.

Grand Coulee mountainsnail

The Grand Coulee mountainsnail is a strategic species that has been documented on the Okanogan-Wenatchee National Forest.

This terrestrial snail is most active in April-May and September-October when conditions are warmer but moist. They forage on plant and rock surfaces for detritus and microscopic fungi, plants, and animals. They are only on the surface when conditions are moist such as mornings after a dew or frost. This snail may be adapted to frequent, low intensity fires, so conditions that cause unusually high intensity fires may negatively affect this species. Nothing is known about the hibernation habits or habitat used during hibernation. Because little is known about the species, the Interagency Special Status Species Program (2011) recommends that management and/or avoidance of rock talus accumulations during road construction and forestry activities may help protect important refugia sites used by these species.

Grand Coulee mountainsnails are known to occur at Blue Lake and Park Lake at Grand Coulee, and potentially up the Okanogan River valley up to Okanogan, where it is found at lower elevations along major river valleys on basalt talus and rocky outcrops on sites associated with springs or seeps surrounded by sagebrush. The Grand Coulee mountainsnail is listed as "imperiled" in the State of Washington by NatureServe (NatureServe 2008).

Shiny tightcoil

The shiny tightcoil is a small terrestrial snail found in eastern Washington. This species is found at moderate to high elevations in Douglas-fir and ponderosa pine forests (Frest and Johannes 1995). This snail feeds on algae, yeast, bacteria, and diatoms (a single-celled organism) on rock, wood, and plant surfaces. They use talus and other sites that provide a higher humidity and constant temperature.

Activities that compact soils or snow, disturb ground vegetation or litter, remove woody debris, alter temperature and humidity of microsites, reduce canopy cover, or alter the water table may be threats to the species, including livestock grazing, timbering activities, recreational activities, mining activities, heavy equipment operation, water diversions and improvements, and construction operations (Gowan and Burke 1999). Most of the original range of the snail has been logged and the potential for recolonization has been precluded by heavy grazing (Frest and Johannes 1995).

The shiny tightcoil is listed as "vulnerable" in the State of Washington by NatureServe (NatureServe 2008). It has been found in eight locations in or adjacent to the Okanogan-Wenatchee National Forest. Management recommendations from the Interagency Special Status Species Program (2010) are to protect new and known sites from heavy grazing, vehicle use, recreational use, and other practices that might compact soil, disturb ground cover or alter habitat.

Prairie Falcon

One focal land bird, the prairie falcon, is associated with cliff habitat. The prairie falcon inhabits drier environments, using cliffs for nest sites. They forage on medium size birds and mammals, particularly ground squirrels. Potential threats to falcon populations are falconry, illegal shooting, habitat loss, pesticides and disturbance to nest sites. Prairie falcons may avoid nesting habitats near major roads (Platt, 1974 BNA). A Mojave Desert study showed that nests near roads were more likely to fail than nests further from roads (Boyce, 1982 in BNA). Short duration but intense disturbance caused flushing while longer term disturbance caused nest abandonment, resulting in loss of eggs or young (Harmata et al. 1978 BNA). However, Holthuijzen (1989 and 1990 bna) found no detectable adverse effects from construction and recreation activities.

Cliff/Talus Habitat

Methods

Effects of the travel management proposed action on cliff and talus habitat was analyzed by comparing the miles of motorized routes found within 100' of a cliff or talus site mapped in the Forest GIS database. Remote sensing data does not classify small habitat inclusions, so smaller cliffs and talus areas are underrepresented using this methodology.

Analysis Area

The analysis area is the cliff and talus habitat across the forest.

Existing Condition

Large cliffs and larger expanses of talus habitat are estimated to occur on approximately 30,697 acres on the Okanogan-Wenatchee National Forest.

Table *. Acres of Cliff/talus Habitat by Subbasin	
Subbasin	**Acres**
Chief Joseph	13
Kettle	168
Lake Chelan	10,268
Methow	3,392
Naches	1,225
Okanogan	597
Sanpoil	407
Upper Columbia-Entiat	2,606
Upper Skagit	2,959
Upper Yakima	1,522
Wenatchee	7,540
forest total	***30,697***

Maintenance Level 1 Roads

Currently, there are approximately 67 miles of road or motorized trails across the forest within 100 meters of this habitat type[2]. Maintenance level 1 roads are part of this total, and their use by motorized vehicles is contributing to potential impacts to cliff/talus species. Use of the road and motorized trail system near cliff and talus habitat could potentially cause avoidance, displacement, or disturbance at sensitive sites for peregrine and prairie falcons and may provide access which could result in illegal shooting of these birds or loss of young to falconers. Direct use of talus by OHVs could potentially cause changes to the interstitial (between rocks) spaces, as rocks shift, used by larch mountain salamanders, Grand Coulee mountainsnails or shiny tightcoils. This could change the temperature and humidity of the habitat, amount of habitat, or crush individuals.

Cross Country Motorized Travel

Cross-country motorized travel is limited in these habitats due to topography and terrain. Currently, motorized cross-country potential is estimated on approximately 3,018 acres in and adjacent to the large area cliff and talus habitat (buffered by 100 meters). Cross-country motorized travel occurs in and around less extensive unmapped areas of talus, as well, but acreages of these are unknown. Cross-country travel could result in disturbance to sensitive sites, displacement from and avoidance of important habitats, changes to interstitial habitat and possibly crushing of individuals (snails and salamanders) or loss of falcons to illegal shooting or falconry.

Motorized Access for Dispersed Camping

It is unlikely that much motorized access for dispersed camping is occurring in cliff/talus habitat, however some may be occurring within 100 meters of the habitat. This motorized access may be causing disturbance, displacement, habitat change, and mortality or loss of individuals from hunting or falconry.

Environmental Consequences

[2] A forest-wide GIS layer of the smaller talus slopes and cliffs does not exist, so an analysis of effects of roads and motorized trails on those habitat types cannot be quantified.

Direct and Indirect Effects

Alternative A

Maintenance Level 1 Roads

Alternative A would not close maintenance level 1 roads to motorized vehicles, so the level of effects from the 67 miles of road and motorized trail near cliff habitat or in or near talus slopes would continue. As discussed above, use of the road and motorized trail system near cliff and talus habitat could potentially cause avoidance, displacement, or disturbance at sensitive sites for peregrine and prairie falcons and may provide access which could result in illegal shooting of these birds or loss of young to falconers. Direct use of talus by motorized vehicles could potentially cause changes to the interstitial (between rocks) spaces, as rocks shift, used by larch mountain salamanders, Grand Coulee mountainsnails or shiny tightcoils. This could change the temperature and humidity of the habitat, amount of habitat, or crush individuals.

Cross Country Motorized Travel

Cross-country motorized use would continue if Alternative A is implemented, and could result in continued disturbance, displacement and avoidance of habitat. Cross-country motorized use would continue to have the potential to change interstitial habitats and crush individual salamanders and mollusks. Over time, it is expected that more trails would be created, and would result in additional habitat loss or degradation and loss of individuals on a localized scale. This could be a critical loss of habitat or individuals, given the limited number of known locations for larch mountain salamanders, shiny tightcoils and Grand Coulee mountainsnails and their "imperiled" or "vulnerable" status.

Motorized Access for Dispersed Camping

Corridors for motorized access for dispersed camping would not be designated with Alternative A, and access for dispersed camping would continue in a fairly unrestricted manner. Over time, new routes may develop, which could degrade habitat, result in loss of individuals, and lead to disturbance, displacement or avoidance of habitats, and crushing or habitat degradation that would affect snails and salamanders.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

Implementation of Alternative B, C, or D would result in the prohibition of motor vehicle use on approximately 12 miles of maintenance level 1 roads near cliff/talus habitat, which would be an 18% reduction from the current condition. This would reduce potential for disturbance, displacement and avoidance, and mortality to the species associated with cliff and talus habitat. Miles of motorized routes in and near the smaller cliff/talus systems are unknown, but it is likely that closure of maintenance level 1 roads would reduce the potential for disturbance and habitat loss or degradation in these areas as well, and would have a beneficial effect for the species associated with these habitats.

Cross Country Motorized Travel

The proposed action would close the forest to cross-country travel, eliminating motorized vehicle use on the approximately 3,018 acres (10%) of cliff/talus habitat potentially receiving that activity. This would benefit cliff/talus habitat and the species using this habitat by reducing disturbance, displacement and avoidance of habitat, and reducing the potential for crushing of snails and salamanders, changing character of the interstitial habitat, and the potential for illegal shooting of falcons or loss of young to falconers.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate corridors 22 acres in and near the cliff/talus habitat, or approximately 0.07% of the 30,697 total acres. Alternative C would designate corridors on 14 acres near the cliff/talus habitat in corridors, while corridors in Alternative D would designate 87 acres.

Table *. Acres and Percent Corridors in Cliff/Talus Habitat Within Corridors by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Cliff/Talus Habitat in Corridors	22	14	87
Percent of Total Cliff/Talus Habitat	0.07%	0.05%	0.3%

Implementation of Alternative B, C, or D would potentially reduce motorized access in comparison with alternative A, which allows access anywhere, as long as resource damage does not occur. This would reduce disturbance, displacement and avoidance of habitat, and reduce the potential for crushing of snails and salamanders, changing character of the interstitial habitat, and reduce potential for illegal shooting of falcons or loss of young to falconers by reducing access.

Cumulative Effects

Geographic Boundary

The geographic boundary is the cliff and talus habitat across the forest, including non-federal inclusions, and the habitats surrounding it, which are used for foraging, connectivity and other life functions by some of the cliff/talus-associated species.

Temporal Boundary

The temporal boundary is the time since European settlement in Washington until 10 years into the future Access to these habitats resulted in hunting, trapping or shooting of species using these habitats (mountain goats, bighorn sheep, wolverine, raptors), and disturbance to the habitats.

Motorized travel is expected to continue in perpetuity on the Forest. However future decisions that affect travel management such as actions stemming from minimum roads analysis and Forest Plan revision are likely to change management direction within about 10 years.

Trends

Road densities in the Interior Columbia basin have increased substantially in the past several decades and are estimated to be moderate to high in most Ecological Reporting Units (ERUs) (Hann et al. 1997) including the units encompassing the Okanogan-Wenatchee National Forest. Snag densities have been reduced by cutting as firewood and danger trees.

The amount of cliff and talus areas has not changed between historical and current periods (Hann et al. 1997).

Past Actions

Past actions affecting the cliff/talus habitat include recreation, mining, blasting and road construction, and use of talus as a rock source. Actions affecting the species associated with the cliff/talus systems include loss or degradation of surrounding essential habitats used for foraging and other functions and loss of important habitat components such as snags. Wildfire and fire suppression, grazing and agricultural, residential and other development have altered composition of surrounding habitats, impacting important foraging and other seasonal use areas.

On-going Actions

Recreational activities, including rock climbing and hiking, continue across the forest and have the potential to disturb species using rock/talus habitats.

Holden Mine Remediation activities are currently in the construction stage. A quarry is planned that would use a cliff talus system to provide rock, which would change the character of the system and may render it unsuitable as habitat. During the time period it would be used, disturbance associated with rock removal would likely displace use by wildlife species.

The Peshastin and Chumstick project will decommission 52 miles of road in the Wenatchee subbasin, some of which may be near large cliff/talus areas, and may also reduce disturbance to the habitat. This will further reduce the potential for reduction of disturbance at sensitive sites, displacement, and mortality from collisions, crushing, hunting, and trapping.

Reasonably Foreseeable Future Actions

Minimum Roads Analysis is currently being conducted in several watersheds across the forest, and decision documents stemming from these would likely result in addition closures and decommissioning of roads. Specific proposals are available for the Chewuch (Chewuch Transportation Plan scoping, October 2011) and The Chewuch Transportation Plan proposal would not close or decommission roads near large cliff/talus areas, but may reduce disturbance near smaller unmapped areas.

Cumulative Effects Summary

Alternative A

The cumulative effect of Alternative A and the past, present, and reasonably foreseeable future actions would be a continued threat to species dependent on cliff/talus habitat due to the continuation of motorized cross country travel. The road decommissioning in some reasonably foreseeable future projects would help reduce threats to these species, but any benefit would be outweighed by continued motorized cross country travel. Other projects on private lands such as quarries, rock pits, road construction and mining are likely to result in additional disturbance to cliff and talus habitats.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D would be reduction in the net motorized access to cliff/talus habitat the Forest, which would reduce disturbance, displacement and avoidance of habitat, and reduce the potential for crushing of snails and salamanders. This would potentially reduce the potential to change interstitial habitat, and reduce potential for illegal shooting of falcons or loss of young to falconers by reducing access.

Determination for Sensitive Species (peregrine falcons, larch mountain salamanders, Grand Coulee mountainsnail, and shiny tightcoil)

Alternative A may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species, due to continued route development. Route development would be minor in this habitat type.

Alternatives B, C, and D may impact individuals or habitat, due to continued route development, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Habitat for peregrine falcons, larch mountain salamanders, and shiny tightcoils may be slightly improved by the closure to motorized cross-country travel, which would reduce potential disturbance to peregrines and reduce the potential for habitat changes and mortality to individual salamanders and snails.

Compliance with Laws and Regulations

Alternative A would not be consistent with the Northwest Forest Plan because no pre-disturbance surveys have been completed for survey and manage species (larch mountain salamander), and this alternative would allow continued cross country use. Over time, this use would result in development of new trails. However, it is not possible to predict where this would occur or if these habitats would be affected.

Alternative A would be consistent with other Forest Plan standards and guidelines, NFMA, and the Migratory Bird Treaty Act.

Alternatives B, C and D would be consistent with NFMA (because species' viability would continue at the Forest level), Forest Plan direction to protect sensitive species, Northwest Forest Plan direction for survey and manage species (by protecting known sites for larch mountain salamanders), and the Migratory Bird Treaty Act (because no additional opportunity for take would occur). Alternatives B, C and D would protect sensitive species better than alternative A because they would eliminate motorized cross-country travel, reducing potential disturbance, habitat change, and mortality to individuals.

Non-forest Habitats (Meadows/shrub-steppe/grasslands)

Introduction

Non-forest habitats include wet and dry meadows, shrub-steppe habitats, and grasslands at all elevations (cliff/talus habitat is discussed in a separate section). These habitat types are found in small inclusions within the forested landscape, at the forest edge above timberline and at the dry low-elevation lands bordering non-federal lands, across the Okanogan-Wenatchee National Forest. Non-forest habitats are estimated to occur on 324,087 acres (7.6% of the forest).

Non-Forest Habitats Species

The following table lists the species of interest for the non-forest habitats, excluding the high-elevation species whose habitat would not be affected by travel management actions.

Columbian sharp-tailed grouse	Sensitive Species
Sandhill crane	Sensitive Species, and Focal Landbird Species
Striped whipsnake	Sensitive Species
Western bumblebee	Sensitive Species
Mardon skipper	Sensitive Species
Meadow fritillary	Sensitive Species
Great Basin fritillary	Sensitive Species
Peck's skipper	Sensitive Species
Tawny-edged skipper	Sensitive Species
Vesper Sparrow	Focal Landbird Species
Sage Sparrow	Focal Landbird Species

Columbian sharp-tailed grouse

Sharp-tailed grouse are a sensitive species that inhabit mesic shrubland and grasslands. Sagebrush, mountain and riparian shrubs are special habitat features used by sharptails (Wisdom et al. 2000) and are used for nesting, brood-rearing, escape cover and wintering habitats. Herbaceous vegetation and arthropods are used as spring and summer foods, while buds and fruits of woody vegetation and agricultural crops are used in the winter.

Sharp-tailed grouse habitat has undergone large-scale conversion to agriculture since European settlement, and sharp-tails are estimated to occupy less than 5% of their historic range (Wisdom et al. 2000). Grazing contributes to habitat degradation for sharp-tails, as it removes forage and cover species (Saab and Marks 1992). Roads allow increased human presence and potential disturbance at reproductive sites (leks) and wintering grounds. Wildfire may enhance or degrade habitat. Many vegetation foods are rejuvenated by fire, but sagebrush, an important cover, is destroyed by fire.

Sandhill Crane

Sandhill cranes are a sensitive species that nest in meadows, marshes, and riparian areas, where they forage in wetlands and grasslands on amphibians, rodents, insects, roots, tubers, berries, and grains. The young birds will also feed on invertebrates (Finch 1991, NatureServe 2010). Sandhill cranes usually nest on the ground or in vegetation in shallow water. These birds have a high fidelity to nesting areas. During the non-breeding season they roost at night along wetlands and rivers (NatureServe 2010).

Sandhill cranes may avoid roads and human development near river channel roost sites. One study found that the presence of bridges or roads adjacent to river channels reduced use by about half (Krapu et al. 1984). Another study found that sandhill cranes avoided roost sites closer than 500 meters from a paved road, and 400 meters from a gravel road (Norling et al. 1992).

The conservation status for sandhill cranes is listed as “critically imperiled” in the state of Washington (NatureServe 2010). Human disturbance at nest sites is a conservation issue for the species (Altman 2000).

Sandhills are not known to nest on the forest, but are occasionally observed during migrations.

Striped Whipsnake

The striped whipsnake is a sensitive species that occurs in central Washington, the northern extent of its geographic range. Known sites are limited to the central Columbia Basin that receive less than 8 inches of precipitation annually, and are below 1,500 feet elevation (WDFW, 2011).

They use sagebrush or other shrublands, arid grasslands, and rocky areas along streams. Their diet consists of lizards, small mammals, birds, and insects, although the young typically focus on lizards as prey (NatureServe 2010).

The striped whipsnake is listed as “critically imperiled” in the State of Washington by NatureServe (NatureServe 2010). While no major threats to the species have been identified, some populations are declining due to habitat loss and road mortality (NatureServe, 2010).

Western Bumblebee

The western bumblebee is a Region 6 sensitive species with a broad historical range across the west coast of North America. The following information is from the Species Fact Sheet compiled for the Interagency Special Status/Sensitive Species Program. Recent analyses suggest dramatic declines in its range over the last century (Species Fact Sheet). In Oregon and Washington, B. occidentalis populations are currently largely restricted to high elevation sites, and the species is no longer found in the western portions of either state where it was once common.

Bumblebees inhabit a wide variety of natural, agricultural, urban, and rural habitats, although species richness tends to peak in flower-rich meadows of forests and subalpine zones. Their 3 basic habitat requirements are underground cavities for nesting sites, nectar/pollen resources available during spring, summer and fall, and suitable overwintering sites for the queens. The western bumblebee is a generalist forager that uses a wide variety of plants.

Threats include pathogens from commercial bees, impacts from reduced genetic diversity and habitat changes from fire suppression, grazing and logging, pesticide use, fire, agricultural intensification, urban development and climate change.

Mardon Skipper

The Mardon skipper (*Polites mardon*), a species of butterfly is a Washington State endangered species and a Region 6 sensitive species. This species is of concern because it has a restricted distribution and exists in disjunct populations. The mardon skipper is currently found at four geographically disjunct areas in northwest California, southwest Oregon, the southern Washington Cascades, and one population in the south Puget Sound region of western Washington. Sixty-six populations in 145 sites are known (Kerwin, 2011). The only known occupied sites on the Okanogan-Wenatchee National Forest occur in the southern portion of the Naches Ranger District.

Mardon skippers are grassland dependent and appear to have narrow habitat requirements, at least in some portions of their range. In the southern Washington Cascades they seem to be restricted to short sedges and grass species such as fescue and oatgrass dominated meadows with adequate nectar sources for adults. The Naches Ranger District sites range in elevation from 3,260 feet to 5,340 feet. They are found in dry and mesic grand fir forest types, within grassland intrusions and in small (less than 1/2 acre) to larger meadow complexes (St. Hilaire et al. 2009). A few of the sites are in grassy clearings in older timber harvest units. The Mardon Skipper Conservation Assessment (Kerwin, 2011) characterizes the current habitat amounts as “relatively stable”, but notes that conifer encroachment, grazing and off-road vehicle use may be affecting habitat quality as well as directly impacting different life stages.

The historic range and abundance of the species are unknown (Kerwin, 2011). However, Potter et al. (1999) believe it is likely that the number of sites, species’ range, and population abundance have declined severely from historic distributions because of habitat loss. Historic landscape conditions within the range of the Mardon skipper prior to fire suppression and extensive human habitation and development, were more open and grassy (Agee 1994). Open, grassy conditions facilitate Mardon skipper dispersal and possible interconnections among populations (metapopulations) (Potter et al. 2002).

Threats to Mardon skipper include direct impacts to eggs, larvae, and pupae by unregulated off-road vehicle use, livestock grazing, and pesticide drift (Kerwin, 2011). Habitat fragmentation, loss or modification through conifer encroachment, noxious weed invasion, roadside maintenance, and grassland/meadow management activities such as prescribed burning and mowing are also threats (Kerwin, 2011). Climate change is also considered a likely threat, as are random chance events such as wildfires (Kerwin, 2011). Kerwin (2011) concludes that “effects of climate change on Mardon skippers are largely unknown; however, phenology of bird migration, butterfly and other insect emergence in other areas, and effects on species because of changes in phenology (e.g., bird migration and food availability) supports climate change as an important issue to consider for conservation of sensitive species” and that conservation and enhancement of suitable habitat and connections between habitat patches at higher elevations may be critical.

Off-road vehicle use can result in direct mortality to individuals, destroy habitat/plants, introduce non-native weeds, and potentially alter hydrologic regimes (which in turn can alter plant composition and vegetative structure) (Kerwin and Huff, 2007).

Roadside meadows and small grassy openings along roads may be used as dispersal routes for this species, and roads serve as linear connectors with other potential habitat (Kerwin, 2011). Mowing for roadside maintenance may reduce suitability for dispersal, by removing nectar food sources or altering vegetative structure (Kerwin and Huff, 2007).

Surveys have been extensive on the Naches District, covering the majority of available Mardon skipper habitat. Mardon skippers have only been found south of Rimrock Lake in the Naches subbasin (Joan St.Hilaire, personal communication), and this is considered the known range. Surveys between 2006 and 2010 located Mardon skippers at 36 sites including two sites with over 900 individuals each in 2008 and 2009 (Kerwin, 2011).

The Okanogan-Wenatchee National Forest sites are mostly mesic meadows with a permanent water source, as indicated by the presence of false hellebore (*Veratrum californicum*). Approximately 10% of the sites are in old harvest areas or plantations. The first located site on the forest was in a grassy clearing in a post-fire woodland; however, this site appears to be atypical for this area (Joan St. Hilaire, personal communication in Kerwin, 2011).

Great Basin Fritillary
The Great Basin fritillary is a sensitive species suspected to occur on the Okanogan-Wenatchee National Forest. None have been documented to date. It inhabits montane meadows and ridges, forest openings and exposed rocky ridges (Scott, 1986). Larvae feed on viola species, adults are nectar feeders. This fritillary is a strong flier and may colonize new sites within a few kilometers of existing populations (Pyle, 2002).

Overgrazing may result in habitat loss and population declines (ISSSSP fact sheet, 2012). Over-collecting is also a threat to the species. Management strategies to protect the species are to protect known and potential sites from practices that would adversely affect any aspect of the life cycle or habitat, including management of forest succession to retain host and nectaring plants.

Meadow fritillary
The meadow fritillary is a Region 6 sensitive species. It is a medium-sized butterfly that is found in moist meadows, aspen stands, grasslands, or wet roadsides on rich soils. They occur in openings in aspen and pine forests between roughly 2000-5000 feet elevation (Fleckenstein 2006b). The meadow fritillary is dependent on the maintenance of open, wet meadow habitat. Overgrazing by livestock and vegetation succession to woody brush is harmful to the species (Miller and Hammond, 2007).

This species may have 2-3 broods in a season with flights from late May through late August. The caterpillars primarily feed on violets (Acorn and Sheldon 2006, Pyle 1992).

The known range of the species includes northern Washington into British Columbia. This species has been documented on the forest (Kent Woodruff, pers. communication).

The meadow fritillary is listed as "imperiled" in the State of Washington by NatureServe (NatureServe 2008).

Peck's Skipper
Peck's skipper is a sensitive species found across much of the northern United States and Canada, and has been documented on the Okanogan-Wenatchee National Forest. Its range in the Northwest is restricted to mountain meadows, riparian habitats and roadsides, at elevations of approximately 2,000 to 5,000 feet (Pyle 2002). Caterpillars of this species feed on rice cutgrass (Leersia oryzoides), Kentucky bluegrass (*Poa pratensis*), bromes (*Bromus species*), saltgrass (*Disticlas spicata*) and other grasses (Opler et al. 2010, Pyle 2002a, Scott 1992). Adults nectar on a wide variety of flowers including purple vetch, oxeye daisy, red clover, thistles, selfheal, New York ironweed, blue vervain, common milkweed, swamp milkweed, dogbane, and New Jersey tea. (Opler et al. 2010, Pyle 2002).

Threats to the species include competition from introduced skippers and habitat degradation from livestock grazing (ISSSP fact sheet, 2012).

This species has been found in several locations on the Tonasket district.

Tawny-edged Skipper

The tawny-edged skipper is a sensitive species occurring across much of the United States and Canada, although it is not widespread in the Northwest. Washington records are from the northeast portion of the state, and the skipper has been documented on the Tonasket district.

The tawny-edged skipper inhabits a variety of grassy habitats, where eggs are laid on host plants. Larvae feed on grasses and sedges. Adults are nectar feeders. Similarly to the Peck's skipper, threats to the species are introduced skippers (competition) and grazing (habitat degradation) (ISSSSP fact sheet, 2012).

Great Basin Fritillary

The Great Basin fritillary is a sensitive species suspected to occur on the Okanogan-Wenatchee National Forest. None have been documented to date. It inhabits montane meadows and ridges, forest openings and exposed rocky ridges (Scott, 1986). Larvae feed on *Viola* species, adults are nectar feeders. This fritillary is a strong flier and may colonize new sites within a few kilometers of existing populations (Pyle, 2002).

Overgrazing may result in habitat loss and population declines (ISSSSP fact sheet, 2012). Over-collecting is also a threat to the species. Management strategies to protect the species are to protect known and potential sites from practices that would adversely affect any aspect of the life cycle or habitat, including management of forest succession to retain host and nectaring plants.

Vesper Sparrow

Vesper sparrows inhabit a wide range of habitat types including grassland, sagebrush, fallow fields, montane meadows, juniper-steppe, agricultural cropland such as grain fields, dry, open woodlands and openings in forested habitat such as clearcuts (Altman, 2000). Their range expanded as agriculture expanded with European settlement.

These sparrows are ground-nesters that feed on seed, grains, and insects. Vesper sparrows are considered secure across North America, due to a large population and large range. However, major regional declines have been attributed to habitat loss and degradation from reforestation of farmlands, urbanization and changing agricultural practices (Natureserve, 2012).

Livestock overgrazing and OHV use are conservation issues for the species (Altman, 2000). Overgrazing may remove important vegetation for egg-laying or feeding. OHV use may degrade habitat, remove vegetation, crush ground nests or disturb nest sites.

Sage Sparrows

Sage Sparrows are highly dependent on shrub steppe habitats (Altman 2000), and use large unfragmented patches of high quality habitat for nesting. In Washington, most of this low-elevation habitat type is in private ownership, but some is found on the Okanogan-Wenatchee National Forest. Since historic times, much of the shrub-steppe habitat has been converted to other uses, largely agriculture, residential and development. In addition, invasive plants such as cheatgrass have encroached on shrub habitats, changing fire regimes. This has resulted in fires that are more frequent and intense, and may kill sage, converting the habitat to a grass-dominated habitat. Disturbances that reduce shrub cover, such as frequent fire, mechanical disruption, heavy livestock grazing, and off-highway vehicle use appear to have negative effects on sage sparrows (Chase and Carlson, 2002).

Sage sparrows nest on the ground or in low shrubs. They are insectivores, and also eat grains. They are considered "vulnerable" in Washington, due to the loss of sagebrush habitats.

Based on differences in mitochondrial DNA, morphology, and ecology, this species was recently split, with two species resulting: Bell's Sparrow (A. belli) and Sagebrush Sparrow (A. nevadensis).

Non-forest Habitat

Methods

Effects of travel management alternatives on non-forest habitats were analyzed by comparing the miles of motorized routes through the meadows, shrub-steppe and grassland habitats.

Analysis Area

The analysis area is the non-forested habitats across the forest.

Existing Condition

Maintenance Level 1 Roads

Meadows, shrub-steppe habitat and grasslands are estimated to occur on 324,087 acres, which is approximately 8% of the forest. Approximately 1,215 miles of road and motorized trails pass through these habitats. Motorized vehicle use on maintenance level 1 roads contributes to the impact of motorized vehicles to this habitat. Use of the road and motorized trail system in meadow, grassland and shrub-steppe habitats could potentially cause disturbance at sensitive sites (such as leks and wintering areas for sharp-tailed grouse), may provide access for collecting (butterflies, moths and skippers) or hunting (sharp-tailed grouse), result in road mortality (striped whipsnake) or result in avoidance of suitable habitats or displacement from roadside/trailside habitats.

Cross Country Motorized Travel

Non-forested habitats are some of the most accessible habitats for cross-country motorized use due to their lack of trees, and are valuable habitats for wildlife. Cross-country motorized travel is estimated to occur on about 80,988 acres of grassland, shrub-steppe and meadow habitat, based on GIS analysis of topography, vegetation, access and land allocation. This is about 25% of the total non-forested habitat. Cross-country motorized travel results in decreased habitat effectiveness, increased potential for habitat degradation from noxious weeds, habitat loss (as vegetation loss occurs), increased potential for disturbance at sensitive sites and avoidance by and displacement of the wildlife species depending on non-forest habitat.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is occurring on the forest since relatively flat, open areas are popular dispersed camping locations. Motorized vehicles driven through meadows to reach dispersed campsites damage or kill vegetation, and increase the potential for disturbance at sensitive sites. The activity can result in avoidance by and displacement of the wildlife species depending on non-forest habitat.

Environmental Consequences

Direct and Indirect Effects

Alternative A

Maintenance Level 1 Roads

Implementation of Alternative A would result in no immediate change to the current level of motorized access on roads and trails, or the resulting potential for disturbance, avoidance or displacement. Over time, recreation is expected to increase, which would likely increase the use of motorized routes including unauthorized routes, many of which are found in this habitat because of its easy accessibility. This could increase the disturbance to sensitive sites, avoidance and displacement from adjacent habitats, and access resulting in hunting, collecting or road mortality. Motorized vehicle use on maintenance level 1 roads would continue, and potentially cause disturbance at sensitive sites (such as leks and wintering areas for sharp-tailed grouse), may provide access for collecting (butterflies, moths and skippers) or hunting (sharp-tailed grouse), result in road mortality (striped whipsnake) or result in avoidance of suitable habitats or displacement from roadside/trailside habitats.

Cross Country Motorized Travel

Cross-country motorized travel would continue if alternative A is implemented, and in time would be likely to expand to more areas, as both the human population and recreational use of the national forests is predicted to grow. Cross-country motorized use would reduce habitat effectiveness and could result in habitat loss and degradation as new trails are established. This could affect the lepidopteran species, several of which are considered sensitive. Use of motorized vehicles in the meadow, shrub-steppe and grassland habitats would reduce vegetation used for egg-laying sites, caterpillar-raising, and nectaring by adult lepidopterans and could result in destruction of eggs and larval stages. Use of motorized vehicles may spread noxious weeds, which compete with the native vegetation, and potentially result in loss of shrub cover important for sage and vesper sparrows.

Motorized Access for Dispersed Camping

Corridors would not be designated with alternative A, and access for dispersed camping would continue in a fairly unrestricted manner. Over time, new routes would be developed, with the results as discussed above. This would increase the degradation on non-forest habitat by displacing or causing avoidance of the areas by the wildlife species that use non-forest habitat. This could also lead to motorized vehicle use in the meadow, shrub-steppe and grassland habitats which could reduce vegetation used for egg-laying sites, caterpillar-raising, and nectaring by adult lepidopterans and could result in destruction of eggs and larval stages. Use of motorized vehicles may spread noxious weeds, which compete with the native vegetation, and potentially result in loss of shrub cover important for sage and vesper sparrows.

Effects Common to Alternatives B, C, and D

Maintenance Level 1 Roads

Alternatives B, C, and D would reduce access to the non-forest habitats compared to the current condition by 351 miles (29%) by prohibiting motorized vehicle use on maintenance level 1 roads. This would potentially decrease disturbance, avoidance and displacement, and the potential for road-related mortality for the associated species.

Cross Country Motorized Travel

Cross-country motorized travel would be eliminated across approximately 80,988 acres of the non-forest habitat on the Forest. Prohibiting cross-country motorized travel in meadows, grassland and shrub habitats would be beneficial to many wildlife species, but would especially benefit the lepidopteran species (butterflies, moths and skippers). Many lepidopterans attach their eggs to vegetation that will also serve as a food source for the larvae (caterpillars), and several hundred species are associated with open meadows and grasslands within the broader forest landscape (Miller and Hammond 2007). Motorized vehicle use in these areas can crush eggs or caterpillars, or destroy vegetation used as a food source by caterpillars and adults. Closure to cross-country travel would also reduce potential shrub loss and habitat degradation that could affect sage and vesper sparrows.

Effects of Designating Corridors for Motorized Access to Dispersed Camping In Alternatives B, C, and D

Alternative B would designate 5,007 acres of corridors (2% of the habitat) in non-forest habitat. Alternative C would include designate 4,755 acres (1%) of corridors in this habitat, while Alternative D would designate 8,966 acres of corridors (3% of the total non-forest habitat).

Table *. Acres and Percent of Corridors in Non-forest Habitat by Alternatives B, C, and D

	Alternative B	Alternative C	Alternative D
Acres of Corridor in Non-forest Habitat	5,007	4,755	8,966
Percent of Total Non-forest Habitat	2%	1%	3%

Motorized access for dispersed camping would be allowed on existing routes within corridors with implementation of Alternative B, C, and D. The motorized use would have the potential to cause mortality to species as a result of collisions, and could cause avoidance of habitat or displacement of wildlife in the vicinity of the access routes.

Alternative D would designate more acres of corridors than Alternatives B or C, but implementation of any of these alternatives would reduce access in comparison to Alternative A, which would not restrict vehicle access for the purpose of dispersed camping. This reduction in access would reduce human presence and disturbance at important sites, reduce displacement from habitats, reduce road mortality, reduce potential for crushing of ground nests, eggs, larva, cover and food plants, and reduce habitat loss/degradation.

Cumulative Effects

Geographic Boundary

The geographic boundary is the non-forested habitat across the subbasins that include the Okanogan-Wenatchee National Forest, including non-federal lands.

Temporal Boundary

The temporal boundary is the time since European settlement when grazing use, development of private lands, and fire suppression began to approximately 10 years into the future. Forest management activities began affecting non-forest habitats in the early 1900s with the initiation of the forest transportation system and other forest activities. Non-forest lowland habitat was likely the first habitat degraded by roads.

The forest transportation system and motorized travel is expected to continue in perpetuity on the Forest, although direction may change within approximately 10 years as a result of minimum roads analysis and Forest Plan revision.

Past Actions

Past actions that have affected meadows, grasslands and shrub-steppe habitats include:

- Livestock grazing removed cover and forage that are important habitat components for sharp-tailed grouse and other ground-nesters.
- Development for agriculture, residential, urban and other uses resulted in habitat loss for the species associated with the lower elevations, such as sharp-tailed grouse.
- Fire suppression resulted in vegetative succession to brushy or forested stands, increased canopy closures and degraded habitats for meadow fritillaries, and other lepidopterans. Fire suppression has also resulted in a longer-term build-up of fuels, which results in more intense fires later.

- Intense wildfires or prescribed fires kill sagebrush, an important cover for sharp-tails. Wildfire and prescribed burns have also enhanced and rejuvenated important shrub and herb species used as food and cover for grouse, and as egg-laying sites and foods for lepidopterans.
- Road construction increased human presence which resulted in disturbance at sensitive sites (leks and other sites), avoidance and displacement from habitats, access for hunting/poaching (which may affect grouse) and collecting (an issue for some butterflies, moths and skippers). Access also results in road mortalities for some species. Snakes, which bask on warm roads, are particularly vulnerable to road mortality, and this may have been a factor in population declines of striped whipsnakes.
- Noxious weeds have displaced native vegetation that is important as food and cover for wildlife. Weeds can be spread by vehicles, humans, wildlife and livestock.
- Off-road vehicle use has reduced shrub and herbaceous cover.

On-going Actions

Human development is on-going on the low-elevation shrub-steppe lands, which are largely in private or non-federal ownership. This continues to reduce habitat for sharp-tailed grouse, which now occupy only about 5% of their historic range (Wisdom et al. 2000).

Fire suppression, prescribed burning, new road construction and grazing are also on-going. Fire suppression occurs on all districts and subbasins. Prescribed burning is occurring in forested habitats for fuels reduction and for restoration of landscapes and habitats, which may include non-forested areas.

Road construction is primarily on non-federal lands to support continued residential, urban and other development. Road construction is also occurring on DNR timber sales. A minor amount of construction, particularly of temporary roads, may occur during Forest Service timber sales, but is generally offset by closures and decommissioning driven by fisheries and wildlife considerations. These closures and decommissioning may be part of project mitigation or separate projects, such as the Peshastin, and Chumstick projects. The Peshastin and Chumstick proposal will decommission 3 miles of road in non-forest habitat. This would potentially reduce access, road-related mortality, avoidance and displacement from habitat and disturbance to species using non-forest habitats.

Livestock grazing on the forest has been reduced on the higher elevation open habitats and several allotments are vacant or have been closed. Livestock grazing is controlled by Forest Plan standards and guidelines, which limit the amount of utilization by livestock, reserving the rest for wildlife. Cattle grazing is occurring on the Methow, Chelan, Naches, Cle Elum, and Tonasket districts. Sheep grazing is occurring on the Naches, Entiat, Wenatchee River and Cle Elum Ranger districts.

Noxious weed management continues each year on all districts. Noxious weed treatments are ongoing on WDNR lands in the Okanogan and Upper Columbia-Entiat subbasins and along country roads in Chelan and Okanogan County. These treatments would reduce the potential for habitat degradation both on Forest and from spread onto the Forest because weeds displace native vegetation.

Reasonably Foreseeable Future Actions

The Forestwide Invasive Species EIS is expected to be released for public comment in 2016. Implementation of the proposed action would allow use of several herbicides that are more effective in controlling weeds and pose less risk to the environment. This could result in less weed spread in these habitats, and retention of native vegetation that is important to wildlife.

Allotment management plans for livestock grazing are being revised on the Methow and Tonasket districts, and would review and evaluate grazing activities, and assure that forest plan standards and guidelines are met. This would allow identification and correction of any areas that do not meet forage utilization maximums, which could improve non-forest habitat conditions.

Minimum Roads Analysis is currently being conducted in several watersheds across the forest, and decision documents stemming from these would likely result in additional closures and decommissioning of roads. The Chewuch Transportation Plan proposal would decommission 11 miles of road in non-forest habitat. This would potentially reduce access, road-related mortality, avoidance and displacement from habitat and disturbance to species using non-forest habitats.

Several other projects would have a net effect of reducing road densities by decommissioning roads across the forest over the next decade. Swauk Pine (Cle Elum RD), Mission (Methow Valley RD), Little Crow (Naches RD), Annie and Light (Tonasket RD) would result in net road reduction of approximately 111 miles. Some of the decommissioning would occur through non-forest habitat types. Other projects would add motorized trails (Naches, Little Crow learner loops 3.4 miles) and allow cross-country access (Cle Elum, Ferris Hard Rock mining project), some of which may be through non-forest habitats.

The Yakima Basin Integrated Water Management Plan identifies a comprehensive approach to water resources and ecosystem restoration improvements in the Yakima River basin. Projects include the expansion of the Bumping Lake reservoir, which would flood shrub-steppe and old growth habitats, and have negative effects on species using those habitats. Land acquisition and other mitigations would be part of the project, and would reduce effects to listed species. The Plan is designed to improve riparian areas and floodplain habitat.

Cumulative Effects Summary

The effects of past actions on non-forest habitats have resulted in loss and degradation of the habitat by road construction and use, conversion to agriculture and other development, spread of noxious weeds, grazing, and fire suppression.

Most ongoing and future actions on the Okanogan-Wenatchee Forest would improve the grassland, shrub-steppe and meadow habitat. Ongoing actions that may not improve this habitat type on Forest include livestock grazing (although it is much reduced from historic levels to reduce habitat degradation) and new trail construction /reconstruction (which will be avoided or mitigated to the extent possible).

The closure and decommissioning of roads in the Chewuch, Peshastin and Chumstick projects would result in an overall reduction in motorized access to non-forest habitats. Other ongoing and future actions- weed management (by the Forest, counties, tribes and state), prescribed burning by the Forest and WDFW, and various restoration actions by the Forest, tribes and WDFW are expected to improve the condition of these habitats over time. However, most of the low elevation grass and shrub habitat is on private land, and is still being lost to development.

Alternative A

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternative A would be reduction in the net motorized access to the Forest as a result of other projects, but to a much lesser degree than the cumulative effects of Alternative B, C, or D. The cumulative effect would be a somewhat reduced human presence and disturbance at some important sites, reducing displacement from habitats, road mortality, potential for crushing of ground nests, eggs, larva, cover and food plants, and reduced habitat loss/degradation.

Alternatives B, C, and D

The cumulative effect of the past, present, and reasonably foreseeable future actions and Alternatives B, C or D would be a substantial reduction in the net motorized access to the Forest, which would improve the quality of the non-forest habitat by reducing human presence and disturbance at important sites, reducing displacement from habitats, road mortality, potential for crushing of ground nests, eggs, larva, cover and food plants, and habitat loss/degradation.

Sensitive Species Determinations (Sharp-tailed grouse, Sandhill cranes, Striped whipsnake, Western bumblebees, Mardon skippers, Meadow fritillaries, Great Basin fritillaries, Peck's skippers and Tawny skippers,)

Alternative A may impact individuals or habitat because trail development from cross-country motorized travel would continue, but will not likely contribute to a trend towards federal listing or cause a loss of viability to populations or species in the short-term. In the longer term, cross-country motorized use could potentially pose a threat to the sensitive skippers and fritillaries, because an estimated 25% of the non-forested habitat in the planning area is available for that use. Loss of plants providing cover and forage, loss of eggs and larvae over ¼ of the Forest habitat could lead to population declines. If alternative A is selected, monitoring of cross-country motorized use and its effect on sensitive lepidopterans would be necessary.

Alternatives B, C, and D would have a beneficial impact on sensitive species associated with the non-forest habitat types (sharp-tailed grouse, sandhill cranes, striped whipsnake, Mardon skippers, meadow fritillaries, Peck's skippers and tawny skippers, and Great Basin fritillaries) because each alternative would reduce access that could result in disturbance at sensitive sites, mortality by crushing or vehicle strikes, access for hunting or collecting, habitat degradation by weed spread or vegetation loss, and displacement or avoidance of suitable habitats. This is a measureable benefit since cross-country motorized travel could occur on approximately 25% of the non-forest habitat, and the closure of ML 1 roads to motorized use would reduce motorized access by 29%.

Compliance with Laws and Regulations

Alternative A is consistent with the Migratory Bird Treaty Act and the National Forest Management Act. Alternative A may not be consistent with Forest Plan direction to protect the lepidopteran sensitive species in non-forest habitats in the long-term, if the expected increase in use and development of trails occurs.

Alternatives B, C, and D are consistent with Forest Plan standards and guidelines to protect sensitive species associated with the non-forest habitat, the Migratory Bird Treaty Act and the National Forest Management Act. These alternatives reduce access that may currently be affecting sensitive sites and reduce potential for habitat degradation.

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