USDA
United States Department of Agriculture

Draft Environmental Assessment

Motorized Travel Management
for the Okanogan-Wenatchee National Forest

Okanogan-Wenatchee National Forest

Chelan, Kittitas, Okanogan, Skagit, and Yakima Counties, Washington

June 8, 2016

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CHAPTER 1
Purpose and Need

This chapter presents the background, purpose and need, decisions to be made, proposed action, and issues considered for Motorized Travel Management for the Okanogan-Wenatchee National Forest (Forest). Additional documentation may be found in the project record located at Okanogan-Wenatchee National Forest Headquarters in Wenatchee, Washington. Some of this documentation is located on the project website http://www.fs.usda.gov/project/?project=46467.

Background

The Okanogan-Wenatchee National Forest has a long history of motorized recreation. Out of approximately 4.3 million total acres on the forest, nearly 2.6 million acres are open to motorized travel, on roads, trails, and cross-country. There are approximately 8,000 miles of National Forest System roads and 1,000 miles of motorized system trails that have been constructed over the past 60 to 70 years. In addition, there are many miles of unauthorized roads and trails spread across the 2.6 million acres, nearly all located on approximately 675,000 acres of forest land that is relatively flat and where the vegetation is open enough to allow vehicles to pass. People have created approximately 1,855 dispersed campsites (individual, user-created campsites, not part of a developed campground) along many open roads. People typically drive motorized vehicles to these campsites. Two distinct rock crawl areas, Moon and Funny Rocks, both on the Naches Ranger District, have been popular authorized destinations for rock crawlers since some of that land was acquired in 1986.

In 2005, in an effort to address resource impacts resulting from unmanaged motorized recreation, the Forest Service published the Motorized Travel Management Rule (36 CFR 212). This Rule requires that all national forests and grasslands designate roads, trails, and areas that are open to motor vehicle use under subpart B[1]. Designations are to be made by class of vehicle and, if appropriate, by time of year, and to be displayed on a Motor Vehicle Use Map (MVUM). Motor vehicle use off designated roads and trails and outside designated areas would then be prohibited by regulation (36 CFR 261.13). The rule also contains provisions for limited motor vehicle use within a specified distance of designated open roads in order to access

[1] This project does not consider subpart A, which is being done across the Forest under separate NEPA analyses, or subpart C, winter use.

dispersed camping and for parking. The MVUM is to be updated and republished as needed, since travel planning will be an ongoing process.

In 2006 the Okanogan-Wenatchee National Forest set forth with the goal of establishing a clearly defined system of roads, trails, and areas where motorized use could occur across the 4.3 million acre landscape. Toward that end, the Forest sent scoping letters, hosted meetings and provided comment opportunities, gathering input from groups and individuals. Resource specialists worked to analyze effects of several alternative motorized travel systems. Given the size of the forest, environmental issues, and extensive existing road and trail system, the analysis was too complex to be covered in a single document, and the analysis process was paused in 2013. The Okanogan-Wenatchee National Forest Supervisor decided to reconsider the approach, taking on the task in a smaller, more manageable, and ultimately more responsive way.

Washington State House Bill 1632 was signed into law in July 2013. It established Wheeled All Terrain Vehicles (WATVs) as a new class of licensed motorized vehicles, setting the stage for land management agencies to designate which roads, if any, would be open to fully licensed WATVs.

The interdisciplinary team was reconvened in 2014 to analyze components of the Travel Management Rule that can be applied consistently across the forest to minimize the effects of cross country use of motorized vehicles. The existing, official system road and motorized trail network, and the Moon and Funny Rocks areas are the existing designated system on the forest, and do not need to be reconsidered to allow the existing authorized motorized uses to continue (USDA Motor Vehicle Route and Area Designation Guide, v. 111705). The forest-wide components that can be applied consistently include:

- minimizing the environmental effects of motorized access to dispersed camping by providing limited motorized access within defined corridors,
- closing the Okanogan-Wenatchee National Forest to motorized cross-country travel, and
- allowing WATV use on some open system roads.

In subsequent years, the Forest will have the opportunity to consider changes to the motorized system on a smaller district or zone-level, in response to public and resource management needs. During these subsequent analyses, the Forest would identify ways to minimize the effects of operating motorized vehicles on trails (minimization analysis), and incorporate these into future proposed actions. Site-specific road access and management decisions will continue to be made at the district level, allowing for additional public involvement. The many comments already collected will be available to each ranger district so that information can be used in future travel management proposals. Any subsequent travel management decisions will be incorporated into future versions of the MVUM.

The two other subparts of the Travel Management Rule (Subpart A, the administration of the forest transporation system, and Subpart C, which address over-snow vehicles) are included under separate analysis processes. Subpart A was completed in 2015, and identified potential changes to the Forest Service road system to address resource concerns and budget shortfalls, while providing access for resource management, fire suppression, and recreation. The results will be considered when proposed actions for road management projects are developed in the future. The Forest will complete Subpart C at some point in the future, but has not started the process yet.

DOCUMENT ORGANIZATION

The Forest Service has prepared this Environmental Assessment (EA) for public comment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. It discloses the direct, indirect, and cumulative environmental effects that would result from implementing the proposed action and alternatives to the proposed action. The purpose of this EA is to provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.

This document contains the following:

- **Chapter 1. Purpose and Need for Action***:* Provides information on the background of the proposal, the planning framework that guides management of this portion of the National Forest, the purpose and need for the project, and the agency proposal (Proposed Action) for achieving that purpose and need. This chapter also details how the Forest Service informed the public of the proposal and how the public responded. Finally, this chapter lists issues developed in response to the proposed action.

- **Chapter 2. Alternatives, including the Proposed Action***:* Provides a detailed description of the proposed action as well as alternative methods for achieving the purpose and need. Mitigation measures and monitoring are also detailed. Finally, this chapter provides a summary table which compares the components and environmental consequences associated with each alternative.

- **Chapter 3. Existing Condition and Environmental Consequences***:* Describes the existing condition of area resources and the environmental effects of implementing the proposed action and alternatives described in Chapter 2. Relevant direction from National Forest Land and Resource Management Plans and applicable laws and regulations are also detailed.

- **Literature Cited:** Includes the citations included throughout the document.

- **Appendices***:* Provide more detailed information to support the analysis presented in the EA.

ANALYSIS AREA

The analysis area is the entire Okanogan-Wenatchee National Forest, focusing on areas currently open to cross-country motorized travel, and the existing road and trail system. The map on the following page shows the project location.

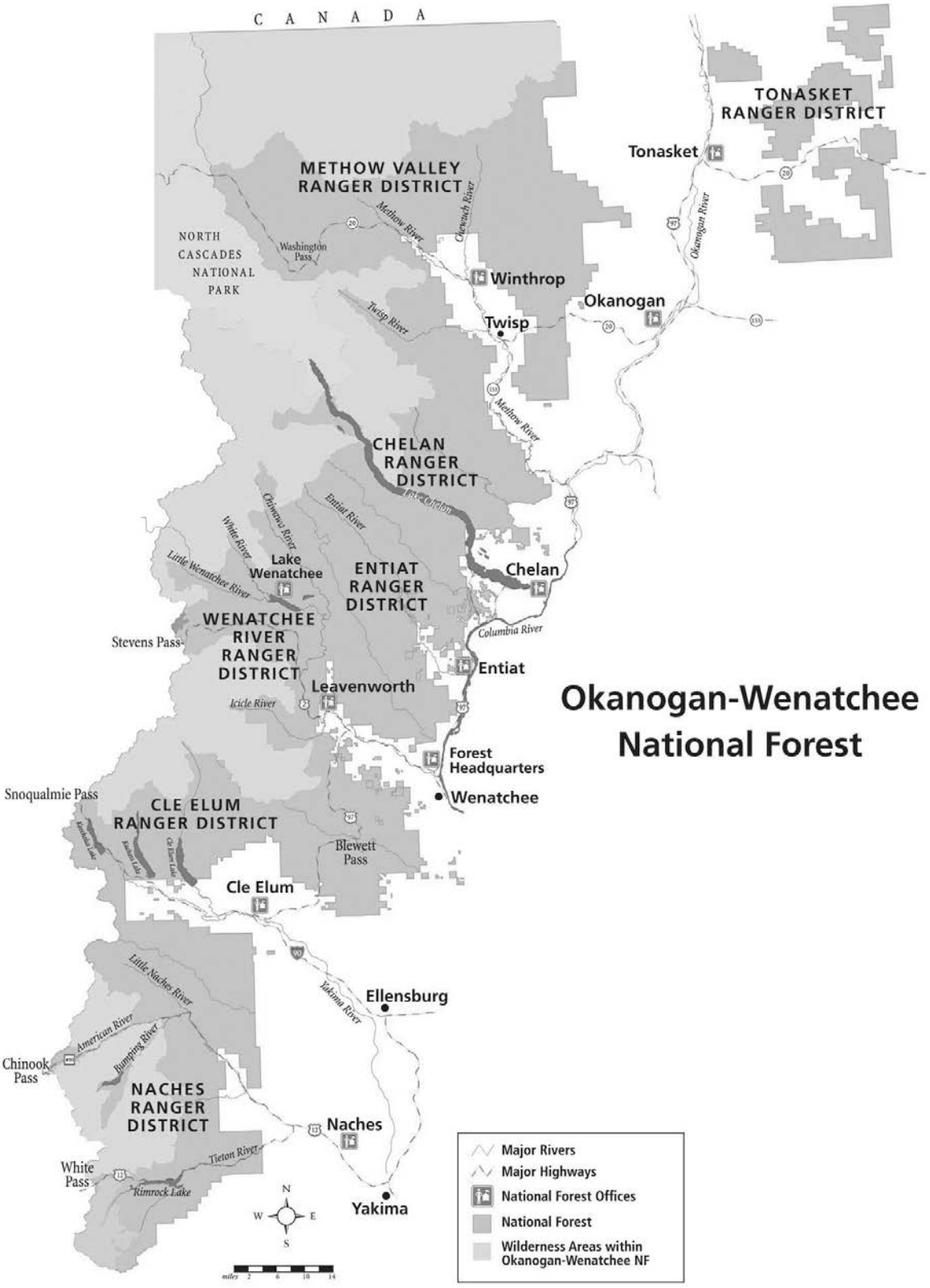

Figure 1. Analysis Area

REGULATORY FRAMEWORK

APPLICABLE LAWS AND REGULATIONS

A number of laws and executive orders, with implementing regulations as appropriate, are relevant to desired and existing conditions and purpose and need for this project. Many other laws, rules and regulations apply to this project and are covered in the resource analyses and findings in Chapter 3 of this document. Those specifically relavent to the Purpose of and Need for this project are detailed below:

Executive Orders

Two Executive Orders provide direction for ORV management on National Forest System lands-President Nixon's Executive Order 11644 – *Use of Off-Road Vehicles on the Public Lands* (February 8, 1972), and President Carter's Executive Order 11989 (*Off-road Vehicles on Public Lands*-May 24, 1977). These executive orders direct that the Forest Service "develop and issue regulations and administrative instructions... to provide for administrative designation of the specific areas and trails on public lands on which the use of off-road vehicles may be permitted, and areas in which the use of off-road vehicles may not be permitted." The 2005 Travel Management Rule implemented these Executive Orders. Thus, if this action meets the 2005 Travel Management Rule, then it meets the Executive Orders. The Executive Orders will not be discussed further.

Travel Management Rule

The Final Travel Management Rule was published in the Federal Register on November 9, 2005. This Rule requires that all national forests and grasslands designate roads, trails, and areas that are open to motor vehicle use on a Motor Vehicle Use Map (MVUM). Motor vehicle use off designated roads and trails and outside designated areas would then be prohibited by regulation (36 CFR 261.13). The rule also allows for designation of the limited use of motor vehicles within a specified distance of certin designated routes, referred to in this documents as corridors, soley for dispersed camping. The MVUM is to be updated and republished as needed, since travel planning will be an ongoing process.

<u>Criteria for Designation (36 CFR 212.55 (a) & (b))</u>

The Travel Management Rule requires that, in designating roads, trails and areas open to motorized vehicles, the responsible official shall consider the effects of motor vehicles on a number of factors described in the regulation, including minimization criteria.

- Roads
  The Forest completed the minimum roads analysis to meet the requirements of Subpart A. This is being further studied and incorporated into transportation management and restoration projects across the forest, on a project-by-project basis.

The purpose and need and proposed action for this EA does not include any changes to the National Forest system roads, in terms of maintenance level, seasonal closures, or mixed use designation, so additional minimization analysis on roads was not conducted for this EA.

- Trails and Areas
  Since the purpose and need and proposed action does not include making any changes to the existing, designated National Forest system motorized trails, the trail minimization analysis was not conducted as part of this project. Rather, it would be done if changes to the motorized trail system were proposed in the future.

  The proposed action was developed to specifically address resource concerns with cross country motorized travel. The resource analysis included in Chapter 3, and the corresponding reports in the analysis file demonstrate how closing cross country travel forest-wide, with the exception of the Moon and Funny Rocks areas, would minimize impacts to soil, water, aquatic resources, wildlife, vegetation, and heritage resources. It would also minimize conflicts between recreationists.

- WATV Routes
  Again, the purpose and need and proposed action does not include making any changes to the designated National Forest System of roads, except where the proposal includes adding designation for WATV use on specific roads. The forest did complete a minimization analysis for every route considered for WATV travel. As described in the Public Involvement section, later in this chapter, several roads were proposed for WATV use with input from WATV riders, ATV clubs and conservation group representatives. Each proposed road was reviewed by ranger district resource specialists to determine potential effects on soil, hydrology, aquatic biology, wildlife habitat, vegetation, heritage resources, and other recreationists or forest visitors. Those roads where WATVs would create unacceptable impacts or resource concerns were eliminated from further consideration in order to minimize effects. Detailed information about this process is in the analysis file. The environmental effects of the proposed WATV roads are included in the resource sections of Chapter 3.

MANAGEMENT DIRECTION

Land and Resource Management Plans, as Amended

Management direction for the analysis area has been established by the Okanogan and Wenatchee National Forest Land and Resource Management Plans. Both Plans have been amended by both Regional and Multi-Regional amendments.

This analysis and document are tiered to the *Okanogan National Forest Land and Resource Management Plan Final Environmental Impact Statement* (USDA Forest Service 1989) and its accompanying *Land and Resource Management Plan* (Okanogan Forest Plan, USDA Forest

Service 1989), and the *Wenatchee National Forest Land and Resource Management Plan Final Environmental Impact Statement* (USDA Forest Service 1990) and its accompanying *Land and Resource Management Plan* (Wenatchee Forest Plan, USDA Forest Service 1990). Forest Plan standards and guidelines provide general direction for the administration of National Forest System land. Relevant standards and guidelines established by both Forest Plans for the purpose and need for this project are listed below.

Forest-wide and Management Area Specific Standards and Guidelines

Under the Wenatchee Forest Plan (USDA, 1990b), the Forest is managed as open to motor vehicles year round unless closed by Forest order. Motorized vehicle restrictions from the Okanogan Forest Plan (USDA, 1989) are displayed on the Travel Plan Map (USFS, 2005), which also displays temporary exceptions or restrictions under 36 CFR section 261.50, and identifies specific areas where seasonal and other restrictions for motorized use are in place for resource protection. As identified on the Travel Plan Map, cross-country motor vehicle travel is seasonally prohibited in some areas and many roads and trails are subject to travel restrictions for wildlife protection. Otherwise the travel plan shows areas as open for motorized use. Temporary exceptions to motorized vehicle closures and restrictions are posted at the appropriate Ranger District office and at the restricted area, road or trail.

The relevant Forest-wide Okanogan Forest Plan standards and guideline for travel management *in relation to this project is (USDA, 1989b, p 4-50):*

> 17-3: Areas, roads, and trails shall be designated open, closed, or restricted to motorized use to conform to management goals. These designations shall be displayed in the Forest Travel Plan (p. 4-38).

Relevant Wenatchee Forest Plan standard for travel management in relation to this project is (USDA 1990):

- Road Closures – The decision to close any Forest road will be made on a case by case basis. Unless there is a resource need documented in the project analysis, currently open roads will remain open and newly constructed roads will be closed to public access by vehicle (p. IV-102).

Both Forest Plans have Management Area specific management direction to maintain some management areas as semi-primitive motorized or semi-primitive non-motorized which resulted in the designation of trails as either motorized or non-motorized.

In 2005, both Forest Plans were amended by the R6 PNW Invasive Plant Management Record of Decision (USDA 2005). Standard 10 of the ROD requires the establishment of a system of roads, trails, and areas designated for motor vehicle use; and prohibition of use of motor vehicles off the designated system that is not consistent with the classes of motor vehicles and if applicable, the time of year designated for use.

PURPOSE AND NEED FOR THE PROPOSED ACTION[2]

The purpose and need of this project is to implement the requirements, under subpart B, of the 2005 Motorized Travel Management Rule and amend the Forest Plans to be consistent with the Rule. The Okanogan-Wenatchee National Forest Supervisor also intends to include a decision concerning the authorization WATVs on some National Forest System roads. In order to accomplish these and publish an MVUM, there is a need to:

- Prohibit motor vehicle travel off of the designated system of motorized roads, trails and outside of designated areas[3], to minimize the effects of motor vehicles on resources.
- Standardize the approach to managing motorized vehicle use on maintenance level 1 roads, and comply with the Forest Service Handbook definition, which specifies that these roads are closed to vehicular (motorized) traffic, unless part of a Forest Service system motorized trail.
- Minimize impacts from motorized access to dispersed campsites while providing for limited motorized access along select designated system roads,
- Amend the Okanogan and Wenatchee National Forest Land and Resource Management Plans to clarify that, expect for over-snow vehicle use, areas, roads, and trails shall be closed to motor vehicles unless specifically designated as open on an MVUM, and
- Allow WATVs on some currently open, National Forest System roads.

The Okanogan-Wenatchee National Forest currently manages the designated system of Forest Service roads and trails open to motorized travel as listed in the Forest Travel Management Atlas, and two rock crawl areas. Each road is assigned a maintenance level[4], and each trail is designated as motorized or non-motorized. Motorized trails are designated for a specific

[2] The purpose and need was revised after public comment from the one that appeared in the December 2014 newsletter.

[3] The Travel Management Rule defines limited exceptions to the cross-country travel prohibition.

[4] Definitions of road maintenance levels, from FSH 7709.58, 10, 12.3:

Maintenance Level 1: assigned to intermittent service roads during the time they are closed to vehicular traffic.

Maintenance Level 2: roads open for use by high-clearance vehicles.

Maintenance Level 3: roads open and maintained for travel by prudent drivers in a standard passenger car. User comfort and convenience are low priorities.

Maintenance Level 4: roads that provide a moderate degree of user comfort and convenience at moderate travel speeds.

Maintenance Level 5: roads that provide a high degree of user comfort and convenience.

vehicle class[5]. Drivers are allowed to pull vehicles off open roads to park or let other vehicles pass, as long as no resource damage occurs.

There are existing seasonal closures on some roads and trails on the Forest. The Okanogan National Forest Travel Plan (April 2005) designates area closures, specific road and trail restrictions, and open routes through area closures on the Methow Valley and Tonasket Ranger Districts. Additional closure orders are used to limit or prohibit motorized vehicles on some roads and trails on these districts. The Chelan, Entiat, Wenatchee River, Cle Elum, and Naches Ranger Districts also use closure orders to limit or prohibit motorized vehicles on some roads and trails, and in some areas, but these orders are not shown on one consolidated map. Some roads on the Forest are identified as open for motorized mixed use, meaning unlicensed ATVs are authorized to operate on roads open to highway legal vehicles.

The Moon and Funny Rocks rock crawl areas have been used for the past 50-60 years, and the Forest Service has permitted events at these areas under special use permit subsequent to the acquisition of portions of these areas by the Forest Service in 1986.

Cross-country motorized use is currently allowed on approximately 2.6 million acres of National Forest System land, as long the regulation prohibiting operation of vehicles in a manner that damages or unreasonably disturbs the land, wildlife, or vegetation is met (36 CFR 261.15(h)). Use consistent with this regulation may include motorized use on maintenance level 1, decommissioned, and unauthorized roads not covered by seasonal or individual closures. In fact, the Okanogan Travel Plan specifically states that OHVs may be driven on roads that are blocked with rocks, trees or earthen barriers, and not open for passenger cars or trucks. Under this existing Travel Plan, once a road is blocked, it is considered part of the cross-country landscape, and therefore open unless designated closed. Approximately 2,557 miles of maintenance level 1 roads are present on the Forest, although many are overgrown with vegetation and some are difficult to access or have no attraction for vehicle operators.

The Okanogan and Wenatchee National Forests, have managed use on maintenance level 1 roads somewhat differently from each other as discussed below, and there is a need to standardize the approach, and comply with the Forest Service Handbook definition, which specifies that these roads are closed to vehicular (motorized) traffic.

The Okanogan Forest Plan states that "Areas, roads, and trails shall be designated open, closed, or restricted to motorized use to conform with management goals" and that "These designations shall be displayed in the Forest Travel Plan" (Standards and Guidelines, 17-3, pp. 4-50). The Okanogan National Forest Travel Plan (2005) states that:

> *If your OHV is not licensed, it may be used only on roads that are blocked with rocks,*

[5] Vehicles are divided into 3 classes: greater than 50 inches wide, such as a 4x4; less than 50 inches wide, such as an ATV; and motorcycles.

trees or earthern barriers and not open for passenger cars or trucks.

Because of this direction, all maintenance level 1 roads on the Methow Valley and Tonasket Ranger Districts are currently considered open for OHVs, unless specifically closed with a Code of Federal Regulations (CFR) legal order (36 CFR 261.54), or if they fall within an area closed to motorized vehicles.

The Wenatchee Forest Plan does not specifically address motorized use on closed roads. Management of these roads assumes they are closed to vehicular traffic. However, cross country travel is not prohibited or enforceable because it is not prohibited by CFR, so some closed roads receive vehicular use to the extent that they are physically accessible. In order to prohibit traffic use on a road, a CFR legal order must be approved and enforced. Only a limited number of maintenance level 1 roads on the Chelan, Entiat, Wenatchee River, Cle Elum, and Naches Ranger Districts are officially closed with a CFR.

Despite regulations against creating resource damage, such damage has occurred in some areas from cross-country motorized use. Many unauthorized motorized trails and roads have been created by motorized recreational use on the Forest.

The Travel Management Rule allows for limited corridors to be designated for motorized access to dispersed camping. The Okanogan Forest Plan requires provision for a variety of recreational experiences (p. 4-38), of which motorized dispersed camping is an important part. The Wenatchee Forest Plan does not include a similar standard and guideline, but requires that dispersed recreation sites be evaluated to determine if they meet present and future public expectations, needs, and desires, and if they have the resource capability of sustaining present or future levels of visitor use (p. IV-65). Open roads currently provide motorized access for dispersed camping across the Forest. A network of unauthorized or user-created access routes to dispersed campsites has developed over the years as people have driven off system roads to popular areas. Although some areas are currently closed to cross-country travel by orders or the Okanogan Travel Plan, most areas adjacent to open roads are currently open to cross-country travel since off-road use is not expressly prohibited.

PROPOSED ACTION

The proposed action below was sent to the public and agencies in December 2014. As a result of both public comment and mistakes found in the original proposed action map and described below, a revised proposed action was developed and is discussed in detail in Chapter 2. No changes are proposed for the existing Forest Service system of roads or trails. The reasons for the modifications to the original proposed action are detailed in the Chapter 2, under the description of Alternative B.

The Forest Supervisor for the Okanogan-Wenatchee National Forest proposes to close the Forest to cross-country motorized travel off the existing open National Forest System roads

(maintenance levels 2-5) and existing open system motorized trails. All system roads currently open for motorized use (maintenance levels 2-5) would remain open to highway legal vehicles during the existing seasons of use, with existing designations for vehicle types. All motorized system trails would remain open to current vehicle designations (greater than 50 inches, less than 50 inches, or motorcycle) during the existing seasons of use.

The Travel Management Rule does not require reconsideration of past management decisions, and the Forest is not proposing changes to existing road maintenance levels, or to the use designation of trails.

The proposed action would make the following changes:

- Prohibit cross-country motor vehicle use off the existing Forest Service system of roads and trails.
- All maintenance level 1 roads would be closed to motorized vehicles, unless currently part of a motorized system trail, in accordance with Forest Service Handbook direction (FSH 7709.58, 10, 12.3).
- Allow motor vehicle use up to 30 feet from the edge of all open system roads for parking, as long as resource damage does not occur.
- Allow WATVs to operate on approximately 350 miles of currently open National Forest System roads.
- Allow managed motor vehicle use off approximately 1,640 miles, or approximately 31% of currently open road for the purpose of accessing dispersed camp sites (as shown on the Proposed Action Map). The corridors would be 300 feet wide from the road centerline, on both sides of these roads. Within corridors, motorized vehicles would be restricted to existing routes, and vehicles would not be permitted within 100 feet of water. Some routes within these corridors have been improved to reduce environmental impacts (called Improved Sites in this document). Fences, boulders or other barricades, and/or signs define the acceptable travel routes. At these sites, vehicles would be allowed on the defined route, regardless of the proximity to water.
- Amend the Okanogan and Wenatchee National Forest Plans to make them consistent with the Travel Management Rule as follows:

  The Okanogan Forest Plan currently contains the following forest-wide standard and guideline:

  > 17-3 Areas, roads, and trails shall be designated open, closed, or restricted to motorized use to conform to management goals. These designations shall be displayed in the Forest travel plan (USDA 1989 page 4-50).

  This would be amended as follows:

  > 17-3 Except for over-snow vehicle use; areas, roads, and trails shall be closed to motor vehicles unless specifically designated as open on the motor vehicle use map. Open, closed, and restricted areas, roads, and trails shall conform to the goals of the

management area. Project-specific NEPA decisions may be made on a case-by-case basis to open, close, or restrict roads, trails, and areas based on the goals of the management areas; these changes would be displayed on future motor vehicle use maps. Over-snow vehicle use areas, roads, and trails shall be open, closed, or restricted consistent with the goals of the management area and designated on a map depicting authorized use.

The Wenatchee Forest Plan currently contains the following forest-wide standard and guidelines:

Road Operation

1. Road closures – The decision to close any Forest Road will be made on a case by case basis. Unless there is a resource need documented in the project analysis, currently open roads will remain open and newly constructed roads will be closed to public access by vehicle (USDA 1990, page IV-102).

Trail System Maintenance and Operation

1. The Forest trail system will provide for use by all specified modes of transportation as contained in the management prescriptions (USDA 1990 page IV-69).

These would be amended as follows:

Road Operation

1. Except for over-snow vehicle use, roads shall be closed to motor vehicle use unless specifically designated as open on the motor vehicle use map. Open, closed, and restricted roads shall conform to the goals of the management area. Project-specific NEPA decisions may be made on a case-by-case basis to open, close, or restrict roads, trails, and areas based on the goals of the management area with changes displayed on the subsequent motor vehicle use map. Over-snow vehicle use on National Forest System roads may be allowed, restricted, or prohibited consistent with the management area prescription.

Trail System Maintenance and Operation

1. The Forest trail system will provide for use by all specified modes of transportation as contained in the management prescriptions. Except for over-snow vehicle use, trails shall be closed to motor vehicle use unless specifically designated as open on the motor vehicle use map. Open, closed, and restricted trails shall conform to the goals of the management area. Project-specific NEPA decisions may be made to open, close, or restrict trails based on the goals of the management area with changes displayed on the subsequent motor vehicle use map. Over-snow vehicle use on National Forest System trails may be allowed, restricted, or prohibited consistent with the management area prescription.

The Wenatchee Forest Plan would additionally be amended to add the following standard and guideline (IV-69):

Motorized Areas

1. Except for over-snow vehicle use, areas shall be closed to motorized vehicles except where specifically designated open on the motor vehicle use map. Open, closed, and restricted areas shall conform to the goals of the management area. Project-specific NEPA decisions may be made to open, close, or restrict areas based on the goals of the management area with changes displayed on the subsequent motor vehicle use map. Over-snow vehicle use on National Forest System areas may be allowed, restricted, or prohibited consistent with the management area prescription.

DECISION FRAMEWORK

The Forest Supervisor of the Okanogan-Wenatchee National Forest is the Responsible Official, and will seek to provide the best compromise between all the Forest needs. The travel management rule, the Forest Plans as described earlier, and project purpose and need provide direction on decision criteria to use.

The Forest Supervisor of the Okanogan-Wenatchee National Forest will decide:

- Will the Forest be closed to cross country motorized vehicles off the existing National Forest System roads and motorized trails?
- Will there be corridors where limited motorized access for dispersed camping is allowed, and if so, where will the corridors be located?
- Will motorized vehicles be allowed on maintenance level 1 roads?
- Will WATVs be allowed to operate on Forest Service roads, and if so, which ones?
- How will the Forest Plan be amended to comply with the travel management rule?

PUBLIC INVOLVEMENT, TRIBAL CONSULTATION AND GOVERNMENT AGENCY INVOLVEMENT

TRIBAL CONSULTATION AND GOVERNMENT AGENCY INVOLVEMENT

The Forest Supervisor sent government-to-government letters to the Yakama Nation and the Confederated Tribes of the Colville Reservation on December 12, 2014 updating the tribes on the revised approach to Travel Management, describing the purpose and need, and proposed action, and inviting comments. The Confererated Tribes of the Colville Reservation responded in a letter dated January 28, 2015, stating that the Tribal Historic Preservation Officer concurred with the monitoring plan, and looked forward to reviewing the monitoring results.

The proposed action was also sent to the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency, and the county commissioners for the affected counties.

The U.S. Fish and Wildlife Service and National Marine Fisheries Service expressed support for the proposal to prohibit cross-country motorized travel, and for closing maintenance level 1 roads to motorized use. They expressed concern over the potential impacts to threatened and endangered fish from motorized access to dispersed campsites within identified corridors, and about concentrating dispersed camping activities within the limited designated corridors. They also included comments that were outside the scope of the purpose and need, and suggested alternatives to the proposed action. Alternatives C and D were developed based on their suggested alternatives, and to address the concerns raised. Refer to the comment database in the project record on the Okanogan-Wenatchee National Forest website for more details.

The Environmental Protection Agency also expressed support for the proposed closure of cross-country motorized travel, but also had concerns about the corridors, and potential impacts to water quality and riparian areas from the motorized access. Some of their comments were outside the scope of the purpose and need. They suggested alternatives to the proposed action. Alternative C partially addresses their concerns. Refer to the Alternatives Considered but Eliminated section in Chapter 2 for an explaination of why some of EPAs suggested alternatives were not considered in detail. Also, refer to the comment database in the project record for more details about EPAs concerns and issues, and how these were used in the analysis.

The Okanogan County Commissioners responded by stating that the proposed action does not comply with the Travel Management Rule because it does not allow all types of motorized vehicles on all roads, specifically ATVs in compliance with Washington State Law #1632

(WATVs). They also felt the Forest Service was required to involve the commissioners in the development of the proposed action, and since this did not occur, the proposed action is invalid. The Travel Managent Rule does not require designation of all types of motorized vehicles on all roads, but rather requires designation of roads, trail, and areas. Use of motorized vehicles off designated roads and trails and outside designated areas is then prohibited by regulation (36 CFR 261.13). The Forest Service has discussed the Travel Management process with the Okanogan County Commissioners at regularly scheduled meetings, and considered their input in the development of the proposed action and alternatives. Opening some National Forest System roads to WATVs was added to the proposed action to address some of the Commissioners' concerns. Refer to the comment database in the project record for more details about their concerns and issues, and how these were used in the analysis.

The Chelan County Commissioners commented, stating concern that the proposed action would limit public access to National Forest System Land, supporting additional opportunities for access. Refer to the comment database in the project record for more details about their concerns and issues, and how these were used in the analysis.

PUBLIC INVOLVEMENT

As described in the earlier Background section of this document, the Forest conducted public involvement and scoping between 2006 and 2010 on the original proposed action and analysis process. All comments received were recorded and analyzed for later use.

A newsletter describing the current Travel Management analysis process, including the purpose and need, and proposed action was sent on December 22, 2014 initiating scoping on a new proposal to all agencies, organizations, and individuals on the Travel Management mailing list. The newsletter, proposed action and purpose and need, and maps showing the proposed action were posted on the Forest's internet site. The site also included a link to submit comments online. Some mailing list members received hard-copy mail of the newsletter, which included the internet site address. Paper copies of the maps were provided on request. The newsletter requested comments be submitted by January 20, 2015. Some requests were submitted for an extension of the comment deadline, so the period was extended until January 30, 2015. The agency invited the submission of comments through a variety of other ways:

- Use of the Web site comment form (PDF that could be downloaded from the site)
- On-line comments
- Comments sent by postal service, delivery service, fax, or hand-delivered to any of the ranger district offices or the Forest Supervisor's Office

The Forest received 484 unique letters during the scoping period. Many commenters expressed support for portions of the proposed action, including the ban on cross-country

motorized travel, not adopting unauthorized roads and trails, and closure of all maintenance level 1 roads to motorized vehicles. Commenters felt these actions would be beneficial to the environment and would reduce user conflicts between motorized and non-motorized recreationists.

Many other people opposed the proposed action, feeling that it would substantially reduce motorized recreation opportunities, and that the assumed environmental effects from motorized vehicles were overstated or inaccurate. Many felt this would reduce public access to public land, and would interfere with the type of recreation they had been enjoying for many years.

Using these comments, and comments from other Federal, state, and local agencies, organizations and American Indian Tribal governments, the planning team developed a list of issues for the project. The following section includes all the issues raised during scoping, and Chapter 2 includes descriptions of all alternatives suggested. Refer to the comment database in the project record for information on all letters and comments received, and how each was used in the analysis process.

In a separate, focused process, the forest identified routes to open to WATVs by requesting input and ideas from WATV riders and ATV club members, and from conservation group representatives. District Rangers and resources specialists reviewed the suggested routes and input from the conservation groups, and recommended routes where no additional environmental impacts would be anticipated from allowing this new class of licensed motorized vehicles on roads currently open to other licensed motorized vehicles. The 350 miles of road were added to the proposed action for this Travel Management analysis.

ISSUES

Issues are unresolved conflicts concerning environmental effects that may occur as a result of implementing the proposed action. Issues provide focus for the analysis of environmental effects and influence alternative development, including development of mitigation measures.

Key Issues are used to formulate alternatives to the proposed action, prescribe mitigation measures, and analyze environmental effects. They are used to compare the alternatives in the Comparison of Alternatives Table in Chapter 2. One Key Issue was identified by the Interdisciplinary (ID) Team and approved by the Responsible Official.

In addition to the Key Issue, other concerns were raised. These concerns shaped the environmental and social analysis of each alternative, and are addressed in resource sections of Chapter 3.

Finally some issues were not considered further because each was; 1) outside the scope of the proposed action, 2) already decided by law or regulation, Forest Plan, or other higher level

decision, 3) irrelevant to the decision to be made, or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality NEPA regulations require identification and elimination from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3).

Corrections or Clarification of the Proposed Action

Some concerns raised during scoping pointed out errors in the proposed action, or identified where additional clarification was needed. These concerns, and the changes made to the original proposed action are listed below.

Correction Issue #1. Proposed action would prohibit motorized vehicles in the Moon and Funny Rock areas on the Naches Ranger District. *This issue was used to correct the proposed action.*

Some commenters pointed out that the Moon and Funny Rock areas were not shown as open on the proposed action maps, nor described in the proposed action distributed on December 22, 2014. These long-established rock climb areas are existing, authorized motorized rock crawl areas that were inadvertently left out of the proposed action. The purpose and need and proposed action were corrected to include the areas.

Correction Issue #2: Several mapping errors were reported, where open system motorized trails or roads were not showing on the proposed action map, and some corridors were showing on non-National Forest System land. *This issue was used to correct the proposed action maps.*

Several comments were received pointing out trails or roads that were not showing on the proposed action maps, that the commenters felt were part of the existing road or trail system. Each road and trail was checked, and those that currently show in the forest's roads database (INFRA) as maintenance level 2, 3, 4, or 5 (system roads), or in the forest's trail database (INFRA) as a motorized system trail were added to the transportation system displayed on the proposed action map. The proposed action map also showed some corridors along National Forest System roads crossing non-National Forest System land. These corridors were removed from the map, and the miles of proposed corridor reduced to reflect the corrections.

Correction Issue #3: The proposed action must include provisions for access covered by Tribal treaty rights, the General Mining Act of 1872, permitted special use activities, disabled hunting areas managed by Washington State Department of Fish and Wildlife, and emergency response. *The proposed action was clarified to explain the exceptions to the prohibitions, covering these areas.*

Comments were received concerning currently authorized or permitted motorized use, wanting to ensure the proposed action would not change this use. The Travel Management Rule does not take away any statutory or treaty rights, and designations must recognize valid existing rights. Several exceptions to the limitation on motorized use are included in the Travel Management Rule, including aircraft, watercraft, limited administrative use, emergency purposes, national defense, law enforcement response, and use specifically

authorized under a written authorization. Refer to Alternative B description in Chapter 2 for more details.

Correction Issue #4: The proposed action should include monitoring to ensure compliance with the MVUM, and to minimize environmental effects. *A monitoring plan was added to all action alternatives.*

Comments were received stating that a monitoring plan would be needed to recognize violations to the MVUM, and to ensure the effects displayed in the EA accurately reflect the conditions on the ground. A mitigation measure and monitoring plan were developed and added to Alternatives B, C, and D. Refer to the Mitigation and Monitoring section in Chapter 2 for the detailed measures and plan.

Key Issues

Key Issue #1: The corridors for motorized access to dispersed camping included in the proposed action should be modified. *This issue was used to develop Alternatives C and D.*

A variety of comments were received concerning the corridors. Some expressed concern about the impact of motorized access within the corridors to threatened and endangered fish species. Alternative C was developed to address this side of the issue, by eliminating corridors within 300 feet of designated critical habitat.

Other comments included specific areas where the commenters felt corridors should be added, and other comments that were less specific, but stated that more corridors were needed so no motorized access to established campsites was lost. Other comments expressed concern that the limited amount of corridors would concentrate campers into the designated corridors, potentially increasing violations of the requirement to stay on existing routes, and changing the distribution of human-caused ignitions of forest fires. Alternative D was developed to address this side of the issue, placing corridors along on all maintenance level 2 through 5 roads. The potential effects to social, economic, and environmental issues, and the indicators used to analyze the alternatives, are specified below.

Key Issue #2: Allowing WATVs on road could cause resource damage, and create safety issues for other drivers. *This issue was used to develop Alternative C.*

Several comments were received expressing concerns about allowing WATVs to operate on National Forest System roads. Some people were concerned that the additional traffic would cause resource damage. Others were concerned that the WATVs would increase the risk of vehicle accidents, including collisions.

Concerns

The following concerns were identified by the public, tribes, planning team, and others. They were used to display the effects of the alternatives in Chapter 3.

1. **Proposed action would substantially reduce motorized recreation opportunities by limiting motor vehicle use to open system roads and trails, and closing the forest to cross-country motorized vehicles.**

   Multiple comments were received expressing this concern. Several comments stated that unauthorized trails and roads are an important part of the current recreation experience. Others felt that maintenance level 1 roads provide important routes and links for motorized vehicles. Concern was also expressed over closing the forest to cross-country travel, stating that it would substantially reduce motorized recreation opportunities, and concentrate people onto designated open roads and trails, causing overcrowding and a decrease in the quality of the recreation experience on the open trails. Commenters expressed concern about the loss of family based recreation opportunities. Concern was also expressed about user conflicts between motorized and non-motorized recreationists on trails and in cross-country areas.

   This issue is analyzed in the Recreation section in Chapter 3 using the following key indicators:

   - Number of acres open for cross-country motorized use, and qualitative discussion of the loss of cross-country motorized recreation opportunities
   - Miles of road open to motorized vehicles
   - Number of miles of motorized system trails
   - Qualitative discussion of the loss of access to unauthorized roads and trails
   - Qualitative discussion of the effects of increased crowding on open roads and trails
   - Qualitative discussion of changes in potential user conflicts between motorized and non-motorized recreationists.

2. **The proposed action would prohibit motorized access to some established dispersed campsites that are not within designated motorized access corridors, leaving some campsites difficult to access and potentially concentrating campers into designated corridors, therefore increasing the possibility of new access routes being created.**

   Several comments were received. Some commenters were concerned they would lose motorized access to their favorite campsites. Others were concerned that displacing people who want to use established campsites not in designated corridors could increase the potential of new access routes being established within designated corridors as people look for places to drive to dispersed campsites.

   The effects will be analyzed and included in the Recreation section of Chapter 3, using the following key indicators:

- Number of miles of designated corridors
- Approximate percentage of established dispersed campsites within designated corridors, and more than 100 feet from water, allowing motorized access directly to campsite
- Approximate percentage of existing campsites located along roads without corridors
- Qualitative discussion of potential changes in use patterns as a result of changes to motorized access for dispersed camping.

3. **The proposed action could affect water quality, fish habitat, and riparian areas by prohibiting cross-country travel, closing maintenance level 1 roads, and by permitting motorized access for dispersed camping in designated corridors.**

   Many commenters supported the ban on cross-country travel because of the potential benefit to water quality, fish habitat, and riparian areas. Others supported closing maintenance level 1 roads to motorized vehicles to reduce potential impacts to these resources. Concerns were expressed over the impact of allowing motorized access for dispersed camping, especially near critical threatened and endangered fish habitat. Concern was also expressed that the project must comply with the Clean Water Act.

   The effects will be analyzed in the Hydrology and Aquatic Habitat section of Chapter 3, using the following key indicators:

   - Overall open road density
   - Number of 5th Level HUs with open road density , 1 mi/mi2
   - Number of 5th Level HUs with open road density between 1 mi/mi2 and 2.4 mi/mi2
   - Number of 5th Level HUs with open road density >2.4 mi/mi2
   - Miles of open Forest Service roads in riparian reserves or RHCAs
   - Miles of open Forest Service roads within 300 feet of Critical Fish Habitat
   - Acres of Riparian Reserves or RHCAs withi designated corridors
   - Acres of corridors within 300 feet of Critical Fish Habitat

4. **The proposed action could affect wildlife by prohibiting cross-country travel, closing maintenance level 1 roads to motorized use, and by allowing motorized access for dispersed camping in designated corridors.**

   Many commenters supported the ban on cross-country travel because of potential benefits to wildlife habitat, specifically with the reduction in noise disturbance. Concerns were expressed over the impact of allowing motorized access for dispersed camping, especially in critical threatened and endangered wildlife habitat. These

concerns were expressed for threatened, endangered, and candidate wildlife species, in addition to management indicator species, sensitive species; and land birds.

The effects will be analyzed in the Wildlife section of Chapter 3, using the following indicators:

- Determination of effects on threatened, endangered, proposed, sensitive, management indicator, and survey and manage species
- Acres and percent of habitat types within area open to cross country motorized travel
- Miles of road open to motorized vehicles and effect on security habitat for wildlife species
- Acres of habitat types within corridors, and qualitative discussion on effects to species

5. **The proposed action could affect threatened, endangered, sensitive, and proposed plants, and change the establishment or spread of invasive species by prohibiting cross-country motorized travel, closing maintenance level 1 roads, and allowing motorized access for dispersed camping within corridors.**

Comments were received expressing concern about vehicles spreading noxious weeds, and how motorized recreation can result in this spread. Concerns were also expressed about the potential effects to threatened, endangered, sensitive, and proposed plants from motorized access within designated corridors.

The effects will be analyzed in the Botany and Invasive Species sections of Chapter 3, using the following indicators:

- Acres open to motorized cross country travel
- Acres of riparian habitat open to motorized cross country travel.
- Acres of late successional habitat/old growth habitat open to cross country motorized travel
- Miles of road open to motorized use
- Acres of corridors in riparian habitat
- Acres of corridors in late successional/old growth habitat
- Number of endangered, sensitive, and survey and manage species within corridors
- Number of known endangered, sensitive and survey and manage sites within corridors
- Determiniation of effects to S. oregano var. calva and its Critical Habitat.

- Determination of effects to sensitive species

6. **The proposed action could change potential impacts to heritage resources by closing cross-country travel, closing maintenance level 1 roads, and allowing motorized access for dispersed recreation within designated corridors.**

   This concern was raised by a commenter wanting to ensure that the Okanogan-Wenatchee National Forest meets the requirements for involving local Tribes in the planning and analysis of Travel Management to identify the impacts, and provide assurance that the Tribes' treaty rights and privileges have been addressed appropriately. Concern was also expressed about potential damage to heritage resources by motorized vehicle use within designated corridors.

   The effects will be addressed in the Heritage Resource section of Chapter 3, using the following the following indicators:

   - Number of known heritage resources potentially impacted by motorized cross country travel
   - Miles of road open to motorized vehicles, potentially impacting unknown heritage resources
   - Number of known heritage resources within corridors
   - Acres of high, moderate, and low probability areas within corridors

7. **The proposed action would have an effect on local economies by changing the number of people visiting local communities for recreation, and potentially impacting minority and low-income populations**

   Some commenters expressed concern that the reduction in motorized recreation opportunities would reduce recreation-based income, hurting the economies of the local towns. Others felt that reducing motorized recreation would increase recreation-based income because more non-motorized recreationists would visit the forest, spending more money on average than motorized recreationists. Concern was also expressed that limiting motorized recreation opportunities could disproportionally impact minority and low-income populations.

   The effects will be analyzed in the Economics section of Chapter 3, using the following indicators:

   - Estimated employment and labor income from motorized recreation.
   - Role of Forest Service recreation visitor spending to local economy
   - Qualitative discussion of effects to communities of interest

8. **The proposed action could affect air quality by prohibiting cross-country motorized use and closing maintenance level 1 roads.**

   Several comments were received expressing concern about dust and exhaust from motorized vehicles, and the required compliance with the Clean Air Act.

   The effects will be analyzed in the Air Quality section of Chapter 3, using the following indicators:

   - Qualitative discussion concerning air quality and the Clean Air Act.

Issues Not Considered Further

The following issues were not considered further because the were; 1) outside the scope of the proposed action, 2) already decided by law or regulation, Forest Plan, or other higher level decision, 3) irrelevant to the decision to be made, or 4) conjectural and not supported by scientific or factual evidence. Each issue is underlined, with the reason for no further consideration following.

1. **Proposed action should open all roads to WATVs or ATVs.**

   Multiple comments were received concerning support for, or disagreement with House Bill 1632. Many felt that it automatically opened all Forest Service roads to WATVs. House Bill 1632 has already been decided by law and is outside the scope of this analysis. The Travel Rule directs designating roads, trails and areas by type of use. It does not require opening all roads or trails to all types of vehicles, therefore this is outside the scope of this analysis.

2. **Proposed action would limit public access to public lands by eliminating cross country travel, blocking use of non-system roads and trails.**

   Multiple comments were received on this topic. The purpose and need is to prohibit motorized use off of the designated system and outside of designated corridors, not to provide for new system road and trail opportunities. Changes to public access as a result of the prohibition on cross-country use are covered in the effects analyses in Chapter 3.

3. **The proposed action would not close, decommission or add any system roads or system trails, nor would it change any existing seasons of use; existing impacts would continue.**

   Several comments were received expressing concern about the existing road and trail system – such as road and trail density, erosion, completing and implementing a minimum roads analysis. Commenters also said that motorized vehicles should (or should not) be allowed on unauthorized, or non-system roads and trails or they requested modifications to the existing system. Changes to the open National Forest system road and trail network, maintenance levels, seasons of use and status of trails are outside the scope of this analysis since the purpose and need is to prohibit motorized use off of the designated system and outside of designated corridors.

Adding unauthorized roads or trails to the system may be considered in future projects, as may changes to the existing road and trail system.

4. **Allowing vehicles to be parked up off roads would lead to resource damage.**

   The use of designated roads and trails includes the ability to park a motor vehicle on the side of the road when it is safe to do without causing damage to National Forest System resources or facilities, unless prohibited by state law, a traffic sign or an order (36 CFR 261.54). The road designation must identify that vehicles can park within one vehicle length, or within a specified distance of up to 30 feet from the edge of the road surface (FSM 7716.1). Alternative distances were considered (refer to Alternatives Considered But Eliminated #6 in Chapter 2). Since the purpose and need does not include making any changes to the National Forest System roads (which currently include roadside parking), prohibiting roadside parking would be outside the scope of this analysis.

5. **Comments were received stating that the safety analysis the Forest Service conducted as part of the previous Travel Management analysis process to determine roads where new mixed use could be considered was flawed.**

   The purpose and need does not include making changes to mixed use designations on roads, but a new safety analysis was conducted on the roads considered for opening to WATVs. The results of this safety analysis are included in the Recreation section in Chapter 3. The safety analysis conducted for the previous Travel Management planning process is outside the scope of the current analysis.

6. **Trail and road maintenance is needed on many routes.**

   Some comments were received concerning the condition of open roads or trails, lack of maintenance, needed trail bridges, etc. Road and trail maintenance is outside the scope of the purpose an d need to implement the requirements of the 2005 Motorized Travel Management Rule and amend the Forest Plans to be consistent with the Rule.

7. **The proposed action would violate the Americans with Disabilities Act, and discriminate against elderly people and people with disabilities.**

   The purpose and need is to prohibit motorized use off of the designated system and outside of designated corridors, and would not discriminate against the elderly and people with disabilities. The comment and response to the 2005 Travel Management Rule states, “Under section 504 of the Rehabilitation Act of 1973, no person with a disability can be denied participation in a Federal program that is available to all other people solely because of his or her disability”. In conformance with section 504, wheelchairs are welcome on all National Forest System lands that are open to foot travel and are specifically exempted from the definition of motor vehicle in § 212.1 of the final rule, even if they are battery-powered. However, there is no legal requirement to allow people with disabilities to use OHVs or other motor vehicles on roads, trails, and areas closed to motor vehicle use because such an exemption could fundamentally alter the nature of the Forest Service’s motorized travel management program (7 CFR 15e.103). Reasonable restrictions on motor vehicle use, applied consistently to everyone, are not discriminatory.”

8. **The proposed action may affect wilderness; either by adding wilderness or by reducing the quality of wilderness.**

   Some comments were received expressing concern that this action would lead to creation of more wilderness. Others expressed concern that allowing motorized vehicles in or near wilderness would decrease the quality of the wilderness. Wilderness designation is outside the scope of this analysis. The purpose and need is to prohibit motorized use off of the designated system and outside of designated corridors. Motorized vehicles are prohibited in Wilderness areas by law.

9. **The Okanogan-Wenatchee's approach to Travel Management is (or is not) flawed.**

   Several comments were received concerning the current approach to this analysis. Some expressed frustration with how long the forest has been working on the analysis, and that their input (concerning which roads and trails to add to the system) up to this time is being ignored. Others expressed concern about having the ranger districts analyze changes to the Forest System roads and trails at a later date, believing that districts lack the ability to consider trails connecting to other districts and to fully analyze cumulative effects, and that adequate public involvement would not occur. The opposing opinion was also expressed. These concerns do not pertain to potential environmental or social effects of the proposed action, but rather to the process being followed. As stated in the Background section earlier in this chapter, the current approach will allow more focused public involvement concerning any potential changes to the National Forest System roads or trails, and site specific analysis of the environmental and social effects. Any future analysis will be conducted on entire trails, even if they cross district boundaries, would include public involvement,and would fully analze cumulative effects.

10. **Concerns were expressed about the methods and environmental impacts of constructing, maintaining, closing or decommissioning roads; including maintenance level 1 and unauthorized roads.**

    Constructing, maintaining, physically closing and decommissioning roads is outside the scope of the purpose and need to prohibit motorized use off of the designated system and outside of designated corridors. The annual motor vehicle use map (MVUM), published as a result of this decision, would make it illegal to use motorized vehicles on maintenance level 1 or unauthorized roads. The minimum roads analyses may result in proposals to to close roads on the ground, and would be addressed in the appropriate level of NEPA analysis, documentation and decision.

11. **Concerns were expressed that restrictions on motorized vehicles within corridors for motorized access to dispersed camping would close trails that cross rivers or creeks.**

    No changes to the existing National Forest System motorized trail network are proposed. Any system motorized trail passing through corridors would remain open to the current authorized use.

12. **The proposed action should include a framework to provide for a continued working relationship between the Forest Service and the motorized recreation community.**

    Working relationships are important, and the Forest Service will continue to work with members of the motorized recreation community to continue providing motorized recreation opportunities on National Forest System land.

13. **The proposed action is not consistent with the 68264 Final Rule which required a firm commitment to motorized recreation.**

    The Travel Management Rule (68264 Final Rule) requires forest to designate routes and areas, if warranted, open for motorized vehicles, and publish a map showing those routes. Under the rule, once the map is published, all cross-country motorized travel is prohibited in areas not shown as open on the MVUM. The proposed action and purpose and need will allow the Okanogan-Wenatchee National Forest to comply with the rule.

14. **The proposed action does not include winter recreation.**

    Winter motorized recreation is outside the scope of the purpose and need, which addresses Subpart B of the Travel Management Rule. Subpart C, which addresses winter motorized recreation will be completed by the forest at a later date, under a separate analysis.

15. **The proposed action should implement a minimum roads plan.**

    Minimum roads anlaysis is outside the scope of the purpose and need to prohibit motorized use off of the designated system and outside of designated corridors. Minimum roads analysis was completed in 2015. Subsequent project level NEPA would analyze recommendations from minimum roads analysis and any decisions would be reflected on subsequent MVUMs.

16. **Travel analysis for the purpose of determining a minimum road system is separate from motorized travel management.**

    For the purpose of informing motorized travel management decisions, the responsible official (Forest Supervisor) had the ability to determine the appropriate scale and detail of travel analysis needed. Travel management decisions do not need to be completed at the same scale as travel analysis. Previous administrative decisions may be incorporated. Thus, the Forest has complied with agency direction.

17. **Roadless Areas should be designated as non-motorized.**

    Motorized status of roadless areas is outside the scope of the purpose and need to prohibit motorized use off of the designated system and outside of designated corridors.

18. **Concerns were expressed about the effect of motorized vehicles on trails.**

    Some commenters had concerns that motorized vehicles cause excessive damage to trails, while others felt that motorized recreationists invest more time volunteering to accomplish trail maintenance, leading to better maintained trails. The condition of National Forest System motorized trails is outside the scope of this analysis, which is focused on cross-country travel off existing designated roads, trails, and areas.

19. **The proposed action could result in increased response times during fire suppression, leading to larger, more destructive fires.**

    There is no factual evidence that the proposed action would increase response times since this project would not close any roads on the ground. Although ML1 roads would be closed to motorized use, exemptions to this are permitted for emergencies, including fires [36 CFR 212.51(a)]. NEPA documents prepared to implement minimum roads analysis are being conducted across the forest, and are the appropriate analysis to address this issue.

20. **The proposed action would not allow people to hide motorized vehicles well off roads when hunting, or picking mushrooms or berries, creating a safety hazard.**

    Roadside parking is part of the designated road network, and therefore not proposed to change. Motorized vehicle travel beyond this 30 feet, outside designated corridors or areas, is considered cross-country travel, and prohibited by the Travel Management Rule.

21. **The proposed action should include a ban of cross-country travel by any user group.**

    A ban on all cross-country travel by any method is outside the scope of the purpose and need, which specifically addresses where motorized vehicles are permitted. Any changes or limitiation on non-motorized methods of travel or recreation are outside the scope of the analysis.

22. **The trail system should be designed to protect the solitude of Roadless Areas, undeveloped areas and Wilderness.**

    Changes to the current trail system are outside the scope of the purpose and need since it does not include making any changes to the current motorized trail system on the forest.

23. **Some people submitted comments on the 2009 proposed action, in response to comments based on that action, or responses to other commenters on this proposed action.**

    Comments received in response to the 2009 proposed action are outside the scope of this analysis. The 2009 proposed action is different than the current proposed action, and included proposed changes to the National Forest System motorized trail system. These comments are on file and will be considered in subsequent Subpart B analyses, and when developing the upcoming site-specific proposals regarding changes to roads and motorized trails. Responses to other commenters were noted, but did not alter the original comment.

24. **Successful implementation of a Travel Management Plan would rely on adequate enforcement and education.**

    Education and enforcement are important aspects to the implementation of Travel Management. Once a decision has been made and the MVUM has been published, education and enforcement plans will be developed.

25. **Concern was expressed that the Nature Conservancy may prohibit motorized vehicles on trails crossing their newly acquired land adjacent to the Cle Elum Ranger District.**

    This issue is beyond the scope of this analysis since it does not pertain to National Forest System land.

26. **Commenters provided advice and guidance on proper development of an EIS.**

    An EA is prepared to determine if there are significant effects. A subsequent EIS would be prepared if the analysis showed that there would be significant effects associated with the proposed action or alternatives. It is the intent that the analysis and documents comply with applicable laws, policies and regulations.

27. **Commenters expressed concern about their ability to understand the maps and about not being able to find non-system routes.**

    The maps were posted on the Okanogan-Wenatchee Forest website, and covered the entire forest. The format allowed the viewer to shift the location and increase the scale of any areas of interest. Larger-scale, or more geographically focused paper maps were provided to everyone requesting them. Non-system roads and trails were not not displayed as part of the proposed action since they are not part of the National Forest transportation system. The proposal is to close the forest to cross country travel which would include prohibiting travel on non-system routes. When a decision is made, the designated motorized system will be displayed on the national standardized Motor Vehicle Use Map.

28. **Gating or physically blocking trails leading to Wilderness would be cost prohibitive.**

    Making any changes to existing system trails, including installing gates or blocking trails, is outside the scope of the purpose and need.

29. **Concern was expressed about how motorized vehicles contribute to climate change.**

    This issue is outside the scope of the analysis. The proposed action would not change the use of carbon emitting vehicles.

30. **Several issues and concerns were raised that are outside the scope of the analysis because they do not pertain to the purpose and need, or Travel Management. These include the following:**

    - fallout from chemical trails from jets
    - clearcutting
    - opening the Twisp and Chewuch River drainages for firewood cutting

- support for the North Summit Horsecamp
- opposition to the National Recreation Area on the Okanogan-Wenatchee National Forest proposed by the Yakima Working group
- concern over the Umpqua National Forest Travel Management process.

CHAPTER 2
Alternatives

INTRODUCTION

Chapter 2 describes the proposed action and alternatives to the proposed action, including a no action alternative. The alternatives are compared, describing the differences among the alternatives and providing a clear basis for choice to the Responsible Official. This chapter also describes the measures necessary to mitigate environmental effects, displays monitoring, and shows a summary comparison of the alternatives relative to the issues and the purpose and need for action.

This chapter is divided into five sections:

- Alternative Development
- Alternatives Considered but Eliminated from Detailed Study
- Alternatives Considered in Detail
- Mitigation Measure
- Monitoring Plan
- Comparison of the Alternatives

ALTERNATIVE DEVELOPMENT

The Forest Service used the Purpose and Need, described in Chapter 1, as a framework for alternative formulation, and the key issues that are identified in Chapter 1 to develop a range of reasonable alternatives. Several sideboards were applied during alternative development:

1. Previous NEPA decisions on the existing system roads and motorized trails or other decisions that predate NEPA do not need to be revisited.
2. All fully analyzed alternatives had to meet the purpose and need of the project.
3. All fully analyzed alternatives had to be consistent with the Forest Plans except where amendments are proposed.
4. The actions triggering NEPA in fully analyzed alternatives are to close the forest to cross-country motorized travel and designating corridors for motor vehicle access to dispersed camping, requiring forest plan amendments.

A “no action” alternative, Alternative A, provides a baseline for the environmental effects analysis. This alternative would not meet the purpose and need for complying with the Travel Management Rule, and therefore does not meet the Purpose and Need, but was fully analyzed to provide a baseline comparison for the action alternatives analysis.

In accordance with Forest Service NEPA regulations [36 CFR 220.7(b)], which allow for modifications to the proposal throughout the analysis process, the original Proposed Action (see Chapter 1) was modified, and the modified Proposed Action is analyzed as Alternative B. The incremental changes to the original proposed action as a result of issues generated during

public involvement are captured in the Alternatives Considered but Eliminated section below (#1).

Alternative C, an alternative to the proposed action, was developed to address issues raised during scoping concerning the proposed corridor designation, and the impacts to fish habitat from motorized access within the corridors. This alternative would meet the purpose and need to prohibit motor vehicle travel off of the existing designated system of open motorized roads, trails and designated areas. Alternative C would also provide motorized access to dispersed camping within designated corridors. The corridors in this alternative were developed by modifying the corridors Alternative B to avoid any overlap within 300 feet of designated critical fish habitat[1].

Alternative D was developed to address concerns about losing motorized access to some established dispersed campsites, and concentrating campers into the corridors included in the Proposed Action. This alternative would meet the purpose and need to prohibit motor vehicle travel off of the existing designated system of open motorized roads, trails and designated areas. Alternative D would also provide camping corridors on all roads open to motorized access to ensure a majority of established motorized campsite access is retained.

Several alternatives were suggested during the public involvement and alternative formulation process that did not meet the Purpose and Need, or were outside the scope of the analysis. These alternatives are described in the following section.

ALTERNATIVES CONSIDERED BUT ELIMINATED

Scoping comments suggested alternative methods for achieving the purpose and need. Federal agencies must explore and evaluate all reasonable alternatives, briefly discussing the reasons for eliminating any alternatives not developed in detail (40 CFR 1502.14).

1. **Eliminate all corridors, and only allow motorized access for dispersed camping directly adjacent to designated roads.**
   This alternative was eliminated from consideration because it either does not meet Forest Plan direction to provide for a variety of recreation experiences in appropriate management allocations or it would require adding many new access routes to the designated open road system to allow for dispersed camping along those routes, which is outside the scope of the purpose and need for this project. In addition, the forest does not have a complete inventory of all access routes, and there is not adequate time to complete the survey and meet the Travel Management timeline.

2. **Do not allow motorized access for dispersed camping within 300 feet of perennial streams, 150 feet of lakes, and 100 feet of intermittent streams.**
   This alternative was not considered further because it would be very difficult for the public to understand and comply with. It does not match the Forest Service definition

[1] Critical habitat is defined in Section 3 of the Endangered Species Act (50 CRF Part 17 p.19). Refer to Hydrology and Aquatics section of Chapter 3 for more information.

of riparian allocations, as specified in the Northwest Forest Plan, PACFISH, or INFISH. However, Alternative C was developed to eliminate some impacts of motorized access to dispersed camping to waterways by eliminating camping corridors in critical fish habitat.

3. **Do not allow motorized access to any dispersed campsites beyond the 30-foot roadside parking allowance.**
   This alternative was eliminated from further consideration because it would only allow motorized vehicle access to approximately 5% of the existing dispersed camping and would not meet Forest Plan direction to provide for a variety of recreation experiences in appropriate management allocations, or it would require adding many new access routes to the designated open road system to allow for dispersed camping along those routes, which is outside the scope of the purpose and need for this project.

4. **Close some areas to dispersed camping.**
   This alternative was eliminated from consideration because the purpose and need does not include any alteration or restrictions on dispersed camping – it only addresses motorized access for the purposes of dispersed camping. Changing authorization or regulations pertaining to dispersed camping is outside the scope of the purpose and need. However, all three action alternatives limit motorized access for the purpose of dispersed camping. All action alternatives prohibit motorized access beyond 300 feet from a designated open road, and within 100 feet of waterways except at defined sites. Additionally Alternatives B and C only designate certain corridors, with Alternative C being the most restrictive because it prohibits motorized access to dispersed camping within 300 feet of critical fish habitat. No alternative adds routes as open system roads.

5. **Do not allow people to pull-off and park 30 feet off the side of roads.**
   This alternative was eliminated from further consideration because use of designated roads and trails includes the ability to park a motor vehicle on the side of the road when it is safe to do without causing damage to National Forest System resources or facilities, unless prohibited by state law, a traffic sign or an order (36 CFR 261.54). The road designation must identify that vehicles can park within one vehicle length, or within a specified distance of up to 30 feet from the edge of the road surface (FSM 7716.1). Alternatives were considered that would designate the parking distance as one vehicle length, and for shorter distances than 30 feet. These were eliminated from consideration because there is considerable variation in vehicle length, including many types of vehicles that exceed 30 feet in length. Specifying a 30-foot distance would be easily understood when displayed on the MVUM, ensure adequate room for vehicles to safely pull off roadways, and limit the distance.

6. **Continue to allow motorized vehicles, specifically ATVs on maintenance level 1 roads.**
   This alternative was eliminated because it does not meet the purpose and need to standardize the management of maintenance level 1 road across the forest in compliance with Forest Service Handbook policy to close all maintenance level 1 roads to motorized use. Although this alternative is not part of an action alternative, Alternative A would not change the current management of these roads, so the effects of not closing the roads are included in the analysis of Alternative A.

7. **Ban all motorized vehicles from the Okanogan-Wenatchee National Forest.**
   This alternative was not considered further because it is outside the scope of the purpose and need to prohibit motorized vehicles off the existing open road system and motorized trail network.

8. **Allow motorized vehicles on paved surfaces only.**
   This alternative was not considered further because it is inconsistent with Forest Plan direction to provide a variety of recreation experiences. This alternative would result in only 333 miles of road being open across over 4 million acres of land, severely limiting access for recreation by closing nearly 7,590 miles of road to all motorized use. It is also outside the scope of the purpose and need to prohibit motorized vehicles off the existing open road system and motorized trail network.

9. **Change the current system of open roads and motorized trails.**
   A variety of alternatives were suggested to change the current system, including; add all unauthorized routes to the system; drop some routes; close some roads; change the motorized designation on some or all motorized trails; close some or all motorized trails; add motorized trails; and create loop routes by using maintenance level 1 and unauthorized routes. All these alternatives were eliminated from further consideration because they were outside the scope of the purpose and need for this project to prohibit motor vehicle travel off of the existing designated system of open motorized roads, trails and areas. These comments will be considered in future NEPA documents.

10. **Allow WATVs (ATVs that meet the requirements of Washington State House Bill 1632) on roads open to other licensed vehicles.**
    A variety of different alternatives were suggested by ATV clubs and conservation groups pertaining to opening roads to WATVs. The ATV club alternatives were reviewed by conservation groups, and presented as modifications of the ATV club alternatives. All alternatives were screened by resources specialists on the ranger districts to determine if they were consistent with management direction, likely to create user conflicts, or could potentially cause unacceptable impacts to other resources. The routes (350 miles) that passed the screening and a safety review by the Forest Service were added to Alternatives B and D. All other routes and variations on the 350 miles were not considered further in this analysis.

11. **Authorize additional motor vehicle use for big game retrieval.**
    The travel management rule allows for limited use of motor vehicles to retrieve downed big game that is in addition to the designated roads, trails, and areas. In Region 6, no additional motor vehicle access to retrieve big game will be authorized, except by the Regional Forester. Discussions with adjacent regions and Washington Department of Fish and Wildlife indicate support for not designating use of motor vehicles off designated roads, trails, and areas for the purpose of big game retrieval. Other discussions concerned needing consistency with adjacent Regions and Forests (USDA 2006). The Forest Supervisor does not have decision authority regarding motor vehicle access for big game retrieval and the Region is not supportive of providing such access; therefore, this alternative was eliminated from detailed study.

12. Complete minimum road analysis as defined by travel analysis of all maintenance levels, and implement recommendations.

The Forest completed Forest-wide Road Analysis in 2004 (USDA 2004) on maintenance level 3-5 roads. The Forest did not determine a minimum road system at that time nor did the Forest complete the travel analysis for maintenance level 1 and 2 roads.

Travel Analysis Relationship to Travel Management

Travel Analysis for minimum roads analysis is separate from Travel Management as FSM 7712 states:

> *Travel analysis for purposes of identification of the minimum road system is separate from travel analysis for purposes of designation of roads, trails, and areas for motor vehicle use. Travel analysis for both purposes may be conducted concurrently or separately.*

Neither agency directives nor the rule mandate minimum roads analysis before conducting a travel management project, and travel analysis appropriate for this project was completed in 2004.

The responsible official has the discretion to determine the scale and detail of travel analysis to adequately inform a motorized travel management decision. Travel analysis is a tool for the responsible official to use when making decisions related to designation of roads, trails, and areas for motor vehicle use in motorized travel management. This is highlighted in FSM 7712:

> *Travel analysis is not a decision-making process. Rather, travel analysis informs decisions relating to administration of the forest transportation system and helps to identify proposals for changes in motorized travel management direction.*

Scale

FSM 7715.2 states that:

> *Travel management decisions do not need to be at the same scale as the travel analysis that informs those decisions. Responsible officials should establish the scale and scope of proposed travel management decisions based on local situations and availability of resources.*

Previous Administrative Decisions

Travel management rule 212.50 (b) states:

> *The responsible official may incorporate previous administrative decisions regarding travel management made under other authorities, including designations and prohibitions of motor vehicle use, in designating National Forest System roads, National Forest System trails, and areas on National Forest System lands for motor vehicle use under this subpart.*

In the case of the Okanogan-Wenatchee National Forest, the Forest Supervisor determined the scale and detail of the travel analysis completed in 2004 was appropriate and sufficient to inform motorized travel management decisions, especially in light of incorporating previous administrative decisions regarding travel management

in developing the purpose and need to prohibit motor vehicle travel off of the designated system of motorized roads, trails and outside of designated areas.

Completing a new travel analysis for the purpose of determining a minimum road system is outside the scope of this project. Minimum roads analysis is currently underway across the Forest and is expected to be completed by the end of 2015. Implementing the recommendations from travel analysis will require subsequent site-specific NEPA documents. Those documents will analyze those recommendations from travel analysis at that time and any resultant decisions would be reflected on subsequent MVUMs. As a result, this alternative was eliminated from detailed study.

13. **Ban all off-road vehicles, and dirt bikes from trails.**
    This alternative was eliminated from consideration because it was outside the scope of the purpose and need to prohibit motor vehicle travel off of the existing designated system of open motorized roads, trails and outside of designated areas, with no changes to vehicle class limitations.

14. **Establish play areas for motorized vehicles.**
    All action alternatives continue the designation of Moon and Funny Rocks as motorized areas. Other "play" areas were eliminated from consideration because it is outside the scope of the purpose and need to prohibit motor vehicle travel off of the existing designated system of open motorized roads, trails and outside of designated areas.

15. **Manage all Inventoried Roadless Areas as non-motorized.**
    Some commenters suggested all roadless areas be managed as non-motorized, while others were specific about Mad River, Lake Chelan-Sawtooth, Entiat/Chelan, Teanaway, West Manastash, Golden Horn, and Tiffany areas. This alternative was eliminated from further consideration because motorized status of roadless areas is outside the scope of the purpose and need to prohibit motor vehicle travel off of the existing designated system of open motorized roads, trails and outside of designated areas.

ALTERNATIVES CONSIDERED IN DETAIL

The Forest Service fully developed four alternatives, including no action, in response to issues raised by the public and other government agencies. Maps of all alternatives are available at http://www.fs.usda.gov/project/?project=46467

Alternative A – No Action

Alternative A is the no-action alternative, which would not implement any changes to the current management direction for the Forest regarding motor vehicle access. Alternative A would allow motor vehicle use on the existing transportation system as well as current cross-country travel except where specifically designated closed to motor vehicle use (such as Wilderness and certain Roadless Areas, or by CFR). Current cross-country travel is a combination of non-routed travel, existing system roads managed as closed but without legal

closure (maintenance level 1), and unauthorized routes. Cross-country travel would only be limited by an existing prohibition on operation of motor vehicles in a manner that damages or unreasonably disturbs the land, wildlife, or vegetation (36 CFR 261.15(h)).

There would continue to be unlimited motorized access for dispersed camping, except in areas specifically designated as closed to motor vehicle use. Campers could drive vehicles off roads for any distance, on established routes or by creating new ones, and as close as they want to any lake, stream, river, or other water body, as long as they complied with 36 CFR 261.15(h).

Action Alternatives

As described above, three action alternatives are fully developed and analyzed in this EA. Alternative B is a modification of the Proposed Action described in Chapter 1, and distributed for public review and comment on December 22, 2014[2]. Alternatives C and D were developed to respond to comments raised by the public and other government agencies. The three alternatives have elements in common, but differ in how each addresses motorized access for dispersed camping. The common elements are described below, followed by detailed description of the differences.

Special Access
Alternatives B, C, and D would comply with the Travel Management Rule's recognition of valid existing rights and not modify those rights, nor take away any statutory or treaty rights. The following would be exempt from designation:

- Aircraft
- Watercraft
- Over-snow vehicles[3]
- Limited administrative use by the Forest Service
- Emergency purposes
- National defense purposes
- Law enforcement response
- Motor vehicle use that is specifically authorized under a written authorization issued under Federal law or regulations.

Additional details for the most common exemptions are included below.

Tribal Access
The Yakama Nation and the Confederated Tribes of the Colville Reservation retain rights to portions of the Forest located within ceded lands. Members of the Yakama Nation retain rights to fishing, hunting, gathering, and pasturing of horses and cattle on the Wenatchee National Forest and portions of the Okanogan National Forest by virtue of Article 3 of the Yakima Treaty of 1855. Members of the Confederated Tribes of the Colville Reservation

[2] Refer to Proposed Action section in Chapter 1 for a description of the modifications made to the original Proposed Action.
[3] Subpart C of the Travel Management Rule pertains to over-the-snow vehicles. The Okanogan-Wenatchee National Forest will complete this part at a later date.

retain the right to hunt and fish in common with all other persons in the former northern half of their reservation by virtue of Article 6 of the 1891 Agreement between the United States and the Tribes. This area includes all of the Tonasket Ranger District east of the Okanogan River. A special authorization process for motor vehicle access off designated routes to exercise these traditional trust activities on the Forest would be considered on a case-by-case basis.

Special Use Permittee, Forest Service Contractor, and Allotment Access
Permittee and contractor motor vehicle access needs would be identified on a site-specific basis for special use permits and easements, Forest Service contracts awarded, and grazing allotments managed. These proposals would continue to be administered in accordance with the terms and conditions of the Forest Service authorization and would be reviewed as needed.

The Forest Service would work with the permittee, easement holder, or contractor to address reasonable requests for motor vehicle use off designated routes (including cross-country) when the use is critical for the operation. Authorized or contractor motor vehicle access must be consistent with other pertinent rules, regulations and laws and would be at the discretion of the authorizing officer's evaluation of need.

Mining Access
Nothing in the final rule revokes any rights held by miners. Reasonable access for and reasonably incident to mining operation is authorized by U.S. Mining Laws. Motorized vehicle use inconsistent with the MVUM could be authorized under an approved Plan of Operations. The approved Plan of Operations would serve as written authorization and would exempt involved parties from specified MVUM regulations.

Special Forest Products, including Firewood
Motor vehicle access for firewood or other forest product gathering would be allowed, consistent with the rules and regulations of the permit that pertains to the area in question.

ELEMENTS COMMON TO ALTERNATIVES B, C, AND D

Alternative B, C and D would close the Forest to cross-country motorized travel off the existing open National Forest system roads (maintenance levels 2-5), existing open system motorized trails (including any sections of maintenance level 1 roads part of a motorized system trail), and outside of the Moon and Funny Rocks rock crawl areas. WATVs would be allowed to operation on 350 miles of National Forest System roads. All system roads currently open for motorized use (maintenance levels 2-5) would remain open to highway legal vehicles during the existing seasons of use, with existing designations for vehicle types. In addition, all system roads currently open to motorized mixed use would remain open for that existing use. All motorized system trails would remain open to current vehicle designations (greater than 50 inches, less than 50 inches, or motorcycle) during the existing seasons of use.

The Travel Management Rule does not require reconsideration of past management decisions, and none of the alternatives would change existing road maintenance levels, the use designation of trails, or the use of the Moon and Funny Rocks rock crawl areas (23.27 and 9.93 acres, respectively). The alternatives would each make the following changes:

1. Prohibit cross-country motor vehicle use off the existing maintenance level 2-5 system roads, and existing motorized trails, and outside of the existing Moon and Funny Rocks rock crawl areas[4].
2. All maintenance level 1 roads would be closed to motorized vehicles, unless currently part of a motorized system trail, in accordance with Forest Service Handbook policy (FSH 7709.58, 10, 12.3).

3. Motor vehicle parking would be allowed up to 30 feet from the edge of the road surface when it is safe to do so without causing damage to National Forest System resources or facilities, unless prohibited by state law, a traffic sign, or a closure order (36 CFR 261.54).

4. Amend the Okanogan and Wenatchee National Forest Plans to make them consistent with the Travel Management Rule as follows:

   The Okanogan Forest Plan currently contains the following forest-wide standard and guideline:

   > 17-3 Areas, roads, and trails shall be designated open, closed, or restricted to motorized use to conform to management goals. These designations shall be displayed in the Forest travel plan (USDA 1989 p. 4-50).

   This would be amended as follows:

   > 17-3 Except for over-snow vehicle use; areas, roads, and trails shall be closed to motor vehicles unless specifically designated as open on the motor vehicle use map. Motorized use on areas, roads, and trails shall conform to the goals of the management area. Project-specific NEPA decisions may be made on a case-by-case basis to open, close, or restrict roads, trails, and areas based on the goals of the management areas; these changes would be displayed on future motor vehicle use maps. Over-snow vehicle use areas, roads, and trails shall be open, closed, or restricted consistent with the goals of the management area and designated on a map depicting authorized over-snow use.

   The Wenatchee Forest Plan currently contains the following forest-wide standards and guidelines:

   <u>Road Operation</u>

   1. Road closures – The decision to close any Forest Road will be made on a case by case basis. Unless there is a resource need documented in the project analysis, currently open roads will remain open and newly constructed roads will be closed to public access by vehicle (USDA 1990, p. IV-102).

   <u>Trail System Maintenance and Operation</u>

   1. The Forest trail system will provide for use by all specified modes of transportation as contained in the management prescriptions (USDA 1990, p. IV-69).

[4] Except by authorization as described in the Travel Management Rule.

These would be amended as follows:

Road Operation

1. Except for over-snow vehicle use, roads shall be closed to motor vehicle use unless specifically designated as open on the motor vehicle use map. Motorized use on roads shall conform to the goals of the management area. Project-specific NEPA decisions may be made on a case-by-case basis to open, close, or restrict roads based on the goals of the management area with changes displayed on the subsequent motor vehicle use map. Over-snow vehicle use on National Forest System roads may be allowed, restricted, or prohibited consistent with the management area prescription.

Trail System Maintenance and Operation

1. The Forest trail system will provide for use by all specified modes of transportation as contained in the management prescriptions. Except for over-snow vehicle use, trails shall be closed to motor vehicle use unless specifically designated as open on the motor vehicle use map. Motorized use on trails shall conform to the goals of the management area. Project-specific NEPA decisions may be made to open, close, or restrict trails based on the goals of the management area with changes displayed on the subsequent motor vehicle use map. Over-snow vehicle use on National Forest System trails may be allowed, restricted, or prohibited consistent with the management area prescription.

The Wenatchee Forest Plan would additionally be amended to add the following standard and guideline (IV-69):

Motorized Areas

1. Except for over-snow vehicle use, areas shall be closed to motorized vehicles except where specifically designated open on the motor vehicle use map. Motorized use on areas shall conform to the goals of the management area. Project-specific NEPA decisions may be made to open, close, or restrict areas based on the goals of the management area with changes displayed on the subsequent motor vehicle use map. Over-snow vehicle use on National Forest System areas may be allowed, restricted, or prohibited consistent with the management area prescription.

ELEMENTS SPECIFIC TO INDIVIDUAL ALTERNATIVES

Corridors for Motorized Access to Dispersed Camping

Alternatives B, C, and D would all establish corridors for motorized vehicle access for dispersed camping. The corridors would be shown on the MVUM. Each alternative varies in the amount of designated corridors although the following items would be consistent among the alternatives:

- All corridors designated for the purpose of access to dispersed camping would be 300 feet wide from the road centerline, on both sides of open designated roads. Within corridors, motorized vehicles would be restricted to existing routes, and vehicles would not be permitted within 100 feet of water, except at defined sites (some routes within

these corridors have been improved to reduce environmental impacts with fences, boulders or other barricades, and/or signs define the acceptable travel routes. At these sites, vehicles would be allowed on the defined route, regardless of the proximity to water). The Motor Vehicle Use Map (MVUM) would include a listing of "Special Provisions" for motor vehicle access to dispersed camping. The "Special Provisions" would read:

Motor vehicle access to dispersed camping is confined to existing routes leading to existing campsites. The following definitions apply:

- ***Existing route**: a route with an established history of motor vehicle use, as indicated by a road-bed width of greater than 50 inches, the predominance of compacted soil, and minimal vegetation growing in the travel way. New resource impacts (indicated by single or double tracks over vegetation) are not considered existing routes.*
- ***Existing campsite**: an area obviously used by campers that usually contains a rock fire ring and minimal ground vegetation as the result of motor or foot traffic.*

Alternative B

Alternative B would designate corridors along approximately 1,640 miles of currently open road (approximately 31%). The corridors would be 300 feet wide from the road centerline, on both sides of these roads. Within corridors, motorized vehicles would be restricted to existing routes. Motorized vehicle use within the corridors would be allowed as described in Elements Common #4 above.

Alternative C

Alternative C would designate corridors along approximately 1,492 miles of currently open road (approximately 28%). The corridor pattern included in Alternative B (Modified Proposed Action) was modified for Alternative C to remove any corridors within 300 feet of Critical Fish Habitat. The corridors would be 300 feet wide from the road centerline, on both sides of these roads. Within corridors, motorized vehicles would be restricted to existing routes. Motorized vehicle use within the corridors would be allowed as described in Elements Common #4 above.

Alternative D

Alternative D would designate corridors along all maintenance level 2 through 5 roads, approximately 5,366 miles, or 100% of the currently open roads[5]. The corridors would be 300 feet wide from the road centerline, on both sides of these roads. Within corridors, motorized

[5] Some maintenance level 2-5 roads are gated, and open only for administrative use. No motorized access for dispersed camping would occur along these gated segments.

vehicles would be restricted to existing routes. Motorized vehicle use within the corridors would be allowed as described in Elements Common #4 above.

WATV Routes

Alternatives B and D

Approximately 350 miles of maintenance level 2 through 5 National Forest System road would be open to WATVs. The specific routes are described below, and shown on the alternative maps available on the website.

- The Table Mountain Route would open approximately 41 miles of currently open road to WATVs, linking the Blewett SnoPark at the Blewett Summit along Highway 97 to the town of Liberty, and to the Reecer SnoPark near Ellensberg.
- The Thunder Mountain Route would open approximately 91 miles of road, linking the town of Conconully to the East Chewuch Road just north of Winthrop, the Toats Coulee Road west of Tonasket, the North Summit SnoPark along Highway 20 at the Loup Loup Summit, and the Beaver Creek Campground on Washington State Department of Fish and Wildlife land east of Winthrop.
- The Bald Mountain Route would open approximately 34 miles of road, linking the Hog Ranch, Dipping Vat, and Cow Canyon Roads, and connecting to the existing 4x4 trail number 4W644 west of Bald Mountain.
- The Clover Springs Route would open approximately 50 miles creating 3 interconnected loops by tying into trail number 4W696 at the Clover Springs Trailhead and Forest Road 1600.
- The Entiat Ridge Route would open approximately 72 miles and link the Lower Chiwawa Trailhead to Forest Road 5700 near Entiat and Forest Road 7401 to the Derby Canyon Road near Peshastin.
- The Grade-Oss Route would open approximately 62 miles and link the Black Canyon SnoPark near Pateros to the Echo Valley Ski Area, and create a loop along Forest Roads 8200 and 8020.

Alternative C

No roads would be opened to WATVs under Alternative C.

MITIGATION MEASURE

If motorized use on access routes within corridors for access to dispersed camping (corridors) is causing resource impacts beyond those predicted in this EA, the access route would be modified to minimize or eliminate the impact. Some of the possible actions could include, but are not limited to:

- using boulders, fences, or other barriers to keep vehicles to an acceptable location;
- hardening the access route surface to minimize erosion;

- improving the access routes with water bars or other drainage structures to protect water quality; or
- decommissioning and blocking the access route
- modifying or removing the corridor.

MONITORING PLAN

The following monitoring plan would be used to determine if the environmental effects of motorized access for dispersed camping projected in the EA are accurate, and when mitigation is needed to modify access routes in corridors so impacts are within the disclosed range of effects. Monitoring and evaluation would determine whether the motorized travel management decision has been properly implemented and how effective the implementation has proven to be in accomplishing the desired outcomes.

Heritage Resources

The objective of monitoring is to determine how motorized use within a corridor is affecting heritage resources and how effective, using evaluation criteria, implementation of the Forest's Travel Management Plan is in accomplishing desired outcomes. For heritage resources the desired outcome is the protection, preservation, and management of the Forest's National Register listed and eligible heritage resources. More specifically, monitoring will be used to:

- determine whether a heritage resource located within a corridor is being adversely affected by motorized use;
- implement appropriate mitigation to prevent damage to National Register listed or eligible heritage resources in corridors; and
- identify and manage new heritage resources located as a result of field inventory and monitoring

Monitoring Procedures and Priorities

During the first year of monitoring a CRS will compile a list of heritage resources located in the corridors of the selected alternative. Para-professionals working under the direction of a CRS will begin inspecting heritage resources on the list and assemble a list of heritage resources overlapped by a motorized route within a corridor. A CRS will then inspect up to 30 heritage resources on that list annually to establish baseline data for each heritage resource. Establishment of baseline data will continue until all heritage resources listed have baseline data. After that, heritage resources on the list will be monitored every five (5) years unless the corridor is removed from the MVUM by adaptive management. Acquisition of baseline data and subsequent monitoring will be prioritized as follows:

- Unevaluated heritage resources located in high probability areas
- Unevaluated heritage resources located in moderate probability areas
- Unevaluated heritage resources located in low probability areas
- National Register listed or eligible heritage resources located in high probability areas
- National Register listed or eligible heritage resources located in moderate probability areas
- National Register listed or eligible heritage resources located in low probability areas

The Forest is responsible for the management of heritage resources listed or eligible for listing on the National Register of Historic Places (NRHP) so the intent of monitoring unevaluated heritage resources first is to evaluate and remove those determined ineligible from the monitoring list.

For each heritage resource located within a corridor, baseline data will consist of an updated or new heritage resource record, photographs of the heritage resource from established datum points, artifact counts with attention paid to artifact distribution in areas of ground disturbance potentially associated with motorized use, and detailed heritage resource maps that also document areas of motorized use and erosion. Heritage resource vandalism will be documented, mapped and photographed. Shovel testing will be done to determine the presence or absence of artifacts and/or features where motorized routes overlap the heritage resource. Baseline data will be captured on an evaluation form specific to heritage resource monitoring. Monitoring results will be documented in an annual report to the State Historic Preservation Officer, the Confederated Tribes of the Colville Reservation and the Confederated Tribes and Bands of the Yakama Nation.

Evaluation Criteria

The questions below will be used to determine whether a heritage resource is being affected by motorized use within a corridor.

- Does a motorized route inside a corridor overlap a heritage resource?
- Is the area of overlap expanding in length, width or depth and if so, by how much?
- Are heritage resource features or artifacts present in the area of overlap?
- Are heritage resource features or artifacts in the area of overlap being affected (e.g., artifact breakage, artifact or feature exposure, relocation of artifacts or features) due to motorized-use?
- Are heritage resource features and artifacts being removed as evidenced by loss of features over time, reduction in the number and types of artifacts, or by the presence of a collector's pile or looters pit?
- Are heritage resources along motorized routes shrinking in size due to motorized-related damage?
- Are heritage resources within line of site of a motorized route being vandalized?
- Are new heritage resources being exposed by use of a motorized route, by expansion of a route in a corridor, by dispersed camping?

Aquatic Resources, Hydrology, and Soil

Monitoring would be done to validate the effects projected in this document of motorized vehicle access in corridors, and to ensure compliance with the Aquatic Conservation Strategy (ACS) and Riparian Management Objectives (RMOs). ACS objectives and RMOs are designed to maintain or restore processes and functions necessary for healthy aquatic ecosystems at the watershed scale. Monitoring of motorized access within corridors would determine whether these objectives are being met, and when mitigation is needed to reduce effects to keep effects within those predicted in this document. This plan defines both implementation and effectiveness monitoring.

The monitoring would be prioritized as follows:

- Riparian allocations within corridors in or adjacent to (within 300 feet) of occupied ESA listed fish habitat, critical habitat, essential fish habitat, or in key watersheds under the NWFP and PACFISH, and priority watersheds under INFISH.
- All other riparian allocations within corridors.

Evaluation Criteria

Implementation monitoring would focus on direct effects of motorized vehicle use in corridors. It would document if vehicles are staying on existing access routes, and remaining 100 feet away from waterways except at defined sites. Effectiveness monitoring would focus on a more thorough inventory of the impacts from any particular access route and offer a clearer picture of use patterns and impacts. The questions below are examples of the data that would be collected within corridors to determine whether motorized use is adversely affecting riparian dependent resources, hydrologic function, or soil, and if mitigation is needed to reduce impacts to acceptable levels.

- Have new access routes been created, or existing ones increased in size or developed degrading conditions?
- Is there evidence that the access route is becoming longer, moving towards the stream/river/lake?
- Is there an obvious rutting/erosion problem on the access route?
- Is there evidence of sediment delivery associated with the access route, to waterways or channels?
- Is vegetation along streams being impacted by motorized vehicles using the access route?
- Is there a reduction in stream shading from motorized vehicles using the access route?
- Is there evidence of recent motorized vehicle use within 100 feet of the edge of a stream, river, or lake?

Botanical Resources

Monitoring would be done to validate the projected effects of corridors on botanical resources. Populations of threatened, endangered, or sensitive species and survey and manage species would be targeted, in addition to known or discovered populations of invasive species.

The monitoring would be prioritized as follows:

- Know populations of threatened, endangered, or sensitive plant species within corridors.
- Known populations of invasive species within corridors.
- Riparian allocations within corridors.

Evaluation Criteria

Implementation monitoring would focus on direct effects of motorized vehicle use in corridors. It would document if vehicles are staying on existing access routes, and remaining 100 feet away from waterways except at defined sites. Effectiveness monitoring would focus on a more thorough inventory of the impacts from any particular access route and offer a clearer picture of use patterns and impacts. The questions below are examples of the data that would be collected within corridors to determine whether motorized use is adversely affecting vegetation or contributing to the introduction or spread of invasive species, and if mitigation is needed to reduce impact to acceptable levels.

- Have new access routes been created, or existing ones increased in size or developed degrading conditions?
- Are populations of threatened, endangered, sensitive, or survey and manage species being affected by new or expanding motorized access routes?

- Have invasive species populations increased or new species become established within corridors?

Wildlife: Chelan Mountainsnail & Larch Mountain Salamander

Monitoring would be done to determine if new motorized access routes within corridors have been developed, or existing ones expanded in habitat for Chelan Mountainsnail (CMS) or Larch Mountain Salamander (LMS).

The monitoring would occur in CMS and LMS habitat within corridors.

Evaluation Criteria

Implementation monitoring would focus on direct effects of motorized vehicle use in corridors on CMS and LMS habitat. Effectiveness monitoring would focus on the potential creation of new access routes, and any effects on the species habitat. The questions below are examples of the data that would be collected within corridors to determine whether motorized use is adversely affecting CMS or LMS habitat, and if mitigation is needed to reduce impacts to acceptable levels.

- Have new access routes been created, or existing ones increased in size or developed degrading conditions?
- Is the motorized access impacting CMS or LMS habitat?

PREFERRED ALTERNATIVE

Alternative B is the preferred alternative.

COMPARISON OF ALTERNATIVES

This section provides a summary of the ability to meet the purpose and need and the effects of implementing each alternative. The data in this table are supported in Chapter 3 and the Resource Specialist Reports.

Table 2-1. Comparison of Alternatives

	Alt. A	Alt. B	Alt. C	Alt. D
Motorized Recreation Opportunities				
Acres Open to Cross Country Motorized Travel	2.6 million	33	33	33
Miles of road open to motorized vehicles	7,923	5,366	5,366	5,366
Miles of road open to WATVs	0	350	0	350
Motorized Access to Dispersed Camping				
Miles of Designated Corridors	n/a	1,640	1,492	5,366
Approximate percent of existing drive-in dispersed campsites located along roads with corridors	n/a	81%	58%	100%
Approximate percent of existing drive-in dispersed campsites located along roads without corridors	n/a	19%	42%	0%
Approximate percent of existing drive-in dispersed campsites with complete motorized access[6].	n/a	56%	42%	69%
Approximate percent of existing drive-in dispersed campsites with partial motorized access[7].	n/a	25%	18%	31%
Approximate percent of existing drive-in dispersed campsites with no motorized access[8].	n/a	19%	42%	0%

[6] These campsites are located within designated corridors, and are at least 100 feet from water, and closer than 300 feet from the road. Campers would be allowed to drive directly to the campsite.

[7] These campsites are located along roads with corridors, but are closer than 100 feet to water, or further than 300 feet from the road. Campers would be allowed to drive up to 300 feet from the road, but not closer than 100 feet to water. The campsite could then be reached on foot, or by some other non-motorized means.

[8] These campsites are located along roads without corridors. Campers would be allowed to park within 30 feet of the side of the road, and access the campsite by non-motorized means.

Hydrology, Fish, and Soil				
Overall Open Road Density	1.1 mi/mi^2	0.7 mi/mi^2	0.7 mi/mi^2	0.7 mi/mi^2
Number of 5th Level HUs with open road density <1 mi/mi^2	23 HUs	29 HUs	29 HUs	29 HUs
Number of 5th Level HUs with open road density between 1 mi/mi^2 and 2.4 mi/mi^2	23 HUs	22 HUs	22HUs	22 HUs
Number of 5th Level HUs with open road density >2.4 mi/mi^2	7 HUs	2 HUs	2HUs	2 HUs
Miles of Open FS Road in Riparian Reserves of RHCAs	1,072	828	828	828
Miles of Open FS Road within 300 feet of Critical Fish Habitat	275	260	260	260
Acres of Riparian Reserves or RHCAs within designated corridors	n/a	20,457	14,401	53,744
Approximate number of established routes to dispersed sites within Riparian Reserves or RHCAs	n/a	277	100	301
Acres of Corridors within 300 feet of Critical Fish Habitat	n/a	5,042,	0	15,175
Approximate number of established routes to dispersed sites within Critical Fish Habitat	n/a	107	0	141
Wildlife				
Determination of effects to threatened or endangered species	May affect, not likely to adversely affect			
Determination of effects to proposed and sensitive species	May impact individuals or habitat, but will not likely contribute to a trend towards federal listing	Beneficial impact, would not jeopardize continued existence		
Determination of effects to management indicator species	Not likely to have negative effects, would not contribute to a negative trend in viability			

Botany				
Acres open to motorized cross country travel	2.6 million	33	33	33
Acres of riparian habitat open to motorized cross country travel	79,261	0	0	0
Acres of late successional/old growth habitat open to cross country motorized travel	140,390	0	0	0
Miles of road open to motorized use	7,923	5,366	5,366	5,366
Acres of corridors in riparian habitat	n/a	20,457	14,401	53,744
Approximate number of established routes to dispersed sites within Riparian Reserves or RHCAs	n/a	277	100	301
Acres of corridors in late successional/old growth habitat	n/a	29,847	22,975	91,927
Number of threatened, endangered, sensitive, and survey and manage species within corridors	n/a	35	27	71
Number of known threatened, endangered, sensitive and survey and manage sites within corridors	n/a	229	193	468
Determination of effects to *S. oregano var. calva (*endangered species)	May affect, not likely to adversely affect			
Determination of effects to sensitive species	Would not result in a loss of species viability			
Invasive Species				
Acres infested with invasive species open to cross country motorized travel	16,281	0	0	0
Miles of road open to motorized vehicles, providing movement corridors for invasive species	7,923	5,366	5,366	5,366
Acres within corridors infested with invasive species	n/a	4,165	3,781	9,691

Heritage Resources				
Number of known heritage resources potentially impacted by motorized cross country travel	1,541	0	0	0
Miles of road open to motorized vehicles, potentially impacting unknown heritage sites	7,923	5,366	5,366	5,366
Number of known heritage resources in corridors	n/a	387	252	676
Acres of high probability areas with corridors	n/a	22,411	16,574	50,050
Acres of moderate probability areas within corridors	n/a	17,946	17,151	36,129
Acres of low probability areas within corridors	n/a	74,198	66,996	223,538
Economics				
Estimated employment and labor income from motorized recreation (no projected difference between alternatives)	6 jobs $240,000 labor income			
Role of Forest Service recreation visitor spending to local economy (no projected difference between alternatives)	0.04% of employment (jobs) 0.03% of labor income			
Air Quality				
Qualitative discussion about air quality and the Clean Air Act	All alternatives would comply with the Clean Air Act.			

CHAPTER 3
Existing Condition and Environmental Consequences

Introduction

This chapter summarizes the affected physical, biological, social, and economic environments of the project area and the effects of implementing each alternative. The scientific and analytic basis is presented for the comparison of alternatives listed in Chapter 2. The effects disclosed are based on the effectiveness of the mitigation measure outlined in Chapter 2. Each resource identified indicators and measures for the analysis, based on management direction, research, or field practice.

The effects resulting from each action are described in terms of their context and intensity. Other activities occurring in the same area over time, under certain circumstances, may have incremental effects that contribute to cumulative effects. Each resource identified the spatial and temporal boundaries appropriate for the analysis. The analyses disclose the direct, indirect and cumulative effects of each alternative. Past, present and reasonably foreseeable future projects that may contribute to cumulative effects are identified.

Many of the effects discussed in this chapter are not easily quantified. It should be kept in mind that many of the values presented are modeled or estimated predictions of effects, and that the actual effects may not occur exactly to the degree presented. In some cases, the value of the analysis is in the comparison of the estimated effects between alternatives, rather than in the absolute values of the effects shown.

Each environmental component is discussed in terms of the consequences of implementing each of the alternatives listed in Chapter 2. This allows the reader interested in specific resources to find the effects related to that resource in one place. The following format is used for each environmental component:
Existing Condition describes the environment of the area to be affected by the alternatives, that is, the baseline environment, thus including past actions. It provides background for understanding the discussion that follows.
Environmental Consequences of implementing each alternative are discussed. There are three types of effects considered:

- Direct Effects are caused by the action and occur at the same time and place [40 CFR 1508.8(a)].
- Indirect Effects are caused by the action but occur later in time or further removed in distance, but are still reasonably foreseeable [40 CFR 1508.8(b)].
- Cumulative Effects result from the incremental impacts of the action when added to other past, present, and reasonable foreseeable actions [40 CFR 1508.7].

Consistency Finding is a statement for each resource area that demonstrates how the action alternatives are consistent with the amended Forest Plan.

The Chapter begins with a discussion of past, present, and reasonably foreseeable actions that may affect the project area. Environmental components are detailed as above.

This EA hereby incorporates by reference the Recreation, Hydrology/Fish, Wildlife, Botany, Invasive Species, Heritage, and SocioEconomics specialist reports in the Analysis file [40 CFR 1502.21] all of which are summarized in this chapter. The referenced reports are located in the corresponding resource section of the Analysis file. All specialist reports contain the detailed data, methodologies, analyses, conclusions, maps, references and technical documentation (best available science) that the resource specialists relied on to reach conclusions.

Past, Present, and Reasonably Foreseeable Future Actions

The project interdisciplinary team (IDT) identified past, present, and reasonably foreseeable future actions, that might have cumulative impacts with the proposed action. Those actions in and adjacent to the project area are listed below. Each resource specialist considered different mixes of these actions, depending on the cumulative effects boundary for the resource area and the resource affected. Only those past, present and reasonably foreseeable future actions that overlap the geographic analysis area boundary for each particular resource are considered, and only if those other actions have or are expected to have overlapping effects (spatially and temporally) with Travel Management. Some past projects may still be having effects on one resource, but not another.

Past Actions

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

The Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.”

The cumulative effects analysis in this EA is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), which state, in part:

CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making." (40 CFR 1508.7)

For these reasons, the analysis of past actions in this section is based on current environmental conditions although the effects of past actions will be aggregated with present and reasonably foreseeable future actions in determining whether the effects from the outfitter-guide activities included in this document are significant.

Present Actions

Present and ongoing actions were considered in the cumulative effects analysis. There are many actions occurring at any given time on National Forest System land. Those that have a cumulative effect with the alternatives are discussed in the individual resource sections.

The main routine present and ongoing actions are listed below.

- Road Maintenance
- Trail Maintenance
- Developed Campground Maintenance
- Respect the River (Improved Site) Maintenance
- Firewood and other Special Forest Products Gathering
- Livestock Grazing on Grazing Allotments
- Noxious Weed/Invasive Species Control
- Mining Operations
- Recreation and Non-Recreation Special Use Permits
- Fire Suppression

Ongoing and Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions are defined as:
Those Federal of non-Federal activities not yet undertaken, for which there are existing decisions, funding, or identified proposals. Identified proposals for Forest Service actions are…[proposals for which the] Forest Service has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated. 36 CFR §220.3 and 36 CFR §220.4(a)(1)

The list of the actions the Forest Service or other landowners are currently implementing that could potentially interact with the effects of the Motorized Travel Management Project is included in Table A-1 in Appendix A. Also included are those actions for which the Forest Service has decisions that have not been implemented, or an identified proposal, in addition to proposals by other landowners, that could potentially interact with the effects of the Motorized Travel Management Project. The following table includes the categories of these actions and key assumptions used in the cumulative effects analysis. A general assumption for all projects is that they will comply with all applicable laws and forest plan standards and guidelines.

Table 3.0-1. Ongoing and Reasonably Foreseeable Future Actions

Type of Project	Agency	Key Assumptions
Restoration and Fuels Reduction	Forest Service	*The Forest will complete Forest Restoration and Fuels Reduction on approximately 140,347 acres and close or decommission 218.5 miles of road. Projects will improve forest health, and reduce fuel loading. Projects will comply with all Forest Plan standards and guidelines, and all laws, including the Endangered Species Act. Transportation System Management will be part of each project and will reduce open road density by closing some roads (maintenance level 1) and decommissioning others. Overall result will be a decrease in open road mileage in each project area.*
Transportation System Management	Forest Service	*Project will reduce open road density by closing (maintenance level 1) or decommissioning approximately 169.7 miles of road. Overall result will be a decrease in open road mileage in the project area.*
Aquatic Habitat Restoration	Forest Service	*Projects will improve aquatic habitat in project area, and will comply with all forest plan standards and guidelines and applicable laws.*
Invasive Species	Forest Service	*Project will help control or eradicate invasive species, helping to restore native plant species and communities.*
Special Use Permits	Forest Service	*Projects will comply with all forest plan standards and guidelines, and applicable laws.*
Minerals	Forest Service	*Projects will disclose environmental impacts and include mitigation for submitted plans of operation from claimants.*
Recreation	Forest Service	*Projects will improve recreation sites and experience. All projects will comply with all forest plan standards and guidelines, and applicable laws.*

Type of Project	Agency	Key Assumptions
Facilities	Forest Service	*Project will dispose of excess facilities*
Radio Repeater	Forest Service	*Project will improve radio transmission in the Twisp River drainage on the Methow Valley Ranger District*
Communication Site	Forest Service	*Projects will improve facilities at existing communication sites.*
Road Maintenance and Management	Non-Forest Service	*Projects will improve fish passage.*
Forest Improvement Treatments	Non-Forest Service	*Project will improve forest health and reduce fuel loadings.*
Recreation Plan Implementation	Non-Forest Service	*Projects will improve and increase recreation opportunities on DNR land.*
Recreation Plan Development	Non-Forest Service	*Project will improve recreation opportunities, and reduce environmental effects of recreation activities.*
Aquatic Restoration	Non-Forest Service	*Project will enhance aquatic habitat in Teanaway waterways.*
Timber Sales	Non-Forest Service	*Projects will generate timber volume, and comply with all State Forestry Practices Act requirements to minimize environmental effects. Projects will comply with all Federal and State laws.*
Mining Projects	Non-Forest Service	*Projects will comply with all State environmental laws.*
Forest Management Plan	Non-Forest Service	*Project will set guidance to meet environmental restoration goals on DNR land*.
Noxious Weed/Invasive Species Control	Non-Forest Service	*Projects will help control noxious weed and invasive species populations.*
Wildlife and Fish Projects	Non-Forest Service	*Projects will improve wildlife and fish populations and habitat*
Range and Livestock Management	Non-Forest Service	*Projects will manage rangeland and livestock to meet all State environmental laws.*
Yakima Basin Integrated Water Resource Management Plan.	Non-Forest Service	*Projects are a comprehensive approach to water resources and ecosystem restoration improvements. The plan was developed to address a variety of water resource and ecosystem problems affecting fish passage and habitat and agricultural, municipal, and domestic water supplies.*
Various vegetation management, timber harvest, road construction and other projects.	Non-Forest Service	*Landowners submit projects to the Department of Natural Resources on a regular basis. The DNR reviews the project to ensure they comply with the Forest Practices Act, which ensures that all projects will meet environmental requirements, including complying with all federal and state laws, such as the Clean Water Act, Endangered Species Act, and Clean Air Act, to name a few.*

Assumptions

Predicting effects on or from changes in recreational uses is an uncertain science, since it relies in great part upon user preferences and choices. It is not known nor is there data to predict whether the overall amount of OHV use, either locally, regionally, or nationally would be reduced as a result of changes in conditions of cross-country travel (from people being displaced or discontinuing use of an OHV) or if current use would be concentrated into the smaller areas as a result of changed conditions of use. It is

also uncertain how fuel prices could affect this use into the future. If the overall use is reduced, the magnitude of the reduction is not known nor is it known where these reductions might occur.

Attempting to quantify how changes in the conditions of motor vehicle uses may affect natural resources is also inherently unpredictable. Therefore, several key common assumptions and data sets were used to guide and frame the analysis of environmental consequences. These are briefly described below. Additional relevant resource-specific assumptions, data, and/or methodology used for the analysis may be included or referenced under appropriate resource analyses. Management direction related to resources analyzed in this EA is incorporated by reference.

General Assumptions

- The acreage open to cross-country travel and motorized access for dispersed camping was used as a relative indicator for potential impacts from forest users that could affect all natural resources and habitats.

- Approximately 2.6 million acres of the Forest are currently open to motor vehicle travel. Roughly 675,000 acres of the Forest that is currently within land allocations open to motor vehicle travel are accessible to off-highway vehicles based on slope and percent canopy cover.[1]

- The existing level of use of National Forest System roads and trails is part of the current condition, and therefore will not constitute a new effect.

- The 350 miles of road being proposed to open to WATVs are currently open, National Forest System roads receiving consistent motorized vehicle traffic. Allowing WATVs on these roads will result in a slight increase in motorized vehicle traffic.

- It is assumed that resource improvement will occur over a portion of the area due to the prohibition on cross-country travel and the changed conditions for motorized access for dispersed camping, but that resources could continue to be affected by motorized access for dispersed camping within 300 feet of open roads, but not closer than 100 feet to water, as well as the actual dispersed camping activities themselves.

- There are no proposals in this EA to designate any new roads or trails that are not currently designated as a National Forest system road, trail or area. As such, it is assumed that there will be no additional adverse effects to resources (wildlife, vegetation, fisheries, soil, range, etc.) associated with roads, trails, or areas as a result of implementation of Alternatives B, C, or D.

- All maintenance level 1 roads are assumed to be receiving some motorized use. There are approximately 2,557 miles of maintenance level 1 roads on the Forest. The definition of a maintenance level 1 road comes from the Forest Service Handbook (FSH) 7709.59:

  LEVEL 1. These are roads that have been placed in storage between intermittent uses. The period of storage must exceed 1 year. Basic custodial maintenance is

[1] This acreage is an estimate which includes Forest Service land that is open to motor vehicles has a slope 40 percent and has a canopy cover less than or equal to 50 percent.

performed to prevent damage to adjacent resources and to perpetuate the road for future resource management needs. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate" all traffic. These roads are not shown on motor vehicle use maps.

Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic but may be available and suitable for nonmotorized uses.

Before a road is placed in this category a decision is made to determine that there are future needs for the road but no access needs for at least one year. Typically, the entrance to the road is physically blocked with an earthen berm, rocks, vegetation or other methods to help eliminate vehicular use. Basic custodial maintenance is performed as necessary to prevent damage to adjacent resources.

The Okanogan and Wenatchee NFs, however, have managed maintenance level 1 roads somewhat differently from each other. The Okanogan Forest Plan states that "Areas, roads, and trails shall be designated open, closed, or restricted to motorized use to conform with management goals" and that "These designations shall be displayed in the Forest Travel Plan" (Standards and Guidelines, 17-3, pp4-50). The Okanogan NF Travel Plan (Oka-Wen NF 2005) states that:

If your OHV is not licensed, it may be used only on roads that are blocked with rocks, trees or earthern barriers and not open for passenger cars or trucks.

Because of this direction, all maintenance level 1 roads on the Methow Valley and Tonasket Ranger Districts are considered open for OHVs, unless specifically closed with a Code of Federal Regulations (CFR) legal order (36 CFR 261.54), or if they fall within an area closed to motorized vehicles.

The Wenatchee Forest Plan does not specifically address motorized use on closed roads. Management of these roads assumes they are closed to vehicular traffic. However, enforcement to eliminate traffic is neither feasible nor intended and, because cross country travel is not prohibited, some closed roads receive vehicular use to the extent that they are physically accessible. In order to prohibit traffic use on a road a CFR legal order must be approved, posted and enforced. Only a limited number of maintenance level 1 roads on the Chelan, Entiat, Wenatchee River, Cle Elum, and Naches Ranger Districts are officially closed with a CFR.

While vehicular use is not prohibited on maintenance level 1 roads under either Forest plan (unless posted as stated above), not all of them actually receive use. Many are overgrown with vegetation; some are difficult to access or have no attraction for vehicle operators. There is currently no inventory of which maintenance level 1 roads actually receive vehicular use.

- A reduction in the number of available motorized trail miles and motorized access to dispersed recreation may concentrate use on those routes remaining open to motorized use. The planning team does not have adequate information to quantify potential future impacts site-specifically, so that potential future use is only discussed qualitatively.

Dispersed Camping

Summaries and reliable comprehensive inventory data about exact numbers, locations, size and condition of dispersed sites across the two Forests is not currently available. An inventory of existing dispersed campsites was conducted on the forest in 2010, but it has not been repeated. The results of this inventory can only be used as a general estimate of the number and location of established sites, with comparative conclusions drawn to discuss the effects of the alternatives. Therefore, the following assumptions about the locations, size, use, and recovery rates guided the analysis of effects.

Motorized access for dispersed camping usually occurs near local attractions, especially water sources such as rivers, lakes and meadows, or in other areas associated with specific recreational activities. Field observations by Forest Service recreation specialists have found that most people that use motorized access for dispersed camping will use:

- An existing dispersed site rather than create a new one if the existing site is in a desirable area and is not occupied. New sites are more likely to be created when existing sites in desirable areas are already occupied.
- Will use what appears to be an already existing route (even if not a signed designated route) to a dispersed site rather than create a new one; and are more likely to create new unauthorized routes only if needed to access a new site or if the existing unauthorized route is impassable.

Enforcement and Compliance

Public education and enforcement of travel management regulations are assumed to be generally effective in limiting public travel to designated routes, based on compliance with other existing and past road and area closures. Though some illegal use is expected to occur, the exact location and extent cannot be predicted. The MVUM would likely be effective in decreasing motorized travel off the designated system compared to the existing system because it will help to better educate the public about where motor vehicle use is allowed and threatens a citation in response to a violation. In addition, the map would be a single resource for communicating what routes are designated to those visitors who want to recreate legally and on system routes.

Once the Motorized Travel Management Project is implemented, restrictions would be easier to enforce due to the ability to issue citations to violators of the motor vehicle use map under 36 CFR 216.13. The ability to issue citations to motor vehicle use map violators would help improve compliance with travel restrictions, which would lead to improved resource conditions.

Most users would stay on existing routes in corridors, however some violations are likely to occur. Violations of the MVUM may result in site-specific resource degradation within corridors for access to dispersed camping. The planning team does not have adequate information to identify where those violations would occur and to what extent and thus cannot quantify potential future impacts. Consequently, those potential impacts are only discussed qualitatively. The mitigation measure includes what actions would be taken if monitoring shows that environmental effects from motorized vehicles are not consistent with effects disclosed in this EA.

3.1 Recreation

REGULATORY FRAMEWORK

Relevant laws and regulations

Two Executive Orders provide direction for ORV management on National Forest System lands-President Nixon's Executive Order 11644 – *Use of Off-Road Vehicles on the Public Lands* (February 8, 1972), and President Carter's Executive Order 11989 (*Off-road Vehicles on Public Lands*-May 24, 1977). These executive orders direct that the Forest Service "develop and issue regulations and administrative instructions... to provide for administrative designation of the specific areas and trails on public lands on which the use of off-road vehicles may be permitted, and areas in which the use of off-road vehicles may not be permitted." The 2005 Travel Management Rule addressed these Executive Orders. Thus, if this action meets the 2005 Travel Management Rule, then it meets the Executive Orders. The Executive Orders will not be discussed further.

The Final Travel Management Rule was published in the Federal Register on November 9, 2005. This Rule requires that all national forests and grasslands designate roads, trails, and areas that are open to motor vehicle use on a Motor Vehicle Use Map (MVUM). Motor vehicle use off designated roads and trails and outside designated areas would then be prohibited by regulation (36 CFR 261.13). The MVUM is to be updated and published as needed, as travel planning will be an ongoing process. The rule also contains provisions for limited motor vehicle use within a specified distance of designated roads, referred to as corridors, in order to access dispersed camping [36 CFR 212.51(b)].

Forest Plan Direction

The Okanogan and Wenatchee National Forests were combined around the year 2000, roughly 10 years after each forest published its Land and Resource Management Plan. The Methow Valley and Tonasket Ranger Districts were on the Okanogan National Forest, while the Chelan, Entiat, Wenatchee River, Cle Elum, and Naches Ranger Districts were on the Wenatchee.

The Okanogan National Forest and Wenatchee National Forest Land and Resource Management Plans (Forest Plans) provide management direction for recreation and access and travel management. Goals of both the Okanogan and Wenatchee Forest Plans include providing a broad spectrum of recreation opportunities and providing a safe road and trail system that protects wildlife, soil, and water resources.

Under the Wenatchee Forest Plan (USFS, 1990), the Forest is managed as open to motor vehicles year round unless closed by Forest order. The Okanogan Travel Plan is displayed on the Travel Plan Map (USFS, 2005), which also displays temporary exceptions or restrictions under 36 CFR section 261.50, and identifies specific areas where seasonal and other restrictions for motorized use are in place for resource protection. As identified on the Travel Plan Map, cross-country motor vehicle travel is

seasonally prohibited in some areas and many roads and trails are subject to travel restrictions for wildlife protection, non-motorized hunting experiences, or for winter recreation such as snowmobiling or cross-country skiing. The Okanogan Travel Plan Map also states "Where off-route travel is prohibited, direct access to temporary campsites within 300 feet of designated routes is permitted". Otherwise the travel plan shows areas as open for motorized use. Temporary exceptions to motorized vehicle closures and restrictions are posted at the appropriate Ranger District office and at the restricted area, road or trail.

The Okanogan and Wenatchee Forest Plans both recognize that motorized and non-motorized forms of recreation will likely increase in the future, along with the likelihood of conflicts between users (USFS, 1990, p. IV-5; USFS 1989, p. 3-17). The Okanogan Forest Plan designated relatively few motorized trails on the Okanogan portion of the Forest, and most trails that lead to designated wilderness are closed to motorized use (USFS, 1989, p. 3-17).

Relevant Forest-wide Okanogan Forest Plan standards and guidelines for travel management in relation to recreation include the following (USFS, 1989):

- 8-1: Recreation and trail opportunities for a variety of recreation activities, including winter recreation activities, shall be provided consistent with the goals and recreation opportunity setting of the management area (USFS 1989, p. 4-38).
- 8-7: Off road vehicle opportunities shall be provided consistent with the goals of the Management Area (USFS 1989, p. 4-38).
- 8-8: Off-road vehicle opportunities shall be designed to minimized damage to soil, water, vegetation, and other resources, to minimize disturbance to wildlife or habitat, and to minimize conflict with other recreation uses (USFS 1989, p. 4-38).
- 17-3: Areas, roads, and trails shall be designated open, closed, or restricted to motorized use to conform to management goals. These designations shall be displayed in the Forest Travel Plan (p. 4-38).

The Wenatchee Forest Plan has no relevant standards and guidelines that apply to this analysis or project.

Forest Service Policy

FSM 7716.1 –Content of Designations

- A designation of a road or trail includes all terminal facilities, trailheads, parking lots, and turnouts associated with the road or trail. The designation also includes parking a motor vehicle on the side of the road when it is safe to do so without causing damage to National Forest System resources or facilities, unless prohibited by state law, a traffic sign, or an order (36 CFR 261.54). Road designations must specify either that they include parking within one vehicle length, or within a specified distance of up to 30 feet, from the edge of the road surface.
- A designation of a trail includes the width of the trail and, to promote public safety, the distance necessary to allow other users to pass where it is safe to do so without causing damage to National Forest System resources or facilities.
- Designations that include limited use of motor vehicles within a specified distance from certain forest roads and forest trails for dispersed camping or big game retrieval must specify the

distance, the vehicle class, the time of year the use is permitted, if appropriate, and any other conditions on use.

FSM 2353.02- Objectives

- Provide trail-related recreation opportunities that serve public needs and that meet land management and recreation policy objectives.
- Provide trail-related recreation opportunities that emphasize the natural setting of National Forest System lands and that are consistent with land capability.
- Provide trail access for management and protection of National Forest System lands.

TERMINOLOGY USED THROUGHOUT THIS REPORT

Term	Definition
Off-highway vehicle (OHV)	Any motor vehicle designed for or capable of traveling cross-country on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain, including 4x4s (OHVs > than 50 inches wide), ATVs (OHVs < 50 inches wide) and motorcycles.
Full size vehicle	Highway legal vehicles and OHVs greater than 50 inches wide.
Route	A general term used to denote any roads and trails open to motorized and non-motorized use, including roads open only to full size vehicles, motorized mixed use (MMU) roads, unauthorized access routes to dispersed campsites, roads for use by OHVs, and trails. Routes may be either designated or not designated for motor vehicle use
Highway legal vehicle	Vehicles primarily operated on roadways publicly maintained by the Department of Transportation or any county or city with funding from the motor vehicle fund. Vehicles meet all applicable state laws for safety and operations.
Non-highway legal vehicle	Vehicles primarily for use on high clearance roads or trails that are not legal on publicly maintained roadways as they do not meet state laws for safety and operation.
Maintenance level	The level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria.
Wheeled All-Terrain Vehicle (WATV)	In July 2013, Washington enacted a law requiring license plates on All Terrain Vehicles, House Bill 1632 (HB1632). The bill created a new class of recreational vehicle (a wheeled all-terrain vehicle, or WATV): *A motorized, non-highway vehicle with handle bars that is 50 inches or less in width; has a seat height of at least 20 inches; weighs less than 1,500 pounds; has 4 tires with diameters of 30 inches or less, or,* *A utility-type vehicle designed for, and capable of, travel over designated roads that has 4 or more low-pressure tires of 20 psi or less; is less than 74 inches wide; Weighs less than 2,000 pounds; has a wheelbase of 110 inches or less; meets 1 or more of the following: is at least 50 inches wide; weighs at least 900 pounds; has a wheelbase of over 61 inches*

4x4 Trail	Also called a Jeep Trail, intended for use by jeep-like vehicles. Generally also open to hikers, horseback riders, bikes, motorcycles, and OHVs. Not all trails will be suitable for all methods of travel.
ATV Trail	Trails intended for use by OHVs less than 50 inches wide. Generally also open to hikers, horseback riders, bikes, and motorcycles. Not all trails will be suitable for all methods of travel.
Single-Tracked Trail	Also called motorcycle trails. Also open to hikers, horse, and bikes. Treads are too narrow for jeep-like vehicles or ATVs

It is important to note that the term OHV does not necessarily denote a vehicle traveling cross-country, or off system routes. Cross-country (or off-road or off-trail travel) will be specified whenever described in this report.

EXISTING CONDITION

The Okanogan-Wenatchee National Forest offers a wide range of recreation opportunities from primitive and remote settings to more developed settings. The Forest receives a wide variety of visitors. Many are local residents, but well-traveled routes like Interstate 90 over Snoqualmie Pass, Highway 20 over Washington Pass (North Cascades Scenic Highway), Highway 2 over Steven's Pass, Highway 12 over White Pass, and Highway 410 over Chinook Pass also provide residents from the west side of the Cascade Range with easy access to the dry and sunny east-side climate of the Forest. Visitors also come from other portions of the Pacific Northwest, or other regions of the country. The Forest also receives international visitors, drawn by the beautiful scenery and recreation opportunities. The Forest is important for the abundance of backcountry recreation opportunities for both motorized and non-motorized visitors. Approximately 36 percent (1.5 million acres) of the Forest is located within designated wilderness, and another 26 percent (1.1 million acres) is within inventoried roadless and potential wilderness areas, providing numerous opportunities for those seeking backcountry, dispersed recreation settings. The Forest is known as a statewide destination for motorized recreationists seeking large and challenging motorized trail systems.

More than 150 developed campgrounds and picnic sites, nearly 180 developed trailheads, six historic Forest Service guard stations available for rent, and numerous boating sites and horse camps are also available for visitors. In 2009 districts inventoried an estimated 1,855 dispersed campsites across the forest. Dispersed camping is popular, especially along routes adjacent to the many streams and rivers located across the Forest, and many sites are used for hunting camps and large group gatherings. The Forest also administers special use permits for 682 recreation residences, mostly concentrated on the southern portion of the Forest.

Numerous water bodies, ranging from small, alpine tarns to large lakes and rivers, attract visitors for camping, boating, fishing, and wildlife viewing. Eighteen rivers on the Forest have been found eligible

for Wild and Scenic River designation. None of the rivers on the forest have been congressionally designated as Wild, Scenic or Recreational Rivers.

Although this project does not address winter use, snowmobiling, cross-country skiing, backcountry skiing, snowshoeing, downhill skiing, snowboarding, snow camping, and snow play are all popular recreation activities on the Forest.

Current Okanogan-Wenatchee National Forest Recreation Use

The National Visitor Use Monitoring (NVUM) study has been conducted every 5 years on the Forest beginning in 2000. The most recent survey was completed between October 2009 and September 2010 (USFS 2010). The information from the most recent study is summarized below. For a complete description of methodology, background, summary data from other Forests and national statistics, visit the NVUM website at: www.fs.fed.us/recreation/programs/nvum.

Visitor activity participation is a good indicator of the types of recreation opportunities and settings in current demand by recreation visitors. Survey respondents were presented with a list of 27 recreation activities and asked to pick all those they had participated in during their current national forest visit. A national forest visit is defined as the entry of one person upon the Forest to participate in recreation activities for an unspecified period. Survey respondents could select multiple activities per visit, so the total activity participation column may total more than 100 percent.

Survey respondents were also asked to select just one of their activities as their primary activity during their national forest visit. For example, a visitor may have engaged in both primitive camping and fishing during their visit to the Forest, but that visitor's main reason for coming to the forest was to camp.

Table 3.1-1 displays the most popular activities and the primary activity participated in during the visit to the Forest. Recreation use participation for certain activities may have been affected by wildfire closures, temporary road closures and other factors that could affect a one-year survey of actual recreation use.

Table 3.1-1–Land-based activity participation on the Okanogan-Wenatchee National Forest (USFS 2010)

Activity	Total estimated activity participation (percent)**	Total number of participants	Reported as primary activity (percent)
Hiking / walking	44.0	601,920	13.3
Viewing natural features	39.4	538,992	9.9
Relaxing	31.4	429,552	6.1
Viewing wildlife	30.5	417,240	1.4
Driving for pleasure	25.7	351,576	5.1
Downhill skiing	15.6	213,408	14.4
Developed camping	14.6	199,728	8.3
Fishing	12.8	175,104	5.2
Cross-country skiing	11.5	157,320	9.5
Picnicking	10.6	145,008	0.3
Gathering forest products	10.2	139,536	6.2
Nature study	6.0	82,080	0.0
Primitive camping	5.5	75,240	3.1
Motorized trail activity	4.4	60,192	2.5
Resort use	4.3	58,824	1.7
Hunting	4.2	57,456	4.2
Some other activity	3.2	43,776	2.0
Other non-motorized	3.0	41,040	1.3
Bicycling	2.4	32,832	0.8
Backpacking	2.1	28,728	1.1
OHV Use	2.0	27,360	0.9
Nature center activities	1.6	21,888	0.3
Visiting historic sites	1.5	20,520	0.0
Snowmobiling	1.5	20,520	1.4
Horseback riding	1.3	17,784	1.3
Other motorized activity	0.1	1,368	0.0
TOTAL ESTIMATED VISITS		**1,368,000**	

*The 90 percent confidence interval width was plus or minus 15 percent for this sample.

**Survey respondents could select multiple activities so this column totals more than 100 percent.

As displayed in the top five recreation activities for the Forest, in terms of total number of participants, were hiking/walking, viewing natural features, relaxing, viewing wildlife, and driving for pleasure (USFS 2010). The top three non-winter based primary activities are hiking/walking (13.3 percent), viewing natural features (9.9 percent), and developed camping (8.3 percent).

The 2010 NVUM data suggests OHV use makes up a smaller proportion of total recreation use within the project area as compared to non-motorized recreational activities. An estimated 32 percent of visitors (440,496 individuals) to the Forest chose to engage in motorized use (including driving for pleasure, OHV use, motorized trail use and other motorized activities) during their visit, while approximately 53 percent of visitors (722,304 individuals) engaged in non-motorized activities while on the Forest (which

includes backpacking, hiking/walking, horseback riding, bicycling, and other non-motorized activities). Almost all of these recreationists arrive by motorized vehicle.

Only 9 percent of respondents reported motorized use as their primary activity (driving for pleasure accounted for 5 percent of the total), as compared to 18 percent who primarily engaged in non-motorized activities (hiking/walking accounted for 13 percent of the total).

This data shows that, overall, the forest receives approximately twice as many visitors who engage in non-motorized recreation activities than those who choose motorized recreation activities. It is important to note that District recreation managers observe OHV use as a primary activity is likely higher than reported in the NVUM study, particularly on the Methow Valley and Tonasket districts, due in large part to study design. For example, 2010 NVUM data showed 0 percent participation in OHV use as a primary activity on these districts, and 1.1 percent primary participation on the remaining districts. These figures appear low since the motorcycle trails in the Sawtooth Backcountry on the Methow and Chelan Districts, and the ATV and motorcycle routes west of the town of Conconully in the Granite Mountain trail system are known to be destinations with consistent OHV use. It appears that the study design missed this use. Likewise, the trail systems on the Cle Elum and Naches districts, and the extensive Devils Backbone/Mad River/Lower Chiwawa and Devils Gulch motorcycle trail systems near Entiat and Leavenworth are popular destinations for motorized recreationists.

National and Regional Recreation Trends

The 2010 NVUM recreation participation data for the Forest displayed in Table 1 represent one year of recreation use data on both portions of the Forest. To gain a more complete picture of recreation participation rates and trends, this next section summarizes national and regional recreation participation data.

As illustrated in Table 3.1-2, participation rates for many outdoor recreational activities popular on National Forest System lands have been increasing since the early 1980s. Even with participation rates that are relatively stable through time, the number of participants will increase due to population growth. For example, though roughly 12 percent of the population has participated in hunting since 1982, the activity gained nearly 6 million participants over that time due to the increase in population.

Table 3.1-2–National recreation participation trends 1982-2009 (Cordell, May 2009)

Activity	1982-1983		2005-2009		Trend	
	Percent Population Participating	Total Participants (millions)	Percent Population Participating	Total Participants (millions)	Percent Change in number of participants 1982-1983 to 2005-2009	Change in No. of Participants (millions)
View/ photograph birds	12.0	20.8	35.0	80.5	287.0	59.7
Day hiking	14.0	24.3	33.0	75.3	210.0	51.0
Backpacking	5.0	8.7	10.0	22.7	161.0	14.0
Drive off-road	11.0	19.1	20.0	46.2	142.0	27.1
Primitive camping	10.0	17.3	14.0	32.8	90.0	15.5
Developed camping	17.0	29.5	24.0	55.7	89.0	26.2
Horseback riding	9.0	15.6	10.0	22.4	44.0	6.8
Picnicking	48.0	83.3	51.0	117.5	41.0	34.2
Driving for pleasure	48.0	83.3	49.0	112.7	35.0	29.4
Fishing	34.0	59.0	34.0	78.0	32.0	19.0
Hunting	12.0	20.8	12.0	26.6	28.0	5.8

Note: This table shows the percentage as well as the total number of the U.S. population 16 or older who participated in a given activity at least once within the 12 months preceding the survey date. While the NSRE does not distinguish recreation activities by land type (private, state or federal), all of the activities in this table are popular on National Forest System lands.

Recreation participation in the Pacific Coast region (which includes California, Alaska, Washington and Oregon) is comparable to the rest of the nation, with the exception of primitive camping and backpacking, which are notably more popular in this region (Cordell, 2008b).

According to Cordell (2009), driving off-road vehicles was one of the fastest growing non-winter, land-based recreational activities from 1982 to 2009, growing 142 percent during that time period. Only two activities, viewing and photographing birds (287 percent growth) and day hiking (+210 percent) gained more participants over that time period. Backpacking (+161 percent), primitive camping (+90 percent) and developed camping (+89 percent) were also among the fastest growing activities. Given the strong growth in OHV use since the early 1980s, it is reasonable to assume continued growth in OHV participation rates in the future.

A study completed in June 2008 by the Washington State Recreation and Conservation Office (RCO), indicates similar participation rates based solely on Washington survey data gathered as part of the State's Comprehensive Outdoor Recreation Planning document (SCORP) (WA RCO, 2008). In this survey, walking/hiking, wildlife watching, bicycle riding, nature photography, ORV use, camping, and hunting were among the top twenty most frequent recreation activities noted. It is important to note that, like Cordell's National Survey on Recreation and the Environment, this study does not differentiate between

different land types (state, federal or private); however, all of the listed activities are popular on National Forest System land.

The RCO has completed similar surveys about every 10 years since the late 1960s, using roughly the same methodology of telephone surveys with mail follow-up (IAC, 2003). Based on three recreation participation surveys completed in 1979, 1989 and 1999, RCO concluded that overall participation in recreation activities, including the total numbers of people fishing and camping, appeared to be declining over the 20-year period, but ORV and equestrian activities appeared to be stable (IAC, 2003).

This downward participation trend is in contrast to the results from the past 10-year survey period from 1999 to 2007, which shows a short-term increase in participation rates for all activities listed in Table 3.1-3. Because the 1999-2000 results are from a diary-based statewide panel and the 2007 results are from a telephone survey, the results must be compared with some caution and viewed as indicators of change rather than as an actual trend.

Table 3.1-3–Washington State participation rates* (IAC, 2002 and WA RCO, 2008)

	1999 Survey Results		2007 Survey Results	
Activity	**Percent residents participating**	**Total number participants (millions)**	**Percent residents participating**	**Total number participants (millions)**
Walking/hiking	53.0	3.10	74.0	4.80
Nature activities**	43.0	2.50	54.0	3.50
Picnicking	20.0	1.20	47.0	3.10
Sightseeing	23.0	1.30	35.0	2.30
Bicycle riding	21.0	1.20	31.0	2.00
Off-road vehicle riding	9.0	0.52	18.0	1.20
Camping	13.0	0.75	17.0	1.10
Fishing	13.0	0.75	15.0	0.98
Hunting/shooting	6.0	0.35	7.0	0.46
Equestrian activities	3.0	0.17	4.0	0.26

* 1999 WA state population approximately 5.8 million; 2007 WA state population approximately 6.5 million (Office of Financial Management, 2010)

** Nature based activities include outdoor photography, observing wildlife and fish, whale watching, gathering plants or food, gardening, gathering firewood and cutting holiday trees.

As displayed in Table 3.1-4, the participation rate of OHV use (listed as off-road vehicle driving in the table) in Washington State appears to have doubled from 9 percent in 1999 to 18 percent in 2007. During that same time period, walking/hiking and picnicking also saw considerable growth (greater than 20 percent), and hunting, fishing and equestrian activities saw very little growth. As with the NSRE data, it is important to note that even stable participation rates result in an increased number of participants due to population growth in Washington State.

In 2003, the RCO completed a report that projected participation rates of nature-based activities in Washington State over a 10-year and 20-year period based on participation data from the 1999-2000 RCO survey (IAC 2003). These projections, shown in Table 3.1-4, took into account NSRE data and projections for the Pacific Northwest Region, demographic trends in Washington State, the local supply of lands available for recreation activities, and other factors.

Table 3.1-4–RCO recreation participation projections as a percent of change in the number of people participating in the future compared to 1999-2000 survey results (IAC 2003)

Activity	Projected percent growth in number of participants (2000-2020)
Nature activities	+37
Picnicking	+31
Bicycle riding	+29
Camping-developed (RV style)	+20
Hiking	+20
Off-road vehicle driving	+20
Camping- backpacking	+8
Equestrian	+8
Hunting/shooting	-21
Camping-primitive dispersed	No estimate available*

*IAC estimates a slow growth in primitive camping due to increasing management controls to minimize or address resource concerns which would result in some loss of opportunity. IAC projects 5 percent growth over a 10-year period, but could not make a prediction over a 20-year period due to a high level of uncertainty.

According to these projections, all activities common on National Forest System land are expected to increase in number of participants except hunting/shooting, which is expected to decrease 21 percent. The differences in participation rates and projected percentage increase in participation rates between the Cordell data and the IAC projections can be explained in part by differences in study design; however, the data from both sources show increasing participation rates for all activities except hunting.

The data suggests the demand for summer activities that favor non-motorized settings will be heaviest in the future, most notably for day hiking. Other non-motorized activities like horseback riding, biking, and backpacking are expected to increase, as well, though the overall numbers of participants in each activity will be relatively low as compared to day hikers.

At the same time, there will likely be an increasing demand for OHV use within motorized settings. The total number of motorized recreationists will still be relatively low as compared to other non-motorized recreation activities; but motor vehicle use takes up proportionately more space due to the ability to travel long distances. In addition, the noise associated with motor vehicle use can disproportionately have a negative effect on other nearby users seeking non-motorized recreation settings because noise of OHVs can travel great distances (see noise analysis of alternatives in this report). The Forest can expect more demand for the motorized trail systems in the future. Trail systems on the southern end of the forest, especially the Taneum-Manastash and Little Naches system, will likely receive the most

pressure due to the close proximity to the highly populated Greater Seattle area. The Devils Gulch and Mad River trail systems near Wenatchee and Entiat may also become more crowded due to increasing use.

As the population of the Greater Seattle area and other nearby population centers increases, visitation to the Forest for all types of recreational activities is also likely to increase, even if participation rates are stable, as the demand for outdoor recreation is strongly correlated to population growth (Hall 2009)[2]. Increasing numbers of recreationists on a finite land base is likely to lead to increasing conflicts in social values, especially between motorized and non-motorized users.

Hunting is the only activity expected to decrease over the coming decades. Though the decrease in hunting participation may reduce pressure on dispersed sites commonly used during the hunting season, it is likely that dispersed sites, particularly the most desirable sites adjacent to water, will be more heavily used in the future due to expected increases in all other activities, including primitive camping and picnicking.

Summary of Current Road and Trail Opportunities

Tables 2 and 3 display the available motorized road and trail opportunities within the project area.

Table 3.1-5– Miles of Forest Service roads by maintenance level[3] and mixed use designation within the project area

Category	Project area miles
Total miles National Forest System road open to highway legal vehicles (maintenance levels 2-5)	5,366
Total miles of maintenance level 1 roads	2,557
National Forest System motorized mixed use road (open to highway legal vehicles and OHVs <50 inches wide)	125
National Forest System motorized mixed use road motorcycle only (open to highway legal vehicles and motorcycle only)	23

[2] The Greater Seattle Area is predicted to grow by more than 1.2 million residents by 2030 (40 percent growth), and Washington state's population is predicted to grow by 2.6 million people (44 percent growth) during that same time frame (Office of Financial Management, 2007). The populations of Yakima, Kittitas, Chelan, Douglas and Okanogan Counties are also expected to increase by nearly 150,000 residents (37 percent growth) by the year 2030 (Office of Financial Management, 2007).

[3] Definitions of road maintenance levels, from FSH 7709.58, 10, 12.3:
Maintenance Level 1: assigned to intermittent service roads during the time they are closed to vehicular traffic.
Maintenance Level 2: roads open for use by high-clearance vehicles.
Maintenance Level 3: roads open and maintained for travel by prudent drivers in a standard passenger car. User comfort and convenience are low priorities.
Maintenance Level 4: roads that provide a moderate degree of user comfort and convenience at moderate travel speeds.
Maintenance Level 5: roads that provide a high degree of user comfort and convenience.

Table 1.1-6–Miles of Forest Service System Motorized Trail by Vehicle Designation Within the Project Area.

Trail type	Uses generally allowed	Uses generally prohibited	Project area miles
4x4 >50 inches	All uses	--	243
ATV ≤50 inches	ATV, motorcycle, bicycle, pack and saddle, hiker/pedestrian	Jeep	20
Motorcycle	Motorcycle, bicycle, pack and saddle, hiker/pedestrian	Jeep, ATV	735
Total summer motorized trail miles			998

*While the trail type denotes the primary activity for which the trail is actively maintained and managed, it is important to note that the designated trail type does not necessarily exclude other uses. For example, pack and saddle trails are open to hikers, and ATV trails are generally open to motorcycles. All motorized trails are open to non-motorized users. ATVs are allowed to use 4x4 trails; however, a number of 4x4 trails are not actually passable by ATVs due to the different sized wheelbase of the vehicles and the challenging terrain of many 4x4 trails.

Approximately 5,366 miles of National Forest System roads (maintenance levels 2 through 5) and 998 miles of National Forest System trails are open and managed for summer motorized use within the project area. These system roads and trails were either constructed or included in the system in the past because they met various transportation needs, both commercial and recreational, of national forest users, permit holders, contractors and managers. These roads and trails provide motor vehicle access to areas for hunting, berry picking, camping, pleasure driving, firewood removal, and to trail systems for OHV, bike, foot, and horseback use, and other activities.

There are 2,577 miles of maintenance level 1 roads on the Forest. When discussing road management, maintenance level 1 roads are closed, and therefore are considered part of cross-country motorized travel landscape. Before a road is placed in this category a decision is made to determine that there are future needs for the road but no access needs for at least one year. Typically, the entrance to the road is physically blocked with an earthen berm, rocks, vegetation or other methods to help eliminate vehicular use. Basic custodial maintenance is performed as necessary to prevent damage to adjacent resources.

The Okanogan and Wenatchee National Forests, however, have managed maintenance level 1 roads somewhat differently from each other, as discussed below. The Forest Service Handbook definition specifies that these roads are closed to vehicular (motorized) traffic.

The Okanogan Forest Plan states that “Areas, roads, and trails shall be designated open, closed, or restricted to motorized use to conform with management goals” and that “These designations shall be displayed in the Forest Travel Plan” (Standards and Guidelines, 17-3, pp. 4-50). The Okanogan National Forest Travel Plan (2005) states that:

> *If your OHV is not licensed, it may be used only on roads that are blocked with rocks, trees or earthern barriers and not open for passenger cars or trucks.*

Because of this direction, all maintenance level 1 roads on the Methow Valley and Tonasket Ranger Districts are considered open for OHVs, unless specifically closed with a Code of Federal Regulations (CFR) legal order (36 CFR 261.54), or if they fall within an area closed to motorized vehicles.

The Wenatchee Forest Plan does not specifically address motorized use on closed roads. Management of these roads assumes they are closed to vehicular traffic. However, enforcement to eliminate traffic is neither feasible nor intended and, because cross country travel is not prohibited, some closed roads receive vehicular use to the extent that they are physically accessible. In order to prohibit traffic use on a road a CFR legal order must be approved, posted and enforced. Only a limited number of maintenance level 1 roads on the Chelan, Entiat, Wenatchee River, Cle Elum, and Naches Ranger Districts are officially closed with a CFR.

Since there is currently no prohibition on cross-country motor vehicle travel (outside areas specifically closed by the forest plans to motorized cross country travel), there is the potential to drive motorized vehicles on the 2,577 miles of maintenance level 1 roads using OHVs. When maintenance level 1 roads are closed, they are placed into long-term storage for a variety of resource related reasons, but not typically with the intention of creating recreational motorized opportunities. It is likely that many of these maintenance level 1 roads are now partially or fully blocked by vegetation and therefore not providing an OHV recreation opportunity. For those maintenance level 1 roads that are still passable, some provide a more remote, backcountry experience than motorized mixed use roads since they are closed to full-size vehicles. These roads do not provide the same recreation opportunity as a trail designed specifically for ATV or motorcycle use. Since these roads are generally wider and flatter than designed OHV trails, they provide opportunities for beginner riders or those seeking a less challenging riding experience, but would likely not meet the needs of skilled OHV users looking for a challenging and varied riding experience.

The Forest additionally manages approximately 148 miles of motorized mixed use roads, which allow concurrent use of a road by highway legal vehicles (such as a standard passenger vehicle) and non-highway legal vehicles (such as ATVs and motorcycles). These roads are typically maintenance level 2 or 3 roads, characterized by a dirt or gravel surface, slower vehicle speeds and may have lower use levels than roads with higher maintenance levels. These roads typically provide for OHV access to allow links between motorized recreation opportunities on adjoining state and county lands, or between segments of motorized trails where road travel is needed as a connection. However on Tonasket Ranger District, these motorized mixed use roads provide an important recreation opportunity for ATV users in particular.

The Forest manages 998 miles of motorized trails, the majority of which are located on the southern portion of the Forest in large, interconnected motorcycle and 4x4 trail systems. Visitors from the heavily populated greater Seattle area seeking the dry east-side climate gain quick access to this portion of the Forest via Interstate 90, Highway 12 and Highway 410 and dispersed sites and trailheads are at capacity on weekends at the most popular sites. The trails on the northern portion of the forest, being farther

from Seattle, generally receive less use. While there are several other important OHV trail systems in the state, primarily on state Department of Natural Resource lands, the Okanogan-Wenatchee National Forest provides by far the single largest venue in the state. There are other large OHV trail systems elsewhere in the nation, but the un-roaded single-track motorcycle systems available in several locations on the Okanogan-Wenatchee are unique at a national scale. There are isolated conflicts between non-motorized and motorized recreationists on these trails, however the abundant availability of non-motorized trails across the forest provide help separate the user groups, minimizing conflicts.

Funny Rocks (9.93 acres) and Moon Rocks (23.37 acres) Rock Crawl destinations are two very popular motorized sites that are located on the Naches Ranger District in the Bald Mountain area of Manastash Ridge. Part of this location came into National Forest management through a land acquisition from Burlington Northern Railroad in 1986. They are located along Trail 4W694 (Summit Trail) on the border between the Cle Elum and Naches Ranger Districts. The Forest Service has managed these as rock crawl destinations since the land was acquired, monitoring use and occasionally issuing special use permits for recreation events. It is not unusual to see a dozen vehicles on either rock formation at one time. On sunny snow-free weekend days as many as 75 to 100 vehicles will visit these sites per day. These formations are popular with both 4X4 vehicles and motorcycle trials bikes. Enthusiasts come from all over the Pacific Northwest to experience these unique areas.

Cross-country Travel and Unauthorized Routes

Cross-country motorized travel typically leads to creation of unauthorized routes. An unauthorized route is a road or trail that is not a National Forest System road or trail or a temporary road or trail and that is not included in a forest transportation atlas (36 CFR 212.1). Any trail or route created without the authorization by the Forest Service following NEPA analysis is considered unauthorized. While it is illegal to create unauthorized roads or trails (36 CFR 261.10A) or cause resource damage (36 CFR 261.9A), the use of unauthorized routes is currently legal unless the routes cross areas closed to motorized use. Advances in recreational vehicle technology have increased the ability of OHVs to travel on steeper grades and over rougher terrain, leading to an ever-increasing development of unauthorized routes created by users, particularly by ATV and motorcycle riders. These routes generally take the shortest or most direct route from one point to another and often fail to meet Forest Service trail construction standards because they are steep, erosive, and do not adequately provide for visitor safety or protection of resources.

It is virtually impossible for a rider to distinguish an authorized, Forest Service system trail from an unauthorized route. Many system trails are signed, but not all, and popular unauthorized routes typically look very similar to system trails. Current Forest Service maps and publications show only system trails, but many privately authored maps and guide books include unauthorized routes. Riders typically use a combination of authorized system trails, and unauthorized routes on a regular basis. The limited number of available law enforcement officers and field-going personnel limits the Forest Service's ability to close unauthorized trails as they are developed and to issue citations to individuals creating the routes or causing resource damage.

Currently, the Forest is managed as "open" to motorized use except where expressly prohibited by Forest order or under the Okanogan National Forest Travel Plan. In areas where cross-country travel is not expressly prohibited, such travel is permitted as long as it does not result in resource damage. Across the Forest, motor vehicle use, particularly ATV and motorcycle use, is expanding where terrain allows and resource damage is evident in some areas, particularly on the more heavily used southern portion of the Forest. Approximately 2.6 million acres are legally open for motorized use, that is, located outside of designated wilderness areas and management areas managed for semi-primitive non-motorized recreation opportunities; however, approximately 675,000 acres of the forest are potentially available for cross-country travel when taking into account steepness of terrain and vegetation cover. It is estimated that motorized vehicles generally would not travel on slopes greater than 40 percent and through vegetation that is closed in more than 50 percent.

Informal monitoring by district personnel indicates there are several locations within the project area where cross-country motorized travel and construction of unauthorized routes is occurring at an increasing level. Some of these locations are listed below, but it should be noted that these issues occur across the forest:

- Cle Elum Ranger District: Swauk, Taneum, and Manastash areas
- Tonasket Ranger District: Crawfish Lake/Lost Creek area
- Wenatchee River Ranger District: Derby Canyon, Chumstick and Natapoc areas
- Naches Ranger District: Nile Creek valley
- Methow Valley Ranger District: Sawtooth Backcountry and North Summit areas

There is ongoing conflict between motorized and non-motorized recreationists because of motorized cross-country travel. Many comments were received from non-motorized recreationists during the scoping process for this travel management analysis expressing concern about the impact motorized recreationists have on their non-motorized recreation experiences on the 2.6 million acres currently open to motorized cross-country travel, and the 675,000 acres where it is likely concentrated. People stated that the noise of the engines, the dust created by the vehicles, and the impacts to soil, vegetation, and wildlife all decreased their desired recreation experience.

Motorized Access for Dispersed Camping Opportunities

Many visitors prefer a more secluded and less regulated experience than offered by developed campgrounds and picnic areas, and instead seek out camping and picnicking opportunities in dispersed, or undeveloped, sites across the Forest. Many people who routinely use dispersed campsites have been returning to the same spots for many years.

Data from the 2010 National Visitor Monitoring study indicated that 6.6 percent of visitors to the Okanogan portion of the Forest and 5.2 percent of visitors to the Wenatchee portion of the Forest engaged in dispersed (primitive) camping during their visit. Big-game hunting has historically been a popular activity on the Forest during designated hunting seasons, and is often associated with camping

at dispersed sites during the fall season. Results of the 2010 NVUM study indicate that 9.7 percent of visitors to the Okanogan portion of the Forest and 2.7 percent of visitors to the Wenatchee portion of the Forest engaged in big game hunting during their Forest visit (see Table 3.1-5).

A forest-wide inventory of dispersed campsites tallied 1,855 established sites, 1,115 of which were access by an unauthorized access route, and 740 of which were considered road-side. Using a GIS analysis of the location of the 1,115 drive-in sites, 773 are within 300 feet of an open road, and at least 100 feet away from water (river, stream, or lake). The GIS analysis also showed that about three-fourths of the dispersed sites across the Forest are located within 300 feet of a system road. Therefore about one quarter of the existing sites are located further than 300 feet from a system road. People park their vehicles within 30 feet of open roads to access the roadside campsites.

The Forest is generally managed as "open" to dispersed camping, meaning camping is allowed anywhere on the Forest unless other restrictions are specifically in place. The 2005 Okanogan Travel Plan map (USFS, 2005) identifies some portions of the Forest as seasonally closed to motor vehicle use off designated routes for wildlife protection. During those closure periods, cross-country motor vehicle use is prohibited, but motor vehicle use is allowed up to 300 feet off designated routes for "direct access to temporary campsites."

Over time, motor vehicle users have created numerous unauthorized routes to access dispersed sites from existing National Forest System roads. The dispersed sites typically consist of a bare soil area where vehicles park and/or tents are set up. The majority of the dispersed campsites have been developed in areas with easy road access, flat ground, where vegetation is open enough to allow vehicle access, and almost always near a lake, stream, or river. These sites are used throughout the snow-free months, but are most popular during the summer. There are some popular dispersed campsites located in "dry" locations, tending to be higher in elevation, near prime hunting areas, and are typically only used during fall hunting seasons.

Facilities are typically not present at dispersed sites; however, user-created fire rock rings are common, and primitive toilets may be created by users as well. Permanent or temporary toilets are provided by the Forest Service at some locations within or near heavily used sites or those sites with specific resource concerns. Visitors are drawn to dispersed sites in part due to the fewer restrictions than in developed campgrounds, the ability to "circle the wagons" and camp in large groups, and because there is no fee to use these sites. Dispersed sites also tend to offer more seclusion and a buffer from the activities of others such as being able to avoid campfire smoke or loud groups.

A full range of Forest visitors use dispersed sites. It is common to see visitors with tents, camp trailers, recreational vehicles, horse trailers or trucks loaded with ATVs and motorcycles camped at these sites. Most dispersed campers prefer to have their vehicles in the campsite because they are sleeping or cooking in the vehicles (such as recreational vehicles), or they worry about security of the vehicle, so

want to have it in site. Some campers are willing to park their vehicles and carry camping gear a distance to their site.

Since the pattern of dispersed camping is largely influenced by road access, topography, vegetation, and proximity to water or prime hunting areas, dispersed campsites, and the access routes leading to them, have already been developed at the most desirable locations. Dispersed campsites are scattered across each ranger district, and many are used occasionally. Areas where campsites are not filled to capacity on a regular basis have a greater ability to absorb more use, meaning that if a visitor reaches their desired campsite and finds it full, there is a high likelihood that unoccupied campsites will be available in the general area. Some areas across the Forest have a higher density of established dispersed campsites. These areas are so popular that all established dispersed campsites are occupied on a regular basis. In these areas, there is no, or very limited likelihood that if a camper finds the desired campsite already occupied, there will be open sites in the vicinity.

New sites are occasionally developed, especially when all existing sites are occupied. In some areas, particularly on the Naches and Cle Elum districts, the boundaries of some dispersed sites have grown due to increasing and heavier use. Such growth in the number and size of dispersed sites has led to loss of vegetation, increased sedimentation in streams, and other resource damage in the vicinity of the campsites. This is especially true in the Little Naches River drainage and along the Cle Elum River.

Over the last thirty years, the Forest has implemented actions to contain motor vehicle access to dispersed campsites. In the late 1980's areas along the Icicle River on the Wenatchee River Ranger District were closed to dispersed camping and motor vehicle use adjacent to riparian areas. In the mid-1990's the Methow Valley Ranger District developed the "Respect the River" program, which targeted popular dispersed recreation sites near important fish habitat along the Chewuch River, and defined and limited motorized access route to some locations. Restoration efforts along access routes and within campsites included soil de-compaction and stream bank plantings. Rock or wood barriers were also installed to limit the size and area of disturbance at the sites, and to limit motorized vehicle access within riparian areas. This program spread across the forest and similar actions have since occurred on the Cle Elum, Naches, and Wenatchee River Ranger Districts, defining sites and decreasing motorized access to dispersed sites within riparian areas. These sites are referred to as "Improved Sites" in this analysis. A variety of other actions has occurred on the districts, and is summarized in the following table.

While these efforts have been largely effective at reducing impacts at some locations, continued use, and increases in the size and number of sites in other areas are perpetuating impacts to riparian areas and aquatic habitat. Table 3.1-7 summarizes the work done on each district.

Table 3.1-7. Actions Taken to Reduce Environmental Impacts of Dispersed Camping

Ranger District	Drainage/Watershed	Examples of Actions Taken	Results
Wenatchee River Ranger District	Icicle Drainage	Closed to dispersed camping and motorized access during the snow-free months.	Reduced vehicle impacts to riparian areas and limited recreation access.
Chelan Ranger District	Antilon Lake/Lake Chelan	Special Order #303 signed 5/8/1996. Restricts camping to designated sites and driving to existing open roads.	Curtailed off road travel and the proliferation of new dispersed campsites.
Chelan Ranger District	First Creek/Lake Chelan	Annual Special Order (2013, 2014). Prohibits camping in a portion of the First Creek drainage on FS lands on Memorial Day Weekend.	Reduced trash, human waste, high speed traffic on 1st Creek Road, and shooting on FS lands. Increased public safety.
Chelan Ranger District	Lake Chelan Watershed	Special Order #878 signed 7/25/2013. Prohibits camping and campfires in Echo Ridge Trail System.	Reduced impacts to trail based recreation from activities associated with camping (especially target shooting). Reduced trash at trailheads used for camping. Reduced potential for wildfire from unattended campfires. Increase in public safety.
Cle Elum Ranger District	Cle Elum Reservoir, Cooper River, Upper Cle Elum River Drainage, Box Canyon, Teanaway, Buck Meadows (Manastash Drainage),	In portions of all these areas, closed critical riparian areas to vehicle access. In some instances altered existing campsite's "foot print"; or designated parking spurs by placing boulders; de-compacted soils and planted vegetation. Eliminated multiple dispersed sites by entirely closing one mile length of road - surfaced ripped and debris added. Closed meadow and built developed campground to accommodate former dispersed use. Up to 30 portable rental toilets placed in highest use riparian dispersed areas during peak summer season.	Reduced vehicle impacts to riparian zones. Reduced erosion created by impacted soils. In places, restricted recreation use by closing access points. Reduced impacts caused by poor human sanitation disposal practices.

Ranger District	Drainage/Watershed	Examples of Actions Taken	Results
Entiat Ranger District	Pine Flat Campground in Mad River drainage	Removed user built camp sites along riparian zone in campground, and rehabbed area.	Reduced impacts to riparian zone vegetation and fish. Limited some recreation access.
Naches Ranger District	Little Naches, American River, Bumping, Naches Mainstem, Rattlesnake, South Fork Tieton Watersheds	Work has been completed at approximately 50 dispersed sites within these watersheds to control traffic using barriers to keep vehicles out of streams, and educate the public through signing about low impact camping activities. Sealed vault concrete toilets were placed at several locations to minimize human waste impacts. Buck and pole fencing was installed at about 15 dispersed sites within these watersheds to control vehicles and minimize impacts to stream banks and sensitive meadow/hardwood areas.	Reduced riparian impacts from vehicles to vegetation and water. Reduce sanitation impacts to riparian zones and to human health concerns. Modified motorized access for dispersed camping in some locations, but allowed access and camping to continue in these desirable areas
Methow Valley Ranger District	Chewuch Watershed	Modified approximately 50 popular dispersed campsites along the river by defining access routes, building buck and pole fences to confine camping areas-keeping them away from river's edge.	Reduced impacts to riparian zone vegetation and fish. Modified motorized access for dispersed camping in some locations, but allowed access and camping to continue in these desirable areas
Tonasket Ranger District	Krueger dispersed sites near Conconully	Closed road access and removed old toilet building, restored vegetation in dispersed campsites.	Reduced vehicle impacts and garbage dumping.

Current WATV Opportunities

Currently, WATVs are only allowed to operate where unlicensed ATVs or OHVs are permitted. The Forest allows unlicensed ATVs, and therefore WATVs, on the 125 miles of mixed use roads, 263 miles of motorized trail (designated for ATVs or 4x4s), and some maintenance level 1 roads.

As described above, the mixed use roads are typically maintenance level 2 or 3 roads, characterized by a dirt or gravel surface, slower vehicle speeds and may have lower use levels than roads with higher maintenance levels. These roads typically provide for OHV access to allow links between motorized

recreation opportunities on adjoining state and county lands, or between segments of motorized trails where road travel is needed as a connection. However on Tonasket Ranger District, these motorized mixed use roads provide an important recreation opportunity for ATV users in particular.

WATVs are also allowed to operate on many maintenance level 1 roads, particularly ones on the Tonasket and Methow Valley Ranger Districts, where the current travel plan map specifically states that non-licensed vehicles can be driven on roads closed with a berm. As discussed above, however, these maintenance level 1 roads are typically short (less than 5 miles), and do not access desirable locations, or provide loop riding opportunities. Some maintenance level 1 roads are included in trails open to ATVs/OHVs, so are important links in those opportunities.

Environmental Consequences

Direct and Indirect Effects

ALTERNATIVE A

Available Motor Vehicle Routes

National Environmental Policy Act regulations require consideration of a "no-action" alternative, which describes the effects on resources if no management action is taken. Alternative A would have no effect on current motorized road and trail recreation opportunities, as there would be no change to the existing open road network (maintenance levels 2 through 5) and trail system.

OHV use would continue to be unmanaged on approximately 2,557 miles of maintenance level 1 roads, although this use would be inconsistent with the travel management rule, which requires motor vehicle use to be restricted to designated open routes. The recreation experience currently offered to OHV drivers on maintenance level 1 roads would continue.

Cross-country Motorized Travel Opportunity

Existing recreation opportunities for motor vehicle users to travel off roads and trails either to ride unauthorized routes or to access portions of the Forest for a variety of other recreational activities would not change. The Forest is currently managed as open to motor vehicle use unless specifically closed, so cross-country motor vehicle travel would continue to be allowed on the 2.6 million acres of the Forest located outside of designated Wilderness and non-motorized areas or where expressly prohibited. Of the total acreage available for cross-country travel, it is estimated that such use may occur on approximately 675,000 acres when topography and vegetation are taken into consideration.

OHV users would likely continue to travel off trail on their favorite unauthorized routes, or would continue to find areas to explore by OHV, potentially creating resource damage and creating conflicts

between motorized and non-motorized recreationists in some areas. Social value conflicts and complaints of noise and safety concerns from non-motorized recreationists would likely occur, resulting in some displacement of those visitors seeking quiet recreation opportunities free from OHV noise.

Access to Dispersed Camping

No restrictions would apply to motor vehicle travel off National Forest System routes for dispersed camping under this alternative, except for those areas already closed to motor vehicle travel by special order or as depicted in the Okanogan National Forest Travel Plan. Under Alternative A, people would continue to be able to drive motorized vehicles all the way from open roads to 100% of existing campsites.

Campers would continue to be able to use the dispersed campsites they have become accustomed to using, including those near water, particularly rivers and streams, which would continue to be a main attraction for those seeking out dispersed camping sites during the summer months.

WATV Opportunities

Alternative A would not open any National Forest System roads to WATVs, so opportunities for WATVs would be no different than those for non-licensed ATVs and OHVs. WATVs would continue to be allowed to operate on the 125 miles of mixed use roads, open to non-licensed ATVs/OHVs, 263 miles of motorized trail (designated for ATVs or 4x4s), and some maintenance level 1 roads.

The mixed use roads providing links between motorized recreation opportunities on adjoin state and county land, and between segments of motorized trails would still be open to WATVs. They would continue to provide links between motorized recreation opportunities on adjoining state and county lands, or between segments of motorized trails where road travel is needed as a connection. This important recreation opportunity on the Tonasket Ranger District would continue.

WATVs would also continue to be allowed to operate on many maintenance level 1 roads, particularly ones on the Tonasket and Methow Valley Ranger Districts, where the current travel plan map specifically states that non-licensed vehicles can be driven on roads closed with a berm. As discussed earlier, however, these maintenance level 1 roads are typically short (less than 5 miles), and would not access desirable locations, or provide loop riding opportunities. The portions of maintenance level 1 roads that are part of ATV/OHV trails would also remain open to WATVs.

Effects Common to Alternatives B, C, and D

Available Motor Vehicle Routes

None of these alternatives would result in any changes to the current open motorized road (maintenance levels 2 through 5) and motorized trail system, so there would be no direct or indirect

effects on motorized road and trail opportunities on currently open National Forest System roads and trails.

Alternatives B, C, and D would close all 2,557 miles of current maintenance level 1 roads to motorized vehicles. As discussed in the Existing Condition section, many of these roads are impassable due to vegetation growth or debris on the roadbed, so are not currently being used as motorized recreation routes. A few of the maintenance level 1 roads are currently officially closed to motorized vehicles, so these are also not providing motorized recreation opportunities. Any maintenance level 1 roads that are currently being used for motorized recreation would be closed to that activity (with the exception of any sections of maintenance level 1 roads that are part of a National Forest System motorized trail), so the motorized recreation opportunity they provide would be lost. While this represents only a portion of the overall motorized recreation occurring on the Forest, it would result in a reduction in motorized recreation opportunities. The people currently using these routes as links between open roads or to access motorized trails or unauthorized cross-country routes would no longer be able to use them. Since the miles of maintenance level 1 roads currently being used is unknown, the loss of opportunity cannot be quantified, but those people currently using these roads would lose this recreation opportunity because they would be legally closed by CFR.

Isolated conflicts between motorized and non-motorized trail users would continue, but be minimized by the abundant non-motorized trails available.

Cross-country Travel Opportunity

The Forest Plan amendments in Alternatives B, C, and D would prohibit cross-country motorized travel on the 2.6 million acres of National Forest System land currently open in conformance with the Travel Management Rule. As described in the Existing Condition section, approximately 675,000 acres of this 2.6 million are flat and open enough for vehicles to pass, and many miles of unauthorized trails have been developed in these areas, however there is no complete inventory of the number of miles of unauthorized trails so the loss cannot be quantified except by these acres. Only 33 acres of cross-country travel would remain at Moon and Funny Rocks.

Implementation of these alternatives would result in a substantial loss of motorized recreation opportunities. Motorized vehicles would only be allowed on designated National Forest System roads and motorized trails. All unauthorized trails and roads that are not part of the Forest Service Transportation system would also be closed to motorized travel. Thousands of people use the unauthorized routes each year, so these people would be displaced to riding or driving on open Forest System roads or motorized trails. This could lead to slightly increased traffic on the roads; however the most noticeable increase in traffic would likely be on motorized trails. The relatively limited number of miles of motorized trails (998 miles total) would still be open. Motorcycles (single-track vehicles) would be allowed on all 998 miles, while vehicles over 50 inches wide would be restricted to 243 miles, and ATVs (dual track vehicles under 50 inches wide) would be restricted to the 20 miles open to ATVs in addition to the 243 miles open to vehicles over 50 inches wide. The additional traffic on these system

trails could make them more crowded, and potentially reduce the quality of the recreation experience for the riders.

Those who drive motor vehicles cross-country would no longer be able to do so. These drivers could be displaced to other public and private lands that provide cross-country travel opportunities. Hunters would no longer be able to use vehicles to travel cross-country to hunt and retrieve game. Some may choose to park and hike to hunt, while others may choose to use horses, hunt on other nearby public or private lands, or choose not to hunt at all.

The closure of the 2.6 million acres currently open for cross-country travel, including the 675,000 acres where the motorized traffic is likely concentrated would substantially reduce conflicts between motorized and non-motorized recreationists in these areas, and address safety concerns raised by the non-motorized recreation community. Isolated conflicts would likely continue on the 998 miles of designated motorized trail. Non-motorized recreationists would no longer encounter motorized vehicles off National Forest System roads and trails, or outside Moon and Funny Rocks, There would be a large increase in potential non-motorized recreation opportunities across the forest, and non-motorized recreationists would not be displaced trying to avoid conflict with motorized recreation activities.

Illegal Motorized Use

Once the travel plan is implemented, it is expected that most visitors would comply with the Motor Vehicle Use Map. Under all action alternatives, however, there is potential for illegal motorized use to continue in some areas, although the location, duration and type of illegal use cannot be predicted. It is reasonable to assume there would be increased violations during the initial years of implementation as it will take time to familiarize the public with the new rules.

Effects of Limitations on Motorized Access for Dispersed Camping in Alternatives B, C, and D

Access to Dispersed Camping

Alternatives B, C, and D would not put any limitations on dispersed camping itself, but would limit motorized access for dispersed camping. The motorized access would be limited to existing routes leading to established campsites within designated corridors, so motorized access to dispersed camping would only occur where it is currently established. Each alternative includes designated corridors for motorized access to dispersed camping, but the miles of corridors and placement varies by alternative, as described below. The locations of the corridors are shown on the Alternative Maps in the analysis file. Each alternative would permit motor vehicle use for dispersed camping along existing routes to established campsites within designated corridors for up to 300 feet from the centerline of the road. If an existing dispersed site is located further from the road than the designated corridor width of 300 feet from the centerline of the road, visitors would need to park their vehicle within the corridor and access the dispersed site by non-motorized means. Access to roadside campsites would not change with any

alternative, since people would still be allowed to park within 30 feet of open roads. Although corridors would exist on all roads, motorized access for dispersed camping would be limited to existing routes to established campsites, so motorized access to dispersed camping would only occur where it is currently established.

Additionally, these alternatives would prohibit motor vehicle use within 100 feet of existing water bodies within designated corridors except at Improved Sites[4]. Consequently, except at Improved Sites all visitors would need to park their motorized vehicle at least 100 feet from the water and access water-front dispersed campsites by non-motorized means. People would no longer be allowed to park trailers or recreational vehicles on the water's edge, except at Improved Sites[5] . Some visitors, who strongly desire to park on the edge of a river, stream or lakeshore, may be displaced to other private or public lands or would not be able to experience this type of desired recreation opportunity.

Along open roads without corridors, visitors would need to park their vehicle within 30 feet of the road and access the desired dispersed site by foot or other non-motorized means of travel. Use at the existing dispersed campsites not located within a corridor and further than 30 feet from a designated road could decrease, since many dispersed campers would be unwilling to park along a road, and carry camping gear to the campsite, potentially leaving their vehicle out-of-sight, and less accessible. This would be even more likely for people camping with recreational vehicles.

The 2009 survey of existing dispersed campsites across the Forest identified 1,855 campsites, as described earlier in the Existing Condition section, with 1,115 drive-in sites, and 740 roadside sites. This survey has not been repeated, and is not considered to be a complete and thorough inventory of all dispersed camping opportunities on the Forest. It does, however, provide important information about the approximate number of sites, and their general distribution along the Forest Service road system. The survey showed that sites are not evenly distributed along all open roads, but tend to be concentrated along rivers, streams, and lakes. There are many established sites at higher locations, not necessarily near water, but in prime hunting areas. The factors that lead to the establishment of each site are a function of open road access, relatively flat ground, vegetation open enough to allow vehicles to pass, and a desirable destination, such as water or hunting area. Roughly 75% of the established sites are within 300 feet of an open road.

Using a GIS analysis of the location of the 1,115 drive-in sites, 773, or 69% are within 300 feet of an open road, and at least 100 feet away from water (river, stream, or lake), all of which would be accessible by vehicles in Alternative D. Also using GIS, 626, or 56% of the 1,115 drive-in campsites would fall within the corridors in Alternative B, and 449, or 40% would fall within the Alternative C corridors.

[4] Driving motor vehicles closer than 100 feet to water would be authorized at Improved Sites, within the limitation established at each site.

[5] Improved Sites are described in Chapter 2 and the Existing Condition section above. The Forest Service has taken steps to reduce environmental impacts from motor vehicle use at these sites. The sites are identifiable on the ground by the presence of barrier rocks or logs defining the access route, buck and pole fences limiting how closely motorized vehicles can be driven to water, defined access trails to the water, and other constructed features.

An important distinction in determining the effect on motorized access limitations to dispersed camping is estimating the percentage of established drive-in campsites that would be located along roads without corridors in each alternative. This was estimated as follows:

Since Alternative D would have corridors on all open roads, the GIS analysis determined there are 773 drive-in campsites along open roads within 300 feet of the road and not closer than 100 feet to water. The other 342 drive-in campsites are either farther than 300 feet from the road, or closer than 100 feet to water. Therefore, a baseline of 773 drive-in campsites was used for comparison for all action alternatives based on rule parameters and water setbacks.

The following table displays the percentages of established campsites that would fall within corridors, in addition to the size of the corridors, and set-back from water. When using a campsite located within a corridor, visitors would be able to drive a motorized vehicle on the established access route the entire distance from the road to the campsite. Some of the established campsites would be located farther than 300 feet from a road and thus fall outside of the designated corridor or are closer than 100 feet to water within the corridor. As described above, in these locations, visitors would be able to drive their vehicles on existing access routes only part-way to the campsite. Other campsites would be located along roads with no corridors. Visitors would have to park within 30 feet of designated roads and use a non-motorized method of accessing the campsites (such as walking, using pack animals, or carts, for example).

Table 3.1-8–Established Campsite Motorized Access Information and Comparison by Alternative*

	Alternative B	Alternative C	Alternative D
Corridor width (feet), from the centerline, on both sides of the road	300 feet	300 feet	300 feet
Setback from water (feet)	100 feet**	100 feet**	100 feet**
Miles of designated corridors	1,680 miles	1,492 miles	5,366 miles
Approximate percent of established dispersed sites within corridors and further than 100 feet from water	56%	40%	69%
Approximate percent of established dispersed campsites located along roads without corridors	19%	42%	0%

*The designation of corridors does not exist under current management, and are not included in Alternative A as motor vehicle travel is permitted off of National Forest System routes unless specifically closed by Forest Order or as listed in the 2005 Okanogan National Forest Travel Plan; therefore 100% of the existing 1,115 campsites would continue to be available for access by motorized vehicle.

**There is an exception to the 100' setback requirement at Improved Sites.

Alternatives B and C would result in a substantially reduced opportunity for motor vehicle access to drive-in dispersed camping sites as compared to Alternatives A and D. Even Alternative D would result in reduced motorized access since 31% of the existing campsites fall outside of corridors or within 100 feet of water. Decreased direct motor vehicle access to dispersed camping sites off of roads may particularly displace visitors with recreational vehicles, whose camping choices and opportunities would be limited. Many dispersed sites that would be inaccessible by motor vehicle may be located adjacent to streams, rivers or other water bodies, resulting in decreased availability of this highly desired recreation opportunity. The requirement for motor vehicle use to occur only on existing routes within existing corridors would not reduce the opportunity to access dispersed sites by motor vehicle within corridors, but would eliminate the opportunity to pioneer new routes to create new dispersed sites by motor vehicle. There would likely be some illegal use of sites, especially during a transitional period of acquainting visitors with new regulations and on roads without a corridor. There may also be development of new sites within 30 feet of roads from visitors seeking a legal place to park. The availability and use of existing roadside campsites would not change from the current condition. People would continue to be allowed to park within 30 feet of open roads to camp.

If monitoring indicates negative environmental impacts occurring from motorized access for dispersed camping, the access route would be modified to minimize or eliminate the impact. Some of the possible actions could include, but are not limited to:

- using boulders, fences, or other barriers to keep vehicles to an acceptable location;
- hardening the access route surface to minimize erosion;
- improving the access routes with water bars or other drainage structures to protect water quality;
- decommissioning and blocking the access route, or
- modifying or removing the corridor.

This mitigation could further reduce motor vehicle access to dispersed camping opportunities on a case-by-case basis, however modifications or limitations of vehicle access, short of decommissioning or blocking the access routes, have been successful at several Improved Sites across the forest, so it is likely that limitations on vehicle access, while allowing access to continue, would be adequate to mitigate impacts.

ALTERNATIVE B

In Alternative B, corridors would be designated on 1,680 miles of road which would allow complete motorized access from the road to approximately 56% of existing drive-in dispersed campsites. In addition, partial motorized access would be provided to those campsites that are located outside the corridor boundaries or closer than 100 feet to water along roads with corridors (approximately 25% of

existing drive-in campsites). This may influence the use of these campsites, however the ability to drive a motor vehicle close to a chosen campsite would likely be sufficient for most visitors.

Approximately 19% of established drive-in campsites would be located along roads with no corridors. These campsites are located anywhere between the roadside to several hundred feet from the road. For those located a distance from the road, visitors would need to park along the open road, and access the campsite by a non-motorized means. This would substantially reduce the quality of the camping experience for most, and would likely lead to many of the drive-in campsites no longer being used. People would not be able to drive recreation vehicles to or near the campsites located off the roads outside of corridors. For those who do leave their vehicle parked along the road and carry camping equipment to the campsite, their vehicles could be out-of-sight while they camp. It is likely that many of the people accustomed to using these sites would be displaced to campsites within or adjacent to corridors. Since the only authorized use of a motor vehicle within a corridor would be along an existing route to an established campsite, there may not be enough established routes within corridors to absorb the displaced campers, so overall access and availability to dispersed camping would decline in some areas during the most popular camping times.

ALTERNATIVE C

Alternative C would modify the corridor pattern in Alternative B to eliminate corridors in Critical Fish Habitat. It would remove corridors from the Chewuch River and Eightmile Creek on the Methow Valley Ranger District, the Upper Cle Elum Valley and Teanaway River on the Cle Elum Ranger District, and the Wenatchee River/Little Wenatchee River and Rainy Creek on the Wenatchee River Ranger District. There would be no difference in the corridor placement between Alternatives B and C on the Chelan, Entiat, Naches, or Tonasket Ranger Districts.

There would be 1,492 miles of corridor with the implementation of Alternative C, with approximately 40% of existing drive-in campsites falling within the corridors. As described under Alternative B, there would be partial motorized access to those campsites that are located outside the corridor boundaries or closer than 100 feet to water along roads with corridors, or approximately 18% of the existing campsites. This may influence the use of these drive-in campsites, however the ability to drive a motor vehicle close to a chosen campsite would likely be sufficient for most visitors.

Approximately 42% of established campsites would be located along roads with no corridors. These campsites are located anywhere between the roadside to several hundred feet from the road. For those located a distance from the road, visitors would need to park along the open road, and access the campsite by a non-motorized means. This would substantially reduce the quality of the camping experience for most, and would likely lead to many of the campsites no longer being used. People would not be able to drive recreation vehicles to or near the campsites located off the roads. For those who do leave their vehicle parked along the road and carry camping equipment to the campsite, their

vehicles could be out-of-sight while they camp. It is likely that many of the people accustomed to using these sites would be displaced to campsites within or adjacent to corridors. Since the only authorized use of a motor vehicle within a corridor would be along an existing route to an established campsite, there is a high likelihood that there would not be enough established routes within corridors to absorb the displaced campers, so overall access and availability to dispersed camping would decline substantially.

The potential impacts to motorized recreation from Alternative C would be intensified with the removal of the corridors within 300 feet of Critical Fish Habitat. The Chewuch River, Eightmile Creek, Upper Cle Elum Valley, Teanaway River, Wenatchee River/Little Wenatchee and Rainy Creek are some of the most popular dispersed camping areas on the Forest. There would be no motorized access to the established drive-in campsites in these areas. The established sites are popular because of their proximity to water, and removing the ability for visitors to drive to or near these established sites would cause the greatest decrease in motorized access to dispersed camping, and subsequently the availability of dispersed camping opportunities, of any of the alternatives.

ALTERNATIVE D

Alternative D would have the least impact to dispersed camping, compared to Alternatives B and C. There would be corridors on every road, which would allow complete motorized access from the road to approximately 70% of existing drive-in dispersed campsites. There would be partial motorized access to remaining campsites that are located outside the corridor boundaries or closer than 100 feet to water along roads with corridors. This may influence the use of these drive-in campsites, however the ability to drive a motor vehicle close to a chosen campsite would likely be sufficient for most visitors.

There may be some displacement of campers with implementation of Alternative D, especially ones wanting to park recreation vehicles directly adjacent to rivers and lakes. These people would likely be displaced to developed campgrounds on the Forest, or private campgrounds or areas that allow unconstrained motor vehicle access to water. It is likely that there would be an adequate number of established campsites and access routes to meet the current demand, although the most popular areas would remain crowded, with competition for the best spots.

WATV Opportunities

ALTERNATIVES B AND D

Alternatives B and D would close all maintenance level 1 roads to motorized vehicles, including WATVs, reducing potential riding opportunities by 2,577 miles. As discussed in the current condition section

above, many of these roads are impassible, or not being used. Others are too short to offer a meaningful WATV riding opportunity, so the loss of miles actually being used by ATVs or WATVs would be less than the total. Portions of maintenance level 1 roads that are part of National Forest System ATV or 4x4 trails would remain open to WATVs.

This loss of maintenance level 1 roads would be offset by opening 350 miles of National Forest System roads to WATVs. These routes would be relatively high-mileage, and create loops and links between towns and SnoParks on every ranger district. These would be in addition to the 125 miles of mixed use road that would also be open to WATV, for a total of approximately 475 miles of open road riding opportunities for WATVs. Each new WATV route is summarized below. Refer to the maps for Alternatives B and D for complete location information.

- The Table Mountain Route would open approximately 41 miles of currently open road to WATVs, linking the Blewett SnoPark at the Blewett Summit along Highway 97 to the town of Liberty, and to the Reecer SnoPark near Ellensberg.

- The Thunder Mountain Route would open approximately 91 miles of road, linking the town of Conconully to the East Chewuch Road just north of Winthrop, the Toats Coulee Road west of Tonasket, the North Summit SnoPark along Highway 20 at the Loup Loup Summit, and the Beaver Creek Campground on Washington State Department of Fish and Wildlife land east of Winthrop.

- The Bald Mountain Route would open approximately 34 miles of road, linking the Hog Ranch, Dipping Vat, and Cow Canyon Roads, and connecting to the existing 4x4 trail number 4W644 west of Bald Mountain.

- The Clover Springs Route would open approximately 50 miles creating 3 interconnected loops by tying into trail number 4W696 at the Clover Springs Trailhead and Forest Road 1600.

- The Entiat Ridge Route would open approximately 72 miles and link the Lower Chiwawa Trailhead to Forest Road 5700 near Entiat and Forest Road 7401 to the Derby Canyon Road near Peshastin.

- The Grade-Oss Route would open approximately 62 miles and link the Black Canyon SnoPark near Pateros to the Echo Valley Ski Area, and create a loop along Forest Roads 8200 and 8020.

Allowing WATVs on these routes would increase the overall volume of traffic on the roads, since they are all open to highway vehicles. Data that could be used to estimate the actual increase does not exist, however it is reasonable to assume the increase would be similar to the volume of ATV traffic typically seen on mixed use roads. Some of the riders currently using the mixed use routes have licensed their vehicles to meet the requirements of a WATV, and these riders would be able to disperse onto the

newly opened routes. This would potentially decrease traffic on the mixed use roads, and spread the riders from the current 125 miles to the total 475 miles.

There would likely be some increase in the overall number of riders. A total of 1,774 WATVs and 5,247 ATVs were licensed in Washington State in 2015, according to the Washington State Department of Licensing website. This totals 7,021 licensed WATVs/ATVs state-wide, of which approximately 25% are WATVs. Given that this relatively small percentage of ATVs are licensed to ride on the WATV routes, it is safe to assume that the number of WATVs on the new routes would be small in comparison to highway licensed vehicle traffic on the routes.

ALTERNATIVE C

Alternative C would not open any National Forest System roads to WATVs, so the effects would be the same as with Alternative A. Opportunities for WATVs would be no different than those for non-licensed ATVs and OHVs. WATVs would continue to be allowed to operate on the 125 miles of mixed use roads, open to non-licensed ATVs/OHVs, 263 miles of motorized trail (designated for ATVs or 4x4s), and some maintenance level 1 roads. As discussed above, WATVs would be prohibited on the 2,557 miles of maintenance level 1 roads with implementation of Alternative C.

The mixed use roads providing links between motorized recreation opportunities on adjoin state and county land, and between segments of motorized trails would still be open to WATVs. They would continue to provide links between motorized recreation opportunities on adjoining state and county lands, or between segments of motorized trails where road travel is needed as a connection. This important recreation opportunity on the Tonasket Ranger District would continue.

WATVs would also continue to be allowed to operate on many maintenance level 1 roads, particularly ones on the Tonasket and Methow Valley Ranger Districts, where the current travel plan map specifically states that non-licensed vehicles can be driven on roads closed with a berm. As discussed earlier, however, these maintenance level 1 roads are typically short (less than 5 miles), and would not access desirable locations, or provide loop riding opportunities. The portions of maintenance level 1 roads that are part of ATV/OHV trails would also remain open to WATVs.

Cumulative Effects

Past Actions

The road and trail systems on the Forest were largely built as a result of timber harvest activities, mining activities, and fire suppression activities beginning in the early 1900s. Over time, these roads and trails have received increasing recreational use and provide a variety of recreational opportunities. Some of those system trails are no longer maintained and may not provide a recreational opportunity. A portion of the Forest's trails were constructed specifically for a given recreational purpose using appropriated

dollars and/or grant funding. In addition, a number of unauthorized routes (total mileage is unknown) have been created by Forest visitors in order to access dispersed recreation sites, reach viewpoints or to provide more recreation opportunities. The aggregate effects of these past actions as they affect road and trail access and recreational opportunities are displayed in the *Existing Condition* section and in the description of the Direct/Indirect effects of Alternative A.

Ongoing (Present) and Reasonably Foreseeable Future Actions

Actions that are ongoing and planned in and adjacent to the Okanogan-Wenatchee National Forest that would act cumulatively to affect recreation are summarized in Table 3.1-9. Refer to Appendix A for detailed information about these actions.

Table 3.1-9–Summary of Ongoing and Reasonably Foreseeable Future Actions Potentially Effecting Recreation Opportunities

Project type	Possible effect to recreation
WATV Routes	Okanogan, Chelan, Douglas, and Kittitas counties have opened most of the county roads with speed limits less than 35 miles per hour to WATVs. Many of these roads connect to National Forest System roads. The towns of Okanogan, Omak, Conconully, East Wenatchee, and Cle Elum have also opened many of the city roads to WATVs. This has increased WATV opportunities on non-National Forest System land.
Restoration & Fuels Reduction	Several restoration projects are proposed across the Forest, and would total approximately 140,347 acres of National Forest System Land. These projects, when combined with other actions, result in a temporary reduction in motorized access on roads and trails within or leading up to the treatment unit(s). New permanent or temporary roads built for timber harvest purposes are typically closed to motorized use or decommissioned after the timber harvest is complete and any road or trail tread damage during project activities would be restored to its pre-project condition (unless they are slated for decommissioning) as required by the Forest Plans. Several projects also include road closures or decommissioning, with a total of 218.5 miles of road currently planned. Road closures and decommissioning would reduce motorized access to any dispersed campsites located along those roads.
Transportation System Management	Approximately 118 miles of road would be closed or decommissioned in the Chewuch Transportation Plan. A planned 51.7 miles of road will be decommissioned in the Peshastin-Chumstick Road Decommissioning Project. These would reduce motorized access to dispersed campsites and motorized recreation opportunities.

Recreation	Several recreation projects, including construction or reroute of non-motorized trails on the Chelan and Wenatchee River Ranger Districts, dock replacement on the Chelan and Tonasket Ranger Districts, establishing ATV trailheads on the Tonasket District, converting 11.7 miles of road to trail on the Wenatchee River Ranger District, and establishing a group site in a campground on the Tonasket District, would increase overall recreation opportunities and access across the forest.

ALTERNATIVE A

Available Designated Motor Vehicle Routes

The cumulative effect of Alternative A and the past, present, and reasonably foreseeable future actions would be a reduction in roaded motorized recreation opportunities. Up to a 388.2 miles of National Forest System roads would be decommissioned as a result of reasonably foreseeable restoration and transportation management projects. The ability for motorized vehicles to be driven on maintenance level 1 roads would help off-set some of that loss, in addition to the construction of new ATV trailheads on the Tonasket Ranger District.

Cross Country Motorized Travel

There are no ongoing or reasonably foreseeable projects that would have the potential to act cumulatively to either increase or decrease the amount of cross-country motorized travel opportunities available. The cumulative effect of the past, present, and reasonably foreseeable future actions with Alternative A would be a continuation of the motorized cross-country recreation opportunities across the forest.

Motorized Access to Dispersed Camping

Up to 388.2 miles of National Forest System roads would be closed with the reasonably foreseeable future restoration and transportation management projects on the forest. This could slightly reduce motorized access for dispersed camping opportunities, however there would be no limitations on motorized access for dispersed camping with the implementation of Alternative A, so the cumulative effect would be very little change from the existing condition, and the ability for the projected increase in the number of people dispersed camping to be proved.

WATV Opportunities

The county and city roads open to WATVs would provide opportunities for the riders, however, since no routes would be open on National Forest System roads, all open routes connecting to National Forest System roads would be truncated at the National Forest System boundary. The cumulative effect would be opportunities limited to non-National Forest System roads, providing some riding options.

ALTERNATIVES B, C, AND D

Overall, the cumulative effect of Alternatives B, C, or D with the effects of other past, present and reasonably foreseeable future actions, would be a substantial reduction of motorized access to the Forest for recreational purposes; however the increases in WATV opportunities in Alternatives B and D would slightly offset this reduction. Specific reductions would be the prohibition on cross-country motor vehicle travel, the prohibition of motorized vehicles on maintenance level 1 roads, limitations on motorized access for dispersed camping, plus other projects that would close roads and trails (and therefore access to dispersed camping). The anticipated trend in the number of people dispersed camping and people driving vehicles off-road would intensify the effect.

Available Designated Motor Vehicle Routes

None of the alternatives would affect or change the current National Forest system of open roads and motorized trails. There would be a loss of some existing and potential motorized recreation opportunities with the legal CFR closure of all maintenance level 1 roads to motorized vehicles (2,557 miles). Up to 388.2 miles of roads would be closed or decommissioned under the ongoing or reasonably foreseeable restoration and transportation system management projects (refer to Table A-1 and A-2). Cumulatively, there would be a 2,945.2-mile reduction in the roads open to motorized vehicles, however many of the 2,557 miles of maintenance level 1 roads are not currently being used by motorized vehicles, so the actual reduction in miles would be less. This would cumulatively reduce motorized recreation opportunities, motorized recreation access to dispersed campsites and potentially the loss of connectivity or loops in the motorized road and trail system.

Cross-country Motorized Travel Opportunity

The greatest incremental effect of implementation of the travel plan would be closure of cross-country motorized travel, and the loss of motorized travel on unauthorized roads and trails that have developed as a result of past actions and activities in the areas currently legally open to cross-country travel. There are no ongoing or reasonably foreseeable projects that would have the potential to act cumulatively to either increase or decrease the amount of cross-country motorized travel opportunities available. Many unauthorized routes and areas that have developed in the past currently used by and important to motorized recreationists would no longer be legally available for motorized use, leading to a loss of motorized opportunity and/or displacement of OHV enthusiasts to available designated motorized routes or other nearby public or private lands. The projected increase in the number of people participating in off-road driving could increase the number of people on the motorized system trails. The cumulative effect could be increased crowding and user conflict on the routes open to motorized recreationists, especially if these routes are also popular with non-motorized recreationists.

Motorized Access to Dispersed Camping

The ongoing activities across the Forest to manage dispersed campsites by maintaining structures at Improved Sites would allow the continued use of these desirable dispersed campsites. As discussed above, approximately 388.2 miles of roads would be closed or decommissioned under the ongoing or reasonably foreseeable future actions, potentially blocking access to some established dispersed campsites. These projects could add to the loss of motorized recreation access to dispersed campsites. The potential upward trend in people dispersed (primitive) camping could result in more competition for established sites, especially in the most popular dispersed camping areas.

Implementation of any of the action alternatives would result in the largest reduction to motor vehicle access to dispersed sites compared to all other restoration activities. Any past, present and reasonably foreseeable future actions would only contribute a minimal effect to overall access to dispersed camping opportunities with motor vehicles. The designation of corridors, setbacks from water bodies and requirement to use only existing routes to dispersed sites under all of the action alternatives would be a large departure from the existing condition and would result in a substantial reduction in visitors' motor vehicle access to dispersed sites across the Forest. Consequently, when combined with other past, present and reasonably foreseeable future actions as described above, Alternative C would result in the largest cumulative reduction in motorized access to dispersed camping as it would be the most restrictive (1,460 miles of corridors providing full motorized access to approximately 40% of existing sites, and eliminating motorized access along some of the most popular dispersed sites on the forest), followed by Alternatives B and D. The cumulative effect of the potential upward trend in the number of people dispersed camping and this decreased access to established sites could lead to increased violation of the MVUM regulations, or more people not being able to dispersed camp.

WATV Opportunities

The cumulative effect of allowing WATVs on 475 miles of National Forest System road in Alternatives B and D (350 miles of WATV routes plus 125 miles of mixed use roads) and the WATV opportunities on non-National Forest System roads would be the establishment of a system of WATV routes that cross ownership boundaries, and allow riders to follow routes that begin on or near private land, and continue onto National Forest System land. It would provide WATV connections between some communities, and interesting loop rides. The 2,557 miles of maintenance level 1 roads that would be closed to WATVs would offset this increase, however the quality of the actual WATV routes would be much higher than what is offered with on maintenance level 1 roads, so the actual cumulative effect would be beneficial to WATVs riders.

Since Alternative C would not open any National Forest System roads to WATVs, and would also close the 2,557 miles of maintenance level 1 roads to WATVs. The county and city roads open to WATVs would provide opportunities for the riders, however, since no routes would be open on National Forest System roads, all open routes connecting to National Forest System roads would be truncated at the National Forest System boundary. The cumulative effect would be opportunities limited to non-National Forest System roads, providing some riding options.

COMPLIANCE WITH LAWS AND REGULATIONS

This analysis finds that all alternatives are consistent with all relevant laws and regulations when the proposed amendments are incorporated.

Each of the action alternatives included in this project were developed based on direction in the travel management rule as summarized in the *Applicable Laws and Regulations* section (Page 1-6). Each of the action alternatives would designate roads, trails and areas as open to motorized use, prohibit cross-country motorized travel, designate corridors for access to dispersed camping, and considered resource and social concerns. Therefore, this project is in compliance with the travel planning rule. Since Alternative A, the no-action alternative, would not designate roads, trails and areas for motorized use, Alternative A would not be in compliance with the travel management rule.

The action alternatives would provide a mix of motorized and non-motorized recreation opportunities consistent with ROS and Management Area guidelines. Motorized use is not proposed within any prescription areas or management areas identified as semi-primitive non-motorized ROS class. Thus, this project is consistent with the following Okanogan Forest Plan and Wenatchee Forest Plan standards and guidelines (USFS, 1989):

- 8-1: This project makes no changes to system trail opportunities or developed recreation, and the alternatives provide different levels of motorized dispersed recreation opportunities, consistent with the goals and ROS class of the management areas (USFS 1989, p. 4-38).
- 8-7: Off road vehicle opportunities would continue to be provided on system roads and system motorized trails, consistent with management areas. No changes would occur to off-road motorized use shown on the Okanogan Travel Plan except as required by the Travel Management rule to close the Forest to cross-country motorized travel, and to be consistent with Forest Service Handbook direction for management of maintenance level 1 roads (USFS 1989, p. 4-38).
- 8-8: Closing the Forest to cross-country motorized use will minimize damage to soil, water, vegetation and other resources, and minimize conflicts in those areas between motorized and non-motorized users.
- 17-3: This standard and guideline is being amended through this project.

Alternatives B, C, and D would all be consistent with the forest plan standards and guidelines amended as part of this action.

3.2 Aquatic Biology, Hydrology and Soil

INTRODUCTION

Aquatic and riparian habitats on the Okanogan-Wenatchee National Forest are extensive, with approximately 11,800 miles of streams and rivers (5, 000 miles of perennial streams and 6,800 miles of intermittent streams) on the Forest, of which approximately 1,600 miles are fish-bearing. RRs and RHCAs cover approximately 520,000 acres (approximately 13% of the forest). There are over 1,000 lakes ranging from very large lakes (e.g., Lake Wenatchee and Lake Chelan) to numerous small high mountain lakes. The Forest contains over 750 perennial snowfields and small glaciers, most of which lie within the north half of the Forest. The majority of streams and rivers on the Forest drain into the Columbia River Basin. Major sub-basins (4th level hydrologic units) include; the Kettle, Sanpoil, Okanogan, Methow, Chelan, Entiat, Wenatchee, Naches, and Upper Yakima. In addition to these sub-basins, the Okanogan-Wenatchee manages several watersheds that are within the administrative boundary of the Mt. Baker-Snoqualmie NF but adjacent to the upper Methow River. Streams and rivers within these watersheds drain into the upper Skagit River in Whatcom County and eventually into the Puget Sound. The streams that drain into Puget Sound will not be discussed further as there are no roads or motorized trails and thus will not be affected by the Travel Management Project.

REGULATORY FRAMEWORK

Clean Water Act as amended in 1977, 1982 and 1987

The primary objective of the Clean Water Act is to restore and maintain the integrity of the nation's waters. This objective translates into two fundamental national goals: To eliminate the discharge of pollutants into the nation's waters, and to achieve water quality levels that are favorable for fishing and swimming in all water bodies.

The State of Washington, as directed by the Clean Water Act and the Environmental Protection Agency, is responsible for the protection of rivers and other water in the public interest. Water quality standards for surface waters in the State of Washington are found in Chapter 170-201A-WAC of the Washington Administrative Code.

The Forest Service responsibilities under the Clean Water Act are defined in a November 2000 Memorandum of Understanding (MOU) between Washington State Department of Ecology and the Forest Service. The MOU designates the Forest Service as the management agency for the State on National Forest System lands. This means that the Forest Service is responsible for defining and implementing appropriate Best Management Practices (BMPs) for National Forest System lands. The Motorized Travel Management Project (Project) Interdisciplinary Team (IDT) developed Mitigation Measures or Best Management Practices consistent with the MOU.

Water bodies that do not meet established water quality standards are identified on a list called the 303(d) list which is prepared periodically (most recently in 2014). Each state also prepares a non-degradation policy for all waters that exceed standards. This policy protects these waters from any further degradation. The Washington Department of Ecology has established a Total Maximum Daily Load (TMDL) for the Wenatchee National Forest to address streams on the 303(d) list (WDOE 2003). The primary objectives of the TMDL are to examine pollutant sources and determine the pollutant reductions (allocations) necessary to achieve the water quality standard.

Within the forest, several streams appear on the most recent Clean Water Act 303(d) list. All alternatives would comply with the Act, and not change the current listing. Therefore, this is not discussed further in this Environmental Assessment. Detailed information is included in the Aquatics Report in the analysis file

The Endangered Species Act of 1973 (as amended) (ESA)

The ESA requires the Forest Service to manage for the recovery of threatened and endangered species and the ecosystems upon which they depend. Forest are required to consult with the US Fish and Wildlife Service and National Marine Fisheries 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.

Magnuson-Stevens Fishery Conservation and Management Act of 1976 as amended (MSA)

The Magnuson-Stevens Fishery Conservation and Management Act is the principal law governing marine fisheries in the United States. The MSA is primarily intended for the management of marine fisheries. The aspect of MSA relevant to this project is the identification of Essential Fish Habitat (EFH). EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

Federal agencies are required to consult with the National Marine Fisheries Service when any activity proposed to be permitted, funded, or undertaken by a federal agency may have adverse impacts on designated EFH. The project area includes designated EFH for Chinook salmon and coho salmon.

Sensitive Species

Within the National Forest System, a sensitive species is a plant or animal whose population viability is identified as a concern by a Regional Forester because of a significant current or predicted downward trend in abundance or habitat quality that would reduce its distribution. The primary objective of the Sensitive species program is to ensure that federal actions do not contribute to a loss of viability, or cause a significant trend toward listing under the ESA.

Management Indicator Species

36 CFR 219.19 (1982 planning rule) directs forests to establish objectives for maintenance and improvement of habitat for management indicator species (MIS). Management indicator species were

designated in the Wenatchee National Forest Plan (1989) and the Okanogan National Forest Plan (1990). Species are selected as MIS because their population changes may indicate the effects of land management activities (36 CFR 219.19 (a) (1)).

Land and Resource Management Plans (Forest Plan)

Wenatchee National Forest Land and Resource Management Plan (Wenatchee Forest Plan) (USDA Forest Service 1990)

The Wenatchee Forest Plan goal for water resource management is to maintain favorable conditions of stream flow in regards to quality and quantity, and timing. The dominant objective is to insure meeting or exceeding federal and state water quality standards during the life of the plan (Wenatchee Forest Plan p. IV-57). For soil, the primary goal is to maintain or enhance the productive properties of the soil resource (Wenatchee Forest Plan p. IV-58). For fisheries, the primary fish habitat objectives are to maintain and improve fish habitat capability, integrate fish and riparian habitat management into other multiple use objectives, have an aggressive habitat management program, and develop management partnerships with local, state, federal, and tribal governments, and private groups (Wenatchee Forest Plan p. IV-41).

Wenatchee Forest Plan standards and guidelines for riparian areas, streams, and lakes are found in the forest plan on pages IV-80 to IV-88. They include direction on planning, administration, sediment, temperature, channel morphology, floodplain/riparian vegetation, fish passage, lakes and wetlands, and non-fish bearning streams. Refer to that document for details. These standards and guidelines were strengthened and augmented by the Northwest Forest Plan and PACFISH.

Okanogan National Forest Land and Resource Management Plan (Okanogan Forest Plan) (USDA Forest Service, 1989)

Objectives for the watershed program include coordinating with other resources to provide support and advice that helps protect soil and water resource, as well as restoring damaged soil and water resources (Okanogan Forest Plan p. 4-19). The goal for fish habitat is management that maintains or enhances biological, chemical, and physical properties, and to be responsive when possible to the goals of other agencies and tribes (Okanogan Forest Plan p. 4-2). Further, an emphasis is placed on coordination with other resource activities to improve or maintain habitat for fish. This coordination is primarily accomplished by proper implementation of standards and guides (Okanogan Forest Plan p. 4-25 to 4-32).

Okanogan Forest Plan standards and guidelines that apply to riparian areas and streams are located on pages 4-30 to 4-32. As with the Wenatchee Forest Plan, these were strengthened and augmented by the Norwest Forest Plan, PACFISH, and INFISH.

Northwest Forest Plan (NWFP)

The NWFP for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (USDA and USDI 1994) developed standards and

guidelines which amended National Forest Plans in the analysis area. Specifically, the NWFP amended some of the standards and guidelines of approved National Forest Land and Resource Management Plans, including all of the Wenatchee National Forest Land and Resource Management Plan, and portions of the Okanogan National Forest Plan.

The NWFP includes The Aquatic Conservation Strategy (ACS) that was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on National Forestlands. The ACS includes nine objectives to guide management for healthy watershed and aquatic resources. Management actions that do not maintain the existing condition or do not lead to improved conditions in the long term would not "meet" the intent of the ACS should not be implemented. The Aquatic Conservation strategy consists of four components: Riparian Reserves (RR), Key Watersheds, Watershed Analysis, and Watershed Restoration. Standards and guidelines for management with RR and Key Watersheds provide further management direction.

Aquatic Conservation Strategy Objectives

Objective 1: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.
Objective 2: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life-history requirements of aquatic and riparian-dependent species.
Objective 3: Maintain and restore the physical integrity of the aquatic system including shorelines, banks, and bottom configurations.
Objective 4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
Objective 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
Objective 6: Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
Objective 7: Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
Objective 8: Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel

migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Objective 9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

The ACS standard and guideline especially relevant to this project is (see USDA and USDI 1994 for details):

- **RM-2** Requires that dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives be adjusted and where adjustment measures are not effective, the practice or occupancy be eliminated.

INFISH and PACFISH

Both PACFISH (USDA Forest Service and USDI Bureau of Land Management 1995) and INFISH (USDA Forest Service 1995) establish stream, wetland, and landslide-prone area protection zones called riparian habitat conservation areas (RHCAs), and set standards and guidelines for managing activities that potentially affect riparian and aquatic habitat conditions within RHCAs. The standards and guidelines include managing vehicles and motor vehicle use in a manner that does not retard or prevent attainment of riparian management objectives (RMOs) and avoids adverse effects on listed anadromous fish (PACFISH) or inland native fish (INFISH). The RMOs identify interim objectives for stream channel conditions such as pool frequency, water temperature, large woody debris and bank stability. The RMOs are considered to be interim and Forests can revise them based upon local data. The RHCA standards and guidelines are essentially the same as those for the NWFP, except, rather than requiring attainment or prohibiting practices that prevent attainment of the ACS, the standards and guidelines in PACFISH and INFISH require attainment or prohibit practices that prevent attainment of RMOs.

SPECIAL STATUS FISH AND SPECIES OF CONSERVATION CONCERN

Of the 37 native fish species that occur on the Okanogan-Wenatchee National Forest, four species are listed as federally threatened or endangered species under the Endangered Species Act of 1973 as amended (ESA)[6]. Two additional species are protected under the Magnuson-Stevens Fishery Conservation Act (MSA). Three species are listed under the Regional Foresters Sensitive Species List (as updated on December 9, 2011), and six species on the Okanogan and six on the Wenatchee are designated as Management Indicator Species (MIS).

[6] Refer to the Aquatics Report in the analysis for a list of all species.

Table 3.2-1. Special Status Fish and Species of Conservation Concern in the Project Area by Category

Threatened and Endangered (ESA Listed)	Regional Forester Sensitive	Management Indicator Species	Critical Fish Habitat
Upper Columbia spring Chinook (Endangered)	Umatilla Dace	Spring Chinook*	Chinook
Upper Columbia steelhead (Threatened)	Redband trout**	Summer Chinook~	Coho
Middle Columbia Steelhead (Threatened)	Pygmy whitefish	Sockeye~	
Columbia River Bull Trout (Threatened)	River Lamprey	Steelhead*	
		Bull trout*	
		Westslope cutthroat*	
		Redband ^,**	
		Brook trout**	

^ A sub-species of rainbow trout indigenous to the Columbia Basin (*O.m.gairdneri)*

*For Wenatchee and Okanogan portion of project area (*O.c. lewisi*)

**For Okanogan portion of project area only

~For Wenatchee portion of project area only

Threatened and Endangered Species

Upper Columbia River (UCR) Spring Chinook Salmon

On March 24, 1999, NMFS listed UCR Spring-run Chinook salmon as an endangered species (64 FR 14308) and their endangered status was reaffirmed on June 28, 2005 (70 FR 37160). UCR spring Chinook are considered to be "stream-type" Chinook salmon. Stream-type Chinook salmon rear for one year (sometimes longer) before migrating to the ocean. Freshwater habitat is thus very important for spring Chinook in the upper Columbia. Upper Columbia spring Chinook adults begin entering the Columbia River in March with the peak migration in April or early May after spending two years in the ocean (4 year old fish) (Chapman et al. 1995). Fifty percent of the run to the upper Columbia pass Priest Rapids and Rock Island dams by mid-May. The fish move into tributaries (to the Columbia) from late April through July and hold in the deeper pools and under cover until spawning (Chapman et al. 1995). Spawning peaks in mid-to late August. Wenatchee Sub-basin spring Chinook spawn in the Chiwawa River, Nason Creek, Little Wenatchee River, White River, and to a lesser extent in the mainstem Wenatchee River between the outlet to Lake Wenatchee and lower Tumwater Canyon. In the Entiat Sub-basin the spring Chinook spawn in the mainstem Entiat River downstream of Entiat falls.

Methow River spring Chinook primarily use the mainstem reaches of the Twisp River, Upper Methow River, Chewuch River and Lost River. Limited spawning has been documented in Gold Creek, Early Winters Creek and Lake Creek. The fry emerge from the gravel in spring. Many fry disperse downstream into the mainstem rivers, others stay in the general area of emergence, while some even move upstream. The fry also move into tributary streams where there is no spawning (Chapman et al. 1995). The alluvial fans of tributaries to the spawning streams can be important rearing areas for spring Chinook in the Wenatchee, Methow, and Entiat sub-basins. Movement generally occurs at night or

during periods of turbidity. The fry occupy shallow, slow water on the stream margins associated with cover such as large woody debris, bank vegetation and larger substrate material (Chapman et al. 1995). As the summer progresses and the fry grow they move into deeper water, with relatively low velocity and with cover. In the Chiwawa and Little Wenatchee Rivers, juvenile spring Chinook are associated with woody debris and multiple channel habitats (Hillman and Miller 1994). Our snorkel surveys show the same patterns of juvenile Chinook habitat use in other tributaries. The juveniles are sensitive to stream temperature, especially increases during the summer. The reported preferred temperature range for juvenile Chinook salmon is between 7.3ºC and 14.6ºC with an upper lethal temperature of 25.1ºC (Lee et al. 1996).

As water temperatures cool in the fall below 10°C there is a movement of juvenile Chinook downstream into the Wenatchee River where the fish over-winter. The fish conceal themselves in the substrate, woody debris and overhanging vegetation during the day (Hillman et al. 1989). Similar movements of juvenile Chinook have also been observed in the Yakima River sub-basin (Fast et al. 1991), and presumably other streams on the Forest.

Lee et al. (1996) state that key habitat factors for juvenile Chinook salmon rearing include streamflow, pool morphology, cover and water temperature. Rearing tends to be most abundant in low gradient, meandering streams. Such habitat matches our own observations in the Wenatchee and Entiat rivers, and those of Chapman et al. (1995). Given that there are at least three major movements of juvenile spring Chinook throughout their freshwater residence: 1) a downstream movement shortly after emergence (although many fish remain in the natal stream and some move upstream and into tributaries; 2) a late fall movement into over winter habitats; and 3) out-migration as smolts; maintaining connectivity between streams and providing diverse habitat and watershed processes is important.

The “native” Okanogan River fish were eliminated or absorbed into other populations (Myers et al. 1998) and thus are not discussed further in this BA.

The *Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan* (UCSRB 2007) identifies primary habitat threats to the persistence of UCR spring Chinook salmon as:

- Although land and water management activities have improved, factors such as dams, diversions, roads and railways, agriculture (including livestock grazing), residential development, and historic forest management continue to threaten spring Chinook and their habitat in some locations in the Upper Columbia Basin.
- Water diversions without proper passage routes disrupt migrations of adult spring Chinook.
- Unscreened diversions trap or divert juvenile spring Chinook resulting in reduced survival.
- Hydroelectric passage mortality reduces abundance of migrant spring Chinook.
- Sedimentation from land and water management activities is a cause of habitat degradation in some salmon streams.

- Loss of habitat complexity, off-channel habitat, and large, deep pools due to sedimentation and loss of pool-forming structures such as boulders and large woody debris threatens spring Chinook and their habitat in some locations in the Upper Columbia Basin.

Upper and Mid-Columbia River Steelhead

The UCR steelhead DPS was listed as endangered on August 18, 1997 (62 FR 43937), their status was upgraded to threatened on January 5, 2006 (71 FR 834) and then reinstated to endangered status per U.S. District Court decision in June 2007. The status was updated again to threatened on August 24, 2009 (74 FR 42605). This DPS includes all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S.-Canada border, as well as six artificial propagation programs: the Wenatchee River, Wells Hatchery (in the Methow and Okanogan Rivers), Winthrop NFH, Omak Creek, and the Ringold steelhead hatchery programs. The ICBTRT has identified five populations within this DPS: the Wenatchee River, Entiat River, Methow River, Okanogan Basin, and Crab Creek (ICBTRT 2005). The Crab Creek anadromous component is functionally extirpated (ICBTRT 2007).

The Middle Columbia River (MCR) steelhead DPS was listed as threatened on March 25, 1999 (64 FR 14517) and their threatened status was reaffirmed on June 28, 2005 (70 FR 37160). This DPS includes all naturally spawned populations of steelhead (and their progeny) in streams from above the Wind River, Washington, and the Hood River, Oregon (exclusive), upstream to, and including, the Yakima River, Washington, excluding steelhead from the Snake River Basin. Seven artificial propagation programs are considered part of the DPS: the Touchet River Endemic, Yakima River Kelt Reconditioning Program (in Satus Creek, Toppenish Creek, Naches River, and Upper Yakima River), Umatilla River, and the Deschutes River steelhead hatchery programs. Major watersheds within this DPS include the Klickitat, Fifteen Mile, Deschutes, John Day, Umatilla, Yakima, and Walla Walla River Basins. The ICBTRT (2007) identified 20 populations in four major population groups (Eastern Cascades, John Day River, the Umatilla Rivers/Walla Walla, and the Yakima River). The two MCR steelhead populations on the Forest, Naches River and Upper Yakima are part of the Yakima River major population group. The Yakima River major population group includes two additional populations which are not on the Forest; Toppenish Creek and Satus Creek.

UCR steelhead abundance has increased recently for all four populations found within the Forest but no populations have achieved population recovery goals and the DPS is still considered to be at a high risk of extinction (Ford 2011). Total and natural-origin escapement estimates for MCR steelhead in the Upper Yakima were higher in the most recent brood cycle for all four of the Yakima River populations than in the cycle associated with the pervious status review with a high proportion of natural-origin fish. Steelhead escapements into the Upper Yakima River, remain very low relative to the total amount of habitat available (Ford 2011). Many of the problems affecting steelhead populations occur downstream of the National Forest in the mainstem Okanogan and Columbia Rivers, lower Yakima River and possibly the ocean environment. However as is the case with UCR Chinook, there have been significant efforts to improve habitat for both steelhead DPS but degraded habitat conditions remain a concern (Ford 2011).

The primary habitat threats to UCR steelhead are the same as those listed above for UCR spring Chinook salmon (UCSRB 2007). NMFS (2009) identifies the following habitat limiting factors for MCR steelhead in the Yakima River Basin:

- Fish habitat in the Yakima subbasin is substantially influenced by the development of irrigation systems. Limiting factors include altered hydrology (low summer flow, scouring peak flows due to degraded watershed conditions, high summer delivery flows in mainstem Yakima and Naches rivers, reduced winter and spring flows due to irrigation storage, delivery, and withdrawals); degraded riparian area and LWD recruitment; impaired fish passage (dams, culverts, seasonal push-up dams, entrainment in unscreened diversions);
- Altered sediment routing; degraded water quality;
- Loss of historical habitat because of blocked or impaired fish passage;
- Degraded floodplain connectivity and function (loss of off-channel habitat, side channels and connected hyporheic zone);
- Degraded channel structure and complexity;
- Reduced out-migrant survival in the mainstem Yakima.

Critical Fish Habitat has been designated for UCR spring Chinook salmon, UCR steelhead and MCR steelhead, and are discussed below. The PCEs for the CFH are displayed in Table 3.2-4.

Bull Trout

The U. S. Fish and Wildlife Service reviewed the status of bull trout (*Salvelinus confluentus*) in 1994 and found that all bull trout in the lower 48 states warranted listing under the Endangered Species Act. Listing however was precluded by other higher priority work. In response to a court order, the USFWS re-assessed the status of bull trout based on the 1994 information. Upon re-analysis the USFWS listed five DPS of bull trout within the conterminous United States in 1998. Bull trout inhabiting the Forest were included within the Columbia Basin DPS. The Columbia Basin bull trout is a Threatened Species. The bull trout DPSs were re-evaluated and listed as the coterminous United States population of the bull trout as threatened on November 1, 1999 (64 FR 58910). The Forest includes four bull trout core areas; Yakima River, Wenatchee River, Entiat River and Methow River. Core areas reflect the metapopulation structure necessary to recover bull trout and they contain both migratory and spawning habitat. The most recent bull trout critical habitat designation was on October 18, 2010 (50 CFR Part 17).
Within designated critical habitat areas, there are eight PCEs for bull trout which list habitat components essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering (see page 56).

Bull trout are native to all sub-basins on the Forest except they appear to be extirpated from the Chelan Sub-basin and the Okanogan sub-basin(USFWS 2015, Brown 1992). Lake Chelan is considered a Historic Core Area and the Chelan River and Okanogan river are considered to be foraging, migration and over-winter habitat (USFWS 2015) However, new information collected by the Colville Tribe near the mouth of Osoyoos Lake at Zosel Dam in the Okanogan sub-basin on November 10, 2007 documents a migratory adult moving upstream at the fish ladder (Personal communication, Judy Delavergne USFWS, with Matt Karrer USFS, 2008). PIT tagged bull trout from the Wenatchee and Methow core areas have been observed in the Okanogan River (USFWS 2015) Bull trout were once present within the Salmon Creek

watershed of the Okanogan Basin. The Okanogan River Basin originates in Canada and flows southward to the Columbia River. According to Scott *et al*. (1973) bull trout are found throughout Canada except in the Okanogan Basin. McPhail and Carveth (1992) note that while bull trout are abundant in the Columbia and Kootenay River systems within Canada, they are absent in the Okanogan and Similkameen systems.

Bull trout occur in sub-basins and watershed across the Forest. Within the Wenatchee Core Area bull trout are known to spawn in the Icicle, Peshastin watersheds, the Chiwaukum River, the Nason, Chiwawa, and White/Little Wenatchee watersheds. The Chiwawa River is a stronghold for bull trout not only in the upper Columbia, but in the interior Columbia Basin as well (Lee et al. 1996). Total redd counts in the Wenatchee Core Area between 2007 and 2011 have ranged between 601 and 312 redds, averaging about 497 redds. The extent to which the current surveys underestimate spawning is unknown as the Icicle redd counts only began in 2008 and spawning surveys are being expanded due to discovery of new spawning locations.[7] The average for specific spawning areas are:

- Icicle Creek (2008-2011) – just over 4 redds
- Peshastin Watersheds - 0 redds over the time period. The last year redds were recorded is 2003
- Chiwaukum watershed – Almost 30 redds
- Nason watershed – 2.6 redds
- Chiwawa watershed – almost 385 redds
- White/Little Wenatchee watershed – almost 77 redds

Bull trout in the Yakima Core Area are currently known to spawn in: Ahtanum Creek (North, Middle and South Forks); in the Naches River system (Rattlesnake Creek and tributaries, Union and Kettle Creeks that flow into the American River and Crow Creek); within the Rimrock Lake system (South Fork Tieton River and Bear Creek, Indian Creek and the upper North Fork Tieton; Deep Creek and the upper Bumping River that flow into Bumping Lake; the North Fork Teanaway River/Deroux Creek; Box Canyon Creek and the upper Kachess River that flow into Kachess Lake; Gold Creek; and in limited numbers in the mainstem Yakima River between Keechelus and Easton. Bull trout arealso found in the Waptus River/Waptus Lake and suspected in the Cle Elum River upstream of Lake Cle Elum. The strongest populations are found in the Rimrock Lake and Bumping Lake systems. Average redd counts between 2010 and 2014 are:

- Ahtanum Watershed – 13 redds
- Naches River tributaries – 93 redds
- Rimrock Lake tributaries – 315 redds
- Bumping Lake tributaries 149 redds
- North Fork Teanaway – only one red during the period in 2013
- Kachess Lake tributaries – 32 redds
- Gold Creek - almost 18 redds

[7] Email from Judy Neibauer (USFWS) to Ken MacDonald May 15, 2015; Redd Data. Email includes *Summary of Bull Trout Spawning Ground Surveys and other Bull trout Counts in the Wenatchee, Entiat, and Methow Watersheds 1988-2011*

Redds have only sporadically been observed in the mainstem Yakima River between Keechelus and Easton, the North Fork Teanaway River and none have been observed in the upper Cle Elum River and Waptus Lake systems. The redd counts are indicators of population trends but it should be noted that many of the surveys are considered incomplete and high water often precluded completing the third of three surveys that are required for a spawning survey to be considered complete.[8]
Bull trout in the Entiat River Core Area are only known to be found in the Mad River and the Entiat River mainstem. Bull trout redd counts in the Entiat core area between 2007 and 2011 have ranged between 13 and 41, averaging a little over 25 redds. The average number of redds (2007-2011) has been 12 redds and 13 redds in the Mad and Entiat Rivers respectively.[9]

Bull trout spawning within the Methow core area occurs in the Lower Methow watershed, the Twisp watershed, Chewuch watershed, Upper Methow watershed and Lost Creek. Total redd counts in the core area between 2007 and 2011 have ranged between 160 and 223 with an average over the time period of 201 redds including 69 redds in the Lost River (first spawning survey completed in 2011). The 2007-2011 averages within the different watersheds are:

- Lower Methow watershed – 2 redds
- Twisp watershed – 89 redds
- Chewuch watershed – 45 redds
- Upper Methow watershed – 50 redds

The viability status of all the core areas is at some level of risk as displayed in Table 3.2-2 based upon USFWS (2008)

Table 3.2-2 Bull Trout Population Status

Core Area	Short-term Trend Rank	Threat Rank	Final Rank
Yakima River	Very rapid decline	Substantial, imminent	High risk
Entiat River	Stable	Moderate, imminent	At risk
Methow River	Declining	Moderate, imminent	High risk
Wenatchee River	Stable	Widespread, low severity	Potential risk

The USFWS (2014, 2015) identified habitat threats to the populations within the four core areas included on the Forest. Some of these threats are summarized in the following table.

[8] Email from Judy Neibauer (USFWS) to Ken MacDonald May 15, 2015; Redd Data. Email includes*: Bull TrRedd Sum2014_Excel*
[9] [9] Email from Judy Neibauer (USFWS) to Ken MacDonald May 15, 2015; Redd Data. Email includes *Summary of Bull Trout Spawning Ground Surveys and other Bull Trout Counts in the Wenatchee, Entiat, and Methow Watersheds 1988-2011*

Table 3.2-2 Bull Trout Core Area Threats

Core Area	Threats			
Yakima River	Passage barriers	Instream impacts (entrainment, low instream flows)	Upland/riparian land management (legacy and current timber harvest and roads: recreation; grazing; water temperature	Nonnative fishes (brook trout hybridization, brown trout)
Entiat River	Upland/riparian land management (legacy timber harvest and roads	Instream impacts (entrainment)	Passage barriers	Nonnative fishes (brook trout)
Methow River	Upland/riparian land management (legacy timber harvest and roads; water temperature)	Passage barriers	Nonnative fishes (brook trout)	
Wenatchee River	Upland/riparian land management (legacy and current timber harvest, roads, recreation)	Nonnative fishes (brook trout)		

Both migratory (adfluvial and fluvial forms[10]) and resident life histories are found on the Forest. Spawning occurs between late August and October. The peak of bull trout spawning on the Forest occurs in the last two weeks of September through the first two weeks of October, dependent on water temperature. Spawning is initiated as water temperatures decline in late summer. Spawning generally begins as water temperatures drop to between 11º and 9ºC, with peak spawning activity when water temperatures reach 5º to 6ºC (about 41º-43ºF) (Brown 1992). Fry have been found to take up to 223 days before emerging from the gravel in the Flathead River system (Brown 1992). Assuming a similar incubation period for the Forest, emergence would be expected in mid-April. Craig (1997) estimated emergence in several Yakima River tributaries to be as early as October and possibly as late as July 7 in one stream. In most of his study streams the estimated date of emergence was before the end of April. Juveniles of the migratory life history forms will rear in the spawning tributaries for one to three years before migrating downstream to a larger river or lake. On the Wenatchee portion of the Forest, most migratory adults observed in spawning aggregations are aged five to nine (Brown 1992). It could be assumed that Methow sub-basin bull trout are similar to those of the Wenatchee with respect to reproductive age.

[10] Adfluvial generally refers to fish that spawn and rear in a river and then migrate to a lake to mature. Fluvial generally refers to fish that spawn and rear in a tributary stream then migrate to a larger river to mature. Resident fish reside in tributary streams their entire life without migrating.

Radio-telemetry studies conducted by the USFWS and Douglas and Chelan County PUDs show that bull trout migrate widely from headwater streams down through the mainstem rivers and even into the Columbia River and sometimes but infrequently between sub-basins). Most of the Entiat bull trout were found in using radio-telemetry studies by the USFWS to depend heavily on the mainstem of the Columbia River to forage and overwinter. Migratory bull trout were also observed above the "Boulder field" (at Snow Creek) on Icicle Creek, which was believed by some to be a passage barrier. Resident bull trout have been observed above the falls on the Little Wenatchee River in Rainy Creek in the Wenatchee sub-basin and above the fall in Early Winters Creek in the Methow sub-basin.

Critical Fish Habitat (CFH)

While the potential effects of roads, cross-country motorized vehicle travel and motorized access for dispersed camping are of concern for all aquatic habitat, the concerns are heightened where the activities may impact designated critical habitat. CFH has been designated for Upper Columbia spring Chinook salmon, Mid-Columbia spring Chinook salmon, Upper and Mid-Columbia steelhead and bull trout. Critical habitat for these species consists of:

- the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (constituent elements)
  - (a) essential to the conservation of the species and
  - (b) which may require special management considerations or protection.

The constituent elements, or primary constituent elements (PCEs) for bull trout that may be affected by motorized recreation and motorized access for dispersed camping decisions particularly pertinent to the Travel Management Project are:

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality, and quantity and provide thermal refugia.
2. Migration habitats with minimal physical, biological or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4. Complex river, stream, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channel, pools, undercut banks and unembedded substrate, to provide a variety of depth, gradients, velocities, and structure.
5. Water temperatures ranging from 36°f to 59°F, with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
6. In spawning and rearing areas, substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand,

embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

7. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

The PCEs for the listed Chinook salmon and steelhead species that may be affected by the Travel Management project are displayed in Table 3.2-4.

Table 3.2-4. PCEs for Upper and Mid-Columbia Steelhead and Upper Columbia Chinook Salmon Pertinent to the Travel Management Project and Life Stage Each PCE Supports (50 CFR Part 226)

	Primary Constituent Element	Life Stage Supported
Freshwater Spawning	Water quality Water quantity Substrate	Spawning Incubation Larval development
Freshwater Rearing	Water quantity Floodplain connectivity	Juvenile growth and mobility
	Water quality Forage	Juvenile development
	Natural cover	Juvenile mobility and survival
Freshwater Migration	Free of artificial obstructions Water quality and quantity Natural cover	Adult mobility and survival Juvenile mobility and survival

Removing vegetation that shades streams and wetlands can contribute to increased stream temperatures and impair fish habitat when high temperatures are a limiting factor. By removing vegetation, roads and motorized access routes for dispersed camping in RR/RHCAs can reduce stream shade and create warmer micro-climates, which in turn can incrementally elevate stream temperatures and thus may degrade water quality, floodplain connectivity, the food base and in-channel habitat components of the above PCEs Road miles and acres within RHCAS open to cross country travel and where motorized access to dispersed camping both in RR/RHCAs and adjacent to Critical Habitat can be useful indicators of the effects of roads and dispersed camping on aquatic habitat.

Recovery Plans

Recovery plans have been prepared for UCR spring-run Chinook salmon and both UCR and MCR steelhead (UCRSRB 2007 and NMFS 2009). The USFWS has prepared a revised draft bull trout recovery plan (USFWS 2014) and a draft implementation plan for bull trout recovery (USFWS 2015). The recovery plans include actions to be implemented to recover the species so that they no longer will need protection under the ESA. The Forest will have a key role either implementing or cooperating with other entities to implement the actions.

Recovery actions identified in the Upper Columbia Recovery Plan of which the Forest is a key partner include:

- Address passage barriers by removing, replacing or fixing artificial barriers (culverts and diversions)
- Reduce sediment recruitment by improving road maintenance
- Reduce the abundance and distribution of brook trout
- Increase habitat diversity, reconnect floodplain and wetlands, restore riparian habitat, increase LWD

Recovery actions identified in the MCR steelhead recovery plan of which the Forest is a key partner include:

- Address Forest Health Issues
- Maintain, upgrade, relocate or abandon forest roads
- Replace culverts
- Improve habitat, restore side channels and floodplains, place LWD
- Reduce dispersed recreation impacts
- Restore tributary headwater meadows

The draft Bull Trout Recovery Plan (USFWS 2014) identifies the following conservation needs for bull trout core areas on the Forest to maintain or expand the current distribution of the bull trout within core areas: maintain stable or increasing trends in bull trout abundance; maintain/restore suitable habitat conditions for all bull trout life history stages and strategies; and conserve genetic diversity and provide opportunities for genetic exchange. Some bull trout recovery actions listed in USFWS (2014, 2015) for which the Forest will be a partner include:

- Maintain, protect and restore riparian habitats
- Reduce impacts to riparian areas, stream banks, stream flow, and water quality
- Reduce impacts from recreation to riparian areas.
- Improve habitat complexity, water quality, and connectivity
- Reduce impacts from transportation networks.

Especially germane to the Travel Management Project, the USFWS (2015) lists recreation as a habitat threat to all bull trout core areas on the Forest. The recreation effects include legacy and new recreational developments that impact spawning and rearing habitat through the recreationists' construction of rock dams, loss of riparian habitat, compacted stream banks and reduced habitat complexity. Naturally the Forest will play an important role managing this threat on the National Forest.

Magnuson-Stevens Fishery Conservation and Management Act (EFH)

Federal fisheries within the middle and upper Columbia basin which are covered under the MSA (Pacific Coast Salmon FMP) include; Chinook and coho (O. kisutch). Summer run Chinook salmon and Yakima River Spring Chinook salmon will be discussed under the MIS section below.

Coho Salmon

Until the early 1900s, naturally produced coho salmon were widespread throughout the Columbia River Basin. Historical abundance is believed to have centered in the Lower Columbia River; however, some stocks migrated to the Spokane River, over 435 kilometers upriver. All middle and upper Columbia River stocks of coho salmon were drastically reduced or destroyed by construction of impassable mill dams, unscreened irrigation diversions, habitat loss, and overharvest prior to completion of Grand Coulee Dam in1941. The decline in production was widespread throughout the river system and has been attributable to combinations of overharvest and habitat loss. All coho salmon populations spawning above Grand Coulee Dam were eliminated with the completion of the dam as no facilities were provided for fish passage. The extent that the middle and upper Columbia River populations declined during the early part of the century is indicated by counts at the first Columbia River main-stem dam (Rock Island Dam) of 183, 69, 10, 0, 58, 78, 13, 12, 29, 1, and 22, from 1933 to 1943, respectively.

Currently the Confederated Tribes of the Yakama Nation are working to re-establish coho salmon in the Wenatchee River, and Methow River subbasins and the Yakima River basin. In the Wenatchee and Methow subbasins coho salmon from the Lower Columbia River have been introduced with the hope of establishing new Upper Columbia populations. Young coho are acclimated to local rivers before being released and then the returning adults are used as broodstock for the next generation. Currently the Tribe is working to re-establish self-sustaining coho salmon population in the Yakima basin's upper reaches in the waters above Lake Cle Elum. Dams prevent access to the headwaters and have been a barrier for more than 100 years. There are five dams on lakes feeding the Yakima River. None of the five dams have fish passages. Fish returning to spawn are captured below Cle Elum dam and trucked around it.

Management Indicator Species (MIS)

Table 3.2-5 lists the Management Indicator Species designated in each forest plan.

Table 3.2-5. Management Indicator Species in Okanogan and Wenatchee Forest Plans

Okanogan Forest Plan	Wenatchee Forest Plan
Cutthroat Trout	Cutthroat Trout
Redband/Rainbow Trout	Bull Trout
Steelhead	Steelhead
Spring Chinook	Sockeye Salmon
Brook Trout	Spring Chinook Salmon
Bull Trout	Summer Chinook Salmon

The following is a brief discussion describing the MIS on the Okanogan-Wenatchee National Forest that are not listed as threatened or endangered species under the ESA.

MCR spring run Chinook Salmon

Spring-run Chinook salmon as with the other salmon species have significant cultural importance to Native Americans. MCR spring-run Chinook salmon are found on the Forest within the Yakima Basin. Mid-Columbia spring Chinook return to both the Naches and the Upper Yakima sub-basins. In the Naches, they spawn in the Naches, Lower Bumping, Lower and Middle Tieton, Rattlesnake, American and Little Naches Rivers, and lower Crow Creek. In the Upper Yakima sub-basin, spring Chinook spawn in the mainstem Upper Yakima, the lower Cle Elum and Teanaway Rivers, and Cabin and Swauk Creeks.

Columbia River Summer-run Chinook Salmon

Summer Chinook salmon are found in the Wenatchee, Okanogan, Lower Yakima, Entiat and Methow subbasins. Currently late or summer run Chinook salmon spawn in the lower part of the mainstem Entiat River, however this population is probably the result of past hatchery releases and it is believed that there never was a natural population in the Entiat River. All summer-run Chinook salmon spawning in the Yakima River, Methow, River and Okanogan River occurs below the National Forest boundary, with spawning occurring within the Forest only in the Wenatchee River. Summer Chinook have been found to be a stable population on the Forest by the NMFS. They are not listed or protected by the ESA. Wenatchee River population has been assessed as Healthy Status by the state of Washington. Wenatchee summer Chinook were identified as a population based on their distinct spawning distribution, river entry timing (June), spawning timing and genetic composition. Spawning takes place throughout the mainstem Wenatchee River from near the outlet at Lake Wenatchee to near the confluence with the Columbia River. Spawning occurs from late September through October. The summer Chinook salmon express an “ocean-type life history. Unlike the spring-run Chinook salmon that generally rear for a year within the natal river systems, the summer Chinook salmon begin migrating towards the ocean soon after the juvenile fish emerge from the spawning gravel.

Sockeye Salmon

The upper Columbia Basin supports the last two viable sockeye salmon populations in Washington State in the Okanogan and Wenatchee subbasins. The Okanogan population spawns in Canada and rears in Lake Osoyoos and therefore is not found on the Forest. Sockeye salmon are unique in that they generally require a lake environment for rearing. Lake Wenatchee is considered one of three ESUs in the interior Columbia River. The Wenatchee River population spawns predominately in the White and Little Wenatchee Rivers and rears in Lake Wenatchee. Dams extirpated sockeye salmon in the Yakima River basin, however since 2007 the Yakima Nation, Bureau of Reclamation, NMFS and other agencies are studying the feasibility of reintroducing sockeye salmon into the upper Cle Elum Rivers.

West Slope Cutthroat Trout (WSCT).

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) are the native cutthroat trout subspecies east of the Cascade Mountains. WSCT are currently found in all sub-basins on the Forest. According to Behnke (2002):

> "The historical east-west distribution of the westslope cutthroat trout extended from the Judith River of central Montana (the Missouri River basin) to eastern-slope cascade drainages of the Columbia River (the Yakima, Wenatchee, Entiat, Chelan, and Methow River drainages in Washington) and the John Day River drainage of Oregon. The distribution of the westslope cutthroat trout in the eastern slope of the Cascade drainages and in the John Day River drainage is likely associated with the glacial-era Lake Missoula and the many failures of its ice dam that sent torrential floods of enormous magnitude across eastern Washington."

WSCT are estimated to currently occupy approximately 59% of the species' total historic range and 58% of the historic range in Washington state (May 2009). WSCT occur throughout the Naches, Upper Yakima, Wenatchee, Entiat, Lake Chelan, Methow subbasins but do not naturally occur in the Okanogan subbasin. The range of WSCT on the Okanogan-Wenatchee National Forest has been extended through extensive stocking programs, especially in high mountain lakes since the early 1900s, including WSCT primarily from Twin Lakes and Chelan/Stehekin in central Washington. There has been genetic testing in many areas to determine the level of hybridization with rainbow trout, which is common, especially where rainbow have been planted and did not historically exist sympatrically with WSCT (Howell and Spruell 2003). WSCT are generally found in headwater streams and alpine lakes, where stream temperatures are cold and human impact is limited. WSCT have been found in channel gradients in excess of 20%, highlighting the importance of protecting steep, low order streams (Latterell *et al*. 2003).

Redband/Rainbow Trout

Redband/rainbow trout are an MIS under the Okanogan Forest plan. Redband trout (*O.m.gairdneri*) are a form of rainbow trout native to the east side of the Cascade Mountain crest (Behnke 2002). Redband trout have been identified via genetic testing in every sub-basin on the Okanogan-Wenatchee National Forest, though in limited distribution. Identification is the main problem, as rainbow trout from many sources have been, and continue to be, planted in streams and lakes throughout the state to satisfy angler demand.

Redband trout populations may exhibit resident and migratory life histories, including the sea-run form or steelhead. Where resident forms of redband trout occur within the range of steelhead, they are not included as a part of the steelhead ESUs that are listed under the federal ESA.

On March 3, 2013 the Regional Forester for USDA Forest Service Region 6 signed the *Rangewide Conservation Agreement for the Conservation and Management of Interior Redband Trout.* The agreement outlines a process of cooperation, coordination, and data sharing among the entities with

either management responsibility or interest for the conservation of interior redband trout. The intent of the agreement is to enhance the cooperation and coordination of interior redband trout conservation efforts. Other signatories include the Regional Foresters of Forest Service Regions 1, 4, and 5; the states of California, Idaho, Nevada, Oregon and Washington, the USDI Bureau of Land Management, the USDI Fish and Wildlife Service; five Indian Tribes and Trout Unlimited.

Brook Trout

(The following discussion was obtained from Reiss *et al.* 2008, page 81).

Brook trout are an introduced char species from the eastern United States that have been planted widely across the state as a game fish. Brook trout have been found to inter-breed with and out-compete native bull trout. Stocking has been much reduced, but many populations are established and thriving. Brook trout are found in every sub-basin on the Forest. Bull trout recovery plans in the Middle Columbia and Upper Columbia Basin list removal of brook trout as a strategy for recovery. However, in the Okanogan Basin where bull trout are not present, brook trout are maintained as an important recreational fishery. Brook trout are also known to have negative impacts on native WSCT populations, in the form of inter-specific competition and predation. Though there is little research on the effect of brook trout stocking on native rainbow populations, habitat overlap would likely create competition between these species as well.

Region 6 Regional Foresters Sensitive Species

Within the National Forest System, a sensitive species is a plant or animal whose population viability is identified as a concern by a Regional Forester because of a significant current or predicted downward trend in abundance or habitat quality that would reduce its distribution. The primary objective of the Sensitive species program is to ensure that federal actions do not contribute to a loss of viability, or cause a significant trend toward listing under the ESA. The following are Region 6 aquatic sensitive species that are suspected and/or known to occur on the Okanogan-Wenatchee National Forest;

- PacificLamprey
- Pygmy Whitefish
- Lake Chub
- Westslope Cutthroat Trout (discussed above)
- Columbia River Interior Redband Trout (discussed above)

Pacific Lamprey (*Entosphenus tridentatus*)

Pacific lamprey is a culturally important the interior Columbia Basin tribes adjacent to the Okanogan-Wenatchee National Forest (Confederated Tribes and Bands of the Yakama Nation and Colville Federated Tribes). Pacific lamprey exhibit an anadromous life history, rearing in freshwater streams, migrating to the ocean where they feed parasitically for several years, and then return to freshwater to spawn. Pacific lamprey distribution on the Forest likely overlaps that of anadromous fish. Washington State lists the pacific lamprey as a taxa of potential concern.

Lake Chub (*Couesius plumbeus*)

Lake Chub have a very limited distribution in Washington State. East of the Cascade Range this species is only known to occur in the Okanogan sub-basin (Wydoski and Whitney 2003). Lake chub use cold, clear water stream and lakes with adequate gravel or cobble for spawning. The lake chub is a Washington state sensitive species.

Pygmy Whitefish

Pygmy whitefish are known to occur in isolated populations within deep lakes of northern North America as remnants of the last ice age (Wydoski and Whitney 2003). Historically, pygmy whitefish resided in at least 16 lakes in Washington (Hallock and Mongillo 1998). Currently they inhabit only nine. Their demise in six lakes is attributed to piscicides, introduction of exotic fish species and/or declining water quality. On the Okanogan-Wenatchee National Forest, WDFW positively identified pygmy white fish in Lake Chelan and in Lakes Cle Elum, Kachess and Keechelus, above barrier dams. In 2010, the Bureau of Reclamation conducted a fish entrainment (the incidental trapping of any life stage of fish within waterways or structures that carry water being diverted for human uses) study below Keechelus Dam in Kittitas County (USBOR 2011). Pygmy whitefish were the second most common fish captured in the study, but suffered a high mortality rate of about 90%. It is therefore assumed that local dam operations in the Mid and Upper Columbia River and pertinent sub-basins have negatively impacted pygmy whitefish populations as a result of habitat fragmentation. The species is a Washington state sensitive species.

Existing Condition

Human uses adjacent to streams whether roads, trails or motorized access for dispersed camping can damage stream bank vegetation. Loss of streambank vegetation can result in stream channel widening and a reduction of large woody debris available for recruitment to the stream. Wider streams with shallow flow are subject to greater amounts of warming. Maintenance of streambank integrity and shade along streams is essential to the maintenance of optimum water temperature and aquatic habitat for naturally occurring biota. As stated above, and generally speaking, these impacts have been proportionally low across the Forest, but may be biologically relevant to aquatic species, for example adjacent to critical habitat for listed species. It is likely that in some areas the daily water temperature changes occurring as a result of the unauthorized creation and maintenance of motor vehicle routes could be measured at the site scale. However, at the sub watershed level (6^{th} level HU) it is likely that these changes would not be measurable. The increased temperature "pollution" would be diluted quickly as water mixes and moves down stream. Dispersed camping impacts to aquatic and CFH are also generally limited to the site scale however there is concern that multiple sites within a subwatershed or watershed may eventually, cumulatively lead to larger scale impacts.

Cross Country Motorized Travel

There are 2.6 million acres currently open to cross country motorized travel, of which approximately 675,000 acres are flat, open and accessible enough to result in the development of unauthorized routes by OHVs. There are 275,416 acres within RRs or RHCAs that are open to cross-country motor vehicle travel. Of these, approximately 79,261 acres have < 40% slope and 50% canopy cover which suggest that cross-country travel is more likely on these acres.

Cross-country motor vehicle travel frequently results in degradation of riparian vegetation, increased bank erosion, nutrient loading, sedimentation, and hydrocarbon pollution to streams; which in turn increases metabolic rate, respiration crushing, and oxygen demand of fish and amphibians (Jennings 1996). Motor vehicles traveling across stream banks degrade those banks, increase future erosion potential, and deliver sediment to streams, increasing turbidity.

In general, off-road travel impacts fisheries and aquatic resources in the form of increased erosion and, consequently, increased sediment delivery to watercourses. The creation of new unauthorized routes and the continued use of previously established unauthorized routes near watercourses and riparian areas are of increased concern because many of these routes are user-created and were never designed to effectively move water off of the route. This can lead to the potential for increased amounts of water being captured and diverted into streams. It can also be disruptive to the hydrologic processes that function to provide the high water quality that aquatic species are dependent upon. In addition to negative impacts to water quality, the effects of cross-country motor vehicle travel include opportunities for motorists to cause direct mortality through the crushing of individual aquatic species as they drive through streams and perennial wet areas.

The proliferation of unauthorized routes has caused disruptions in the aquatic and riparian environment and declines in water quality, negatively affected. Focused use in areas that are unsuited for cross-country motor vehicle travel is also a concern. Unmanaged motor vehicle use has resulted in unplanned roads, trails, erosion, and watershed degradation. Riparian areas are particularly vulnerable to motor vehicle use.

Riparian areas that are of vital importance to aquatic species are impacted through modifications to vegetation and hydrology that occur with the creation and use of un-designed, unauthorized routes. Negative impacts to vegetation can result in decreased stream productivity and decreased stream shading. Stream productivity can be reduced when riparian vegetation is modified, reduced, or eliminated. Once riparian vegetation is impacted, it no longer provides leafy debris or other organic materials to the stream channel. This organic material is consumed by aquatic species including invertebrates, algae, and bacteria as a food source, thus providing a productive and robust aquatic environment supplying food sources for fish.

A decrease in stream shading because of modifications or reductions to riparian vegetation contributes to increases in water temperatures through solar insolation. Aquatic species are reliant on natural

temperature regimes, and when altered, temperature changes can result in the decreased vigor and production of aquatic populations. Stream temperature is very important to the aquatic communities' diversity and structure. Alterations in environmental conditions like temperature may reduce habitat suitability for some species but increase it for others. For example, anadromous species require cold water for spawning and rearing. Vehicle travel off designated roads, and use of unauthorized routes within riparian areas is creating disturbed areas unable to reestablish important vegetation and hydrologic function.

The Moon and Runny Rock areas are located at sites of extrusive volcanic bedrock and have long been used by OHV enthusiast as "rock crawl" challenge. Soil development is limited due to the exposed bedrock, and the potential for accelerated erosion and sediment delivery is limited due to the geomorphic and topographic setting. The current use if having no effect on fish habitat, hydrology, or soil resources.

Road and Trail Network

Route density and designated open route density at the watershed level are useful measurements to display the magnitude of these interactions at the watershed scale. Watersheds that have a higher open route density are more likely to produce sediment and alter the flow regime. Current road densities in FS jurisdiction are 1.2 miles/sq. mile. The open road density of FS system roads in FS jurisdiction is 0.8 miles/sq. mile (ml 2-5). Current open trail densities in FS jurisdiction are 0.6 miles/sq. mile.

The current road density on National Forest System Land and designated open road density are discussed under Atlernative A and displayed by 5th level HUC in Table 3.2-6. At the 5th level current open road densities range from zero to 4.1 mi/mi^2. Open road density refers to roads that are open to motorized travel. Generally when discussing the impacts of roads to watershed function and fish habitat the term total road density or just road density is used as, while the use of roads has greater potential to contribute sediment and chemicals to streams, as well as provide access to riparian habitat, any road on the landscape will cause some change to watershed processes, whether open or closed. Often the open road density is less than the total road density as roads may be closed seasonally to protect important wildlife habitat (e.g. deer winter range) or they may be administratively closed (e.g. maintenance level 1 roads). However for the existing condition, open road density is considered to be the same as total road density as even though maintenance level 1 roads are closed to public travel, in reality, since the Forest is generally open to cross-country travel, the level 1 roads are open to motorized travel unless specifically closed by administrative order that closes the road or area to cross-country travel.

Cedarholm et al. (1981) found that the presence of 2.5 km/km2 (4.0 mi/mi^2) of gravel-surfaced roads undergoing an average distribution of road uses is found to be responsible for producing sediment at 2.6-4.3 times the natural rate in a drainage basin. Lee *et al* (1996) found strong fish populations were generally found where road densities were less than 1.0 mi/mi$^{2.}$ Similarly, in *A Framework to Assist in Making Endangered Species Act Determinations of the Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* (USFWS 1998), road densities less than 1.0 mi/mi^2 are considered

properly functioning, densities between 1.0 mi/mi^2 and 2.4 mi/mi^2 are considered functioning at risk, while those greater than 2.4 mi/mi^2 are considered not functioning with respect to aquatic impacts of road density. It is important to note that viewing route density at the 5th HU scale is a more appropriate scale than to view density at the Forest Scale. Densities are being represented at the 5th HU in this analysis because it is a fine enough scale to isolate conditions of concern. The effects to fish populations due to high road densities are not just due to the presence of the roads but are an indicator of overall human uses and disturbances in a watershed, including recreation.

While motorized vehicle use varies across the Forest, the proportional impacts vary as well. Many of the aquatic environments across the Forest are not substantially affected by motorized vehicle use, but in areas where use is higher, or habitats are particularly vulnerable, even low to moderate motorized vehicle use can have a substantial effect on watershed and aquatic resources. Route density across the Forest is currently having variable impacts. On Forest Service lands, 23 watersheds (43 percent) are properly functioning with regard to road density, 23 (43 percent) are functioning at risk, and 7 (13 percent) are not properly functioning[11].

Alternatively, motorized vehicle use in a watershed like the Stehekin River has a proportionally low impact on aquatic and watershed resources. Road density is very low and there are likely few impacts to aquatic and watershed resources in that watershed that could be identified at broader than the site scale since no listed fish are found in this watershed.

Currently there are 1,313 miles of road in RR/RHCA. This includes Non-National Forest System roads, unauthorized roads, and National Forest system (FS) Maintenance Level 1-5 roads (ML–1 are existing system roads managed as closed but without legal closure). There are 1071.5 miles of FS system road (ML 1-5) in RR/RHCA, and 827.8 miles of Designated Open FS System roads in RR/RHCAs across the Forest. The proximity of these roads to streams adds to their potential to have impacts on the riparian and aquatic environment, threatened and endangered species, sensitive, and MIS. Refer to the Aquatics Report in the analysis file for information about specific watersheds.

There are currently 677.4 miles of roads adjacent to CFH. This includes Non-FS system roads, unauthorized[12], and FS system ML (1-5). There are 274.7 miles of FS system roads (ML 1-5) adjacent to CHF and 259.5 miles of Designated Open FS System roads in CHF. The proximity of these roads adds to their potential to have impacts on the aquatic environment and the PCEs of CFH.

[11] The density represented does not include unauthorized user created routes. Surveys were not done to identify the real extent of unauthorized user created routes. The numbers above under represent the current conditions on the ground.

[12] The Forest does not have a full inventory of unauthorized routes that have been identified. It is likely more unauthorized roads exist than have been inventoried.

Motorized Access for Dispersed Camping

Motorized access to dispersed camping is currently occurring in an unmanaged pattern adjacent to roads in areas open to cross country motorized travel. Of the 275,416 acres of Riparian Reserves/RHCAs where cross country motorized access is not prohibited, 79,261 acres have slopes less than 40% and less than 50% vegetative cover. This can serve as a reasonable upper bound for the current acreage of Riparian Reserves/RHCAs where most of the motorized access for dispersed camping is currently occurring. Of the 1,115 inventoried user created unauthorized access routes to dispersed recreation across the Forest, around 50 percent (554) are in RRs/RHCAs. Of these, 194 are considered roadside parking (within 30 feet of the road) and 301 are routes that access dispersed recreation opportunities.

Dispersed camping sites, and particularly vehicle access to dispersed sites have many characteristics in common with other forms of vehicle use across the Forest. Among the potential impacts of vehicle use to access dispersed sites are bare ground, compacted soils, erosion, changes in hydrology, sediment delivery to streams, removal of vegetation, impacts to stream banks, decreases in shading. These wide ranging effects can degrade habitat and organisms as previously discussed.

The USFWS (2015) has identified some areas of the Forest, where recreation access including unauthorized user created routes (which access dispersed recreation) in riparian areas are a concern for bull trout recovery. Some of the streams where recreation access is a concern include the Twisp River, Early Winters Creek, Wolf Creek, Lost Creek, Lake Creek, Chewuch River and Upper Methow River in the Methow core area; Icicle Creek, the Chiwawa River, Nason Creek the White and Little Wenatchee Rivers in the Wenatchee core area; and an overall concern in the Yakima and Entiat core areas.

Over the last thirty years, the Forest has implemented actions to contain parking access to dispersed campsites. In the late 1980's areas along the Icicle River on the Wenatchee River Ranger District were closed to dispersed camping and motor vehicle use adjacent to riparian areas. In the mid-1990's the Methow Valley Ranger District developed the "Respect the River" program, which targeted popular dispersed recreation sites near important fish habitat along the Chewuch River, and defined and limited motorized access route to some locations. Restoration efforts along access routes and within campsites included soil de-compaction and stream bank plantings. Rock or wood barriers were also installed to limit the size and area of disturbance at the sites, and to limit motorized vehicle access within riparian areas. This program spread across the Forest and similar actions have since occurred on the Cle Elum, Naches, and Wenatchee River Ranger Districts, defining sites and decreasing motorized access to dispersed sites within riparian areas. These sites are referred to as "Improved Sites" in this analysis. A variety of other actions has occurred on the districts, and is summarized in Table 3.1-7, in the Recreation section, on page 3-26.

Direct and Indirect Effects

The following table includes the indicators for fish, hydrology, and soil. The effects are described under the individual alternative sections below. The changes in open road densities, miles of open roads in Riparian Reserves or RHCAs and acres of riparian reserves or RHCAs within designated corridors are relative indicators of the potential risks (or conversely benefits) of the alternatives to aquatic habitat and MIS, sensitive and T&E fish species. Additionally, the miles of open road within 300 feet of Critical Fish Habitat and the acres of corridors within 300 feet of Critical Fish Habitat indicate the relative risks (or conversely benefits) of the alternatives to provide for the PCEs as well as sensitive and MIS species since sensitive and MIS species occupy many of the same watersheds as ESA listed fish on the Forest. Watershed-specific information about these factors is in the Aquatics Report in the analysis file.

Table 3.2-6 Comparison of Fish/Water/Soil Indicators

Indicator	Existing Condition	Alt A	Alt B	Alt C	Alt D
Acres open to Cross-Country Motor Vehicle Travel	2.6 million acres	2.6 million acres	33 acres	33 acres	33 acres
Overall Open Road Density	1.1 miles/sq. mile	1.1 miles/sq. mile	0.7 miles/sq mile	0.7 miles/sq mile	0.7 miles/sq mile
Number of 5th Level HUs with open road density < 1 mi/mi^2	23 HUs	23 HUs	29 HUs	29 HUs	29 HUs
Number of 5th Level HUs with open road density between 1 mi/mi^2 and 2.4 mi/mi^2	23 HUs	23 HUs	22 HUs	22 HUs	22 HUs
Number of 5th Level HUs with open road density >2.4 mi/mi^2	7 HUs	7 HUs	2 HUs	2 HUs	2 HUs
Miles of Open FS Road in Riparian Reserves or RHCAs	1,072 miles	1,072 miles	828 miles	828 miles	828 miles
Miles of Open FS Road within 300 feet of Critical Fish Habitat	275 miles	275 miles	260 miles	260 miles	260 miles
Acres of Riparian Reserves or RHCAs within designated corridors	n/a	53,774 acres*	20,457 acres	14,401 acres	53,744 acres
Acres of Corridors within 300 feet of Critical Fish Habitat	n/a	15,175 acres*	5,042 acres	0 acres	15,175 acres

*Alternative A would not designated Corridors, so the number of acres within Riparian Areas or RHCAs, within 300 feet on both sides of all open roads is displayed as a point of comparison. There would be no limitations on where motorized vehicles could be driven within these acres in Alternative A.

ALTERNATIVE A

Under this alternative, no changes would be made to the current NFTS and no cross-country travel prohibition would be put into place. The Travel Management Rule would not be implemented, and no motor vehicle use map (MVUM) would be produced. Motor vehicle travel by the public would not be limited to designated routes. Unauthorized routes would continue to have no status or authorization as NFTS facilities.

Effects to Threatened, Endangered, Sensitive, and MIS Species

Alternative A poses the most risk to T&E, sensitive and MIS species and EFH.[13] Cross country travel along unauthorized routes would continue to increase the potential for sediment and chemical delivery to streams, as well as damage to riparian vegetation and stream banks. The area over which such impacts may occur is expected to increase due to the anticipated increase in unauthorized routes and general cross-country motorized travel, as well as the effects to watershed and aquatic habitats from unauthorized routes. The proliferation of user developed dispersed camp sites is expected to continue resulting in an increasing amount of riparian and aquatic habitat degradation due to: compacting stream adjacent soils; loss of riparian vegetation that may filter sediment before entering streams, provides shade to streams, provides leaf litter that supports the aquatic macroinvertebrate food base for native trout and salmon as well as provide habitat for terrestrial insects that contribute to the food base; and anchor stream banks. There is expected to be continued loss of large woody debris as in-stream wood is cut for campfires and harassment of spawning fish may increase as new dispersed sites are developed. The construction of rock dams by recreationists may also increase inhibiting upstream fish movement during late-summer and fall low flow periods. Most effects to riparian and aquatic habitat are expected to be confined to the site but whether the level of future use under Alternative A would increase to the point of creating or contributing to watershed scale effects is unknown.

Alternative A has the most potential to adversely affect the PCEs for all the ESA listed species and thus contribute to the threats to recovering the T&E fish identified in the recovery plans. Particular threats and impacts to the PCEs due to continued motorized uses, especially open cross country travel include; increased sediment delivery, loss of stream channel complexity and degraded riparian habitat. While sensitive species and MIS do not have designated critical habitat, MIS and sensitive species habitat would be affected in a similar manner. Depending upon the level of habitat degradation, especially temperature, some non-native MIS may attain a greater competitive advantage over the native MIS if

[13] Note, EFH overlaps with CFH of MCR steelhead in the Yakima subbasin and CFH for UCR steelhead or UCR spring-run Chinook salmon or bull trout in the Wenatchee, Entiat and Methow subbasins. Therefore the potential impacts to EFH that may be attributed to any alternative will be considered the same as CFH and therefore the potential effects to EFH will not be specifically discussed further.

habitat damage contributes to sub-watershed scale effects. The greatest potential for the development of user-built cross country trails and dispersed campsites to impact aquatic habitat would likely occur on the approximately 79,261 acres that have < 40% slope and 50% canopy cover that are open to cross country travel.

Cross Country Motorized Travel

The 2.6 million acres currently open to cross-country motor vehicle travel, including the 675,000 acres most likely being used within this, would still be open. As discussed in the Existing Condition section, cross-country motor vehicle travel frequently results in degradation of riparian vegetation, increased bank erosion, nutrient loading, sedimentation, and hydrocarbon pollution to streams; which in turn increases metabolic rate, respiration crushing, and oxygen demand of fish and amphibians (Jennings 1996). Motor vehicles traveling across stream banks degrade those banks, increase future erosion potential, and deliver sediment to streams, increasing turbidity. These changes result in decreases to water quality that can result in negative impacts to aquatic resources such as fish and aquatic invertebrates.

In general, the continuation of off-road travel and the use of unauthorized routes could impact fisheries and aquatic resources in the form of increased erosion and, consequently, increased sediment delivery to watercourses. The creation of new unauthorized routes and the continued use of previously established unauthorized routes near watercourses and riparian areas are of increased concern because many of these routes are user-created and were never designed to effectively move water off of the route. This could lead to the potential for increased amounts of water being captured and diverted into streams. It could also be disruptive to the hydrologic processes that function to provide the high water quality that aquatic species are dependent upon. In addition to negative impacts to water quality, the effects of cross-country motor vehicle travel include opportunities for motorists to cause direct mortality through the crushing of individual aquatic species as they drive through streams and perennial wet areas.

As there are continued disruptions in the aquatic and riparian environment and declines in water quality as unauthorized routes proliferated, aquatic species could be negatively affected. Focused use in areas that are unsuited for cross-country motor vehicle travel is also a concern. Unmanaged motor vehicle use has resulted in unplanned roads, trails, erosion, and watershed degradation. Riparian areas are particularly vulnerable to motor vehicle use. The use of these routes would continue, and new routes could be created. The actual extent to which aquatic biota would be affected as a result of implementing this alternative cannot be quantitatively assessed because of the unknown potential for expansion of the unauthorized route system. The continued unmanaged use of these routes and unlimited cross country travel poses risks to the fish and other aquatic species of the Okanogan-Wenatchee National Forest.

Riparian areas that are of vital importance to aquatic species would continue to be impacted through modifications to vegetation and hydrology that occur with the creation and use of unauthorized routes.

Negative impacts to vegetation could result in decreased stream productivity and decreased stream shading. Stream productivity could be reduced when riparian vegetation is modified, reduced, or eliminated. Once riparian vegetation is impacted, it would no longer provide leafy debris or other organic materials to the stream channel. This organic material is consumed by aquatic species including invertebrates, algae, and bacteria as a food source, thus providing a productive and robust aquatic environment supplying food sources for fish.

A decrease in stream shading because of modifications or reductions to riparian vegetation would likely contribute to increases in water temperatures through solar insolation. Aquatic species are reliant on natural temperature regimes, and when altered, temperature changes could result in the decreased vigor and production of aquatic populations. Stream temperature is very important to the aquatic communities' diversity and structure. Alterations in environmental conditions like temperature could reduce habitat suitability for some species but increase it for others. The continuation of vehicle travel off designated NFTS roads, and use of unauthorized routes, will likely leave currently disturbed areas unable to reestablish important vegetation and hydrologic function. Current ground disturbances will likely persist, impacting the fisheries and other aquatic resources on the Okanogan-Wenatchee National Forest. In the long-term, this alternative is likely to result in aquatic and riparian habitat degradation and negative impacts to individual fish and other aquatic species individuals. The continued unrestricted creation and use of roads and cross-country travel would have an unquantifiable amount of risk to Forest fisheries and aquatic resources.

Road and Trail Network

Open Road Density

Use of roads can increase the production and delivery of fine, easily detached and eroded soil particles, especially if use exceeds the original road design. Overall, road density would continue to be 1.2 mi/mi^2 on FS lands. Maintenance level 1 roads would continue to be part of this road density because they would not be closed to motorized use. Twenty-three of the 53 watersheds would continue to have open road densities between 1.0 and 2.4 mi/mi^2 while only seven watersheds would have open road densities greater than 2.4 mi/mi^2. Five of the watersheds which are not properly functioning with regard to total road density would have open road densities below 2.4 mi/mi^2. The amount of sediment delivered to the aquatic environment from the roads would vary depending upon the amount of use. Some roads could receive relatively little use and therefore the sediment production may be less than the total road density may suggest.

Functioning Watersheds

There would continue to be 23 watersheds properly functioning, 23 watersheds functioning at risk and seven watersheds that are not properly functioning with regard to road density with implementation of Alternative A. Maintenance level 1 roads are included in the Road Density on FS Lands calculation because, though these roads are put in a maintenance level that is designed to preclude vehicle use, vehicle use by motorized vehicles would still be allowed on these roads by virtue of allowing cross-country vehicle travel. These watersheds can be expected to continue experiencing the problems

related to moderate and high road densities described in the Existing Condition section. In particular, these watersheds have a greater potential for accelerated erosion and sediment delivery to streams than watersheds with lower road densities, along with resulting impacts to aquatic invertebrates and fish.

Miles of Road in Riparian Reserves/RHCAs

There would be no change in the mileage of roads within RR/RHCAs or the mileage of road in RR/RHCAs. In Alternative A there would be 1,071.5 miles NFS roads in riparian reserves, which includes ML-1 roads. Though ML -1 roads are put in a maintenance level that is designed to preclude vehicle use, vehicle use would still be permitted by virtue of allowing cross-country vehicle travel. The roads within RR/RHCAs would continue to affect floodplain and riparian function through changes to hydrologic function and alteration of vegetation, while being an efficient delivery pathway of sediment to streams. These effects in turn could affect aquatic habitat and organisms by increasing fine sediment in streams and elevating stream temperatures. These road miles would also have the potential for accelerated erosion dependent on the level of maintenance and use they receive. Current effects to sensitive and MIS species habitat, and EFH would be expected to continue.

Miles of Road within 300 Feet of Critical Fish Habitat

There would be no change in the mileage of roads within 300 feet of Critical Habitat. Overall, there would be approximately 677 miles of roads within 300 feet of Critical Habitat for listed fish species, almost 275 miles of which are Forest Service system road, and about 259 miles of FS System designated open. Much like roads located within the larger RR/RHCAs, the roads within 300 feet of Critical Habitat for Listed Fish would continue to affect floodplain and riparian function through changes to hydrologic function and alteration of vegetation, while being an efficient delivery pathway of sediment to streams. These effects could, in turn, affect aquatic habitat and organisms by increasing fine sediment in streams and elevating stream temperatures. The current risks to CFH and impacts to the PCEs as well as the recreation threat to bull trout recovery as identified by USFWS (2015) would be expected to continue.

Motorized Access to Dispersed Camping

Unmanaged motorized access for dispersed camping would continue with implementation of Alternative A, perpetuating the current effects described above. Motorized access to dispersed campsites within riparian acres, especially considering that vehicles would be driven to the water's edge, would continue to have a greater potential to affect RR/RHCAs by hydrologic modifications, soil transport and deposition, and vegetation alteration. Concurrent with the potential physical impacts are impacts to aquatic habitat and organisms such as localized decreases in stream shading, and delivery of fine sediment to streams. There would likely be continued proliferation of newly created routes in some areas impacting sensitive, MIS and ESA listed species and CFH. Currently the lack of restrictions on use within 300 feet of critical habitat, including driving and parking motorized vehicles at the water's edge (except at defined sites) would continue to degrade critical fish habitat as described earlier in the sections, Best Available Science and Rationale, and Existing Condition as well as result in the likely proliferation of unauthorized routes in these areas.

Overall Effects of Alternative B on Aquatic Resources, Hydrology and Soil

Alternative B would decrease open road densities in forty-two watersheds. While the road mileage in RR/RHCAs would not change, there would be 317.5 fewer miles of road open to vehicle travel in RR/RHCAs, and 23.3 fewer miles of open road to vehicle travel in critical fish habitat as a result of closing maintenance level 1 roads to motorized vehicles. Since use of routes continuously produces fine, easily detached and eroded soil particles, closure would reduce sediment production.

Actions listed above which may result in modest short term decreases in sediment production and delivery would likely lead to greater long term reductions due to natural re-vegetation of roads that are currently open and would be closed under this alternative. By designating the Forest closed to motor vehicle travel except on designated routes, undesignated routes and roads would not produce easily detached and eroded soil particle through time. Further, re-vegetation through time would reduce sediment production and delivery, particularly in RR/RHCAs where transport distances are the shortest.

As mentioned, designation of corridors includes special provisions for operation of motor vehicles within the corridors, which are designed to prevent incremental growth of disturbed areas within the corridors. The monitoring and mitigation, as discussed above, would also identify and mitigate for incremental growth. These measures would reduce the chronic production and delivery of sediment within the RR/RHCAs as well as protect riparian vegetation necessary for maintenance of beneficial microclimates and stream temperature. The provisions and strategies would also serve to maintain streambank integrity and shade which is essential to the maintenance of optimum water temperature and aquatic habitat.

Decreasing the production and delivery of fine sediment to aquatic systems would be beneficial to these systems. Decreasing sediment may improve spawning success, improve primary production of aquatic microorganisms and insects, and improve respiration and feeding success of salmonids.

Effects to Threatened, Endangered, Sensitive, and MIS Species

Alternative B reduces the risk to T&E, MIS and sensitive species and their habitat compared to Alt. A. Cross country motorized use, including the use of maintenance level 1 roads outside of designated corridors would no longer be allowed, greatly reducing the potential for sediment and chemical delivery to streams, damage to stream banks and riparian vegetation from such use. Motorized use would be authorized only within designated corridors along existing roads, trails and routes within the designated corridors, and not within 100 feet of water. Motorized access under Alternative B would be restricted to four percent of the RRs/RHCA acreage on the Forest. Not allowing motorized use within 100 feet of streams and other waterbodies would protect riparian and aquatic habitat function from damage by

motor vehicles as riparian vegetation that filters sediment, provides shade and bank stability to streams, as well as leaf litter and terrestrial invertebrates should be maintained.

The potential impacts to riparian and aquatic habitat due to dispersed camping would also be greatly reduced as access to dispersed sites would be confined to existing routes within the corridors, and, other than the improved sites, there would be no motorized use in the corridors within 100 feet of a stream other than at the improved sites. By keeping motorized use back 100 feet, the potential damage to riparian soils, vegetation, and stream banks would be greatly reduced, since any impacts would be caused by foot traffic and not by vehicles. There would undoubtedly be unauthorized cross-country travel but such travel should diminish over time as the public adjusts their use patterns to conform to the new rules. Having designated corridors would make it easier for the Forest to manage motorized use to prevent impacts to watershed, riparian and aquatic resources and designated corridors will allow for better enforcement of unauthorized motorized use and allow the Forest to focus monitoring within the corridors.

The potential for motorized use to affect the PCEs of CFH and contribute to the threats to recovery of ESA listed fish would be greatly reduced in all watersheds with CFH, as the acres within RRs/RHCAs adjacent to CFH open to motorized use greatly reduce in all watersheds. The reduced acres of RRs/RHCAs not only in watersheds with CFH but other watersheds as well also greatly reduces the potential for adverse effects to MIS and sensitive species.

Overall Effects of Alternative C on Aquatic Resources, Hydrology and Soil

Alternative C would decrease open road densities in forty-two watersheds. While the road mileage in RR/RHCAs would not change, there would be 317.5 fewer miles of road open to vehicle travel in RR/RHCAs, and 23.3 fewer miles of open road to vehicle travel in critical fish habitat as a result of closing maintenance level 1 roads to motorized vehicles. Since use of routes continuously produces fine, easily detached and eroded soil particles, closure would reduce sediment production.

Alternative C would have the least potential impact to RR/RHCA of any alternative. The RR/RHCAs not included in corridors would be restored as the access routes revegetate, and no new ones are established. The special provisions for operation of motor vehicles within the corridors would help reduce the risk of incremental growth of disturbed areas within the corridors. The monitoring and mitigation, as discussed above, would also identify and mitigate for incremental growth. These measures would reduce the chronic production and delivery of sediment within the RR/RHCAs as well as protect riparian vegetation necessary for maintenance of beneficial microclimates and stream temperature. The provisions and strategies would also serve to maintain streambank integrity and shade which is essential to the maintenance of optimum water temperature and aquatic habitat.

Short term there would be a slight reduction in delivery of sediment to water ways. Riparian vegetation would benefit in the short term primarily due to further decreases in the acreage of RR/RHCA where vehicle travel would be permitted and the Monitoring and Mitigation Plan discussed above in Effects Common to All Action Alternatives.

Alternative C would reduce motor vehicle travel in sensitive riparian areas. Because of the decrease in the number of established access routes where motorized use would be allowed within RR/RHCA riparian vegetation would improve as those areas begin to recover naturally. By designating the Forest closed to motor vehicle travel except on designated routes and roads, undesignated routes and roads would not produce easily detached and eroded soil particles through time. Further, re-vegetation through time would reduce sediment production and delivery, particularly in RR/RHCAs where transport distances are the shortest.

This alternative would have the least number of acres in corridors, and the fewest number of established access routes where motorized vehicles would still be allowed. This would result in the largest reduction in the chronic production and delivery of sediment within the RR/RHCAs as well as protect riparian vegetation necessary for maintenance of beneficial microclimates and stream temperature, compared to the other alternatives. The design criteria for corridors as well as the Monitoring and Mitigation Plan would also serve to maintain streambank integrity and shade which is essential to the maintenance of optimum water temperature and aquatic habitat.

Over time, this alternative would allow for a very high level of recovery in the RRs and RHCAs currently impacted by cross-country motor vehicle use and the use of unauthorized routes. Passive natural restoration of previously created unauthorized routes would begin to improve riparian conditions beginning in the first couple of years, while longer term, five or more years, would likely show near complete recovery in some areas. The rate that passive restoration would improve conditions would be directly proportional to the degree of current impacts in any particular area. The degree of compaction provides a good example of one characteristic that would influence restoration and recovery rates. The higher the degree of compaction in an area the longer it may take to recover. As passive restoration occurs across the landscape improved conditions are expected for fish and aquatic species.

Decreasing the production and delivery of fine sediment to aquatic systems would be beneficial to these systems. Decreasing sediment may improve spawning success, improve primary production of aquatic microorganisms and insects, and decrease the potential harassment of spawning salmon and bull trout.

Effects to Threatened, Endangered, Sensitive, and MIS Species

Alternative C poses the least risk and would provide the most benefit to T&E, MIS and sensitive species and their habitat of all alternatives. Cross country motorized use, including the use of maintenance level 1 roads outside of designated corridors would no longer be allowed, greatly reducing the potential for sediment and chemical delivery to streams, damage to stream banks and riparian vegetation from such use. Motorized use would be authorized only within designated corridors along existing roads, trails and

routes within the designated corridors, and not within 100 feet of water. Motorized access under Alternative C would be restricted to three percent of the RRs/RHCA acreage on the Forest. Not allowing motorized use within 100 feet of streams and other waterbodies would protect riparian and aquatic habitat function from damage by motor vehicles as riparian vegetation that filters sediment, provides shade and bank stability to streams, as well as leaf litter and terrestrial invertebrates should be maintained.

The potential impacts to riparian and aquatic habitat due to dispersed camping would also be greatly reduced as access to dispersed sites would be confined to existing routes within the corridors, and other than the improved sites, there would be no motorized use in the corridors within 100 feet of a stream. By keeping motorized use back 100 feet, the potential damage to riparian soils, vegetation, and stream banks would be greatly reduced to that caused by foot traffic and not by vehicles. There would undoubtedly be unauthorized cross-country travel but such travel should diminish over time as the public adjusts their use patterns to conform to the new rules. Having designated corridors would make it easier for the Forest to manage motorized use to prevent impacts to watershed, riparian and aquatic resources and designated corridors would allow for better enforcement of unauthorized motorized use and allow the Forest to focus monitoring within the corridors.

Alternative C should not affect the PCEs of CFH or contribute to the threats to recovery of ESA listed fish. There would be no corridors open to motorized use within RRs/RHCAs adjacent to CFH, other than at the improved sites. Allowing no motorized access in RRs/RHCAs adjacent to CFH would also protect habitat for MIS and sensitive species habitat within those areas.

Overall Effects of Alternative D on Aquatic Resources, Hydrology and Soil

Open road densities would be reduced in forty-two watersheds resulting in approximately 317 fewer miles of open roads in RR/RHCAs and 23 fewer miles of open road within RRs/RHCAs adjacent to CFH with implementation of Alternative D. The reduction in open road densities is expected to decrease in sediment production and delivery especially over time due to natural re-vegetation of roads and unauthorized routes that are currently open or being used. By designating the Forest closed to motor vehicle travel except on designated route and roads, undesignated routes and roads would not produce easily detached and eroded soil particles through time. The benefits of reduced sediment production and delivery through time will be greatest as in RR/RHCAs where transport distances are the shortest.

As mentioned, designation of corridors would include special provisions for operation of motor vehicles within the corridors, which would be designed to prevent incremental growth of disturbed areas within the corridors. Monitoring and Mitigation Plan strategies would also identify and mitigate for incremental growth (See Effects Common to All Action Alternatives). These measures would reduce the chronic production and delivery of sediment within the RR/RHCAs as well as protect riparian vegetation necessary for maintenance of beneficial microclimates and stream temperature. The provisions and

strategies would also serve to maintain streambank integrity and shade which is essential to the maintenance of optimum water temperature and aquatic habitat.

Decreasing the production and delivery of fine sediment to aquatic systems would be beneficial to these systems. Decreasing sediment may improve spawning success, improve primary production of aquatic microorganisms and insects. The potential for harassment of spawning salmon and bull trout should be reduced from the present as vehicles will not be allowed within 100 feet of water except at the improved sites.

Effects to Threatened, Endangered, Sensitive, and MIS Species

Implementation of Alternative D would result in less disruption of watershed processes, riparian and aquatic habitat than continued management as described for Alternative A but is not as protective as Alternatives B and C. As in Alternatives B and C the risks to T&E, MIS and sensitive species and their habitat, compared to the current situation, would be reduced as cross country motorized use, including the use of maintenance level 1 roads would no longer be allowed. Restricting motorized vehicles to only maintenance level 2 through 5 roads, motorized trails and established routes to dispersed campsites would reduce the potential for sediment and chemical delivery to streams, and reduce damage to stream banks and riparian vegetation compared to the existing condition and Alternative A. Motorized use would be authorized only along established access routes within 300 feet of existing roads maintenance level 2-5 roads and not within 100 feet of water except at the improved sites. Motorized access under Alternative D would be restricted to the established access routes that fall within four percent of the RRs/RHCA acreage on the Forest. Not allowing motorized use within 100 feet of streams and other waterbodies would protect riparian and aquatic habitat function from damage by motor vehicles as riparian vegetation that filters sediment, provides shade and bank stability to streams, as well as leaf litter and terrestrial invertebrates should be maintained.

The potential impacts to riparian and aquatic habitat due to dispersed camping would also be greatly reduced as access to dispersed sites would be confined to existing routes within the corridors, and other than the improved sites, there is no motorized use in the corridors within 100 feet of a stream. By keeping motorized use back 100 feet the potential damage to riparian soils, vegetation, and stream banks is greatly reduced to that caused by foot traffic and not by vehicles. There would undoubtedly be unauthorized cross-country travel but such travel should diminish over time as the public adjusts their use patterns to conform to the new rules. As with the other action alternatives, having designated corridors would make it easier for the Forest to manage motorized use to prevent impacts to watershed, riparian and aquatic resources and designated corridors will allow for better enforcement of unauthorized motorized use and allow the Forest to focus monitoring within the corridors.

The potential for motorized use to affect the PCEs of CFH and contribute to the threats to recovery of ESA listed fish, as well as adversely affect habitat for MIS and sensitive species, is reduced compared to Alternative A, but is greater than Alternatives B and C. With Designated Corridors along all open roads, the potential for unauthorized cross country travel and unauthorized travel and dispersed camping

within 100 feet of streams is greater than Alternative B and C due to the increased area the Forest would need to monitor and potentially implement mitigation measures.

EFFECTS COMMON TO ALTERNATIVES B, C, AND D

Cross Country Motorized Travel

Alternative B, C, or D would be expected to reduce the current and future potential adverse effects to watershed, riparian and aquatic habitat. Closing cross-country travel and designating areas for motorized use would result in a substantial improvement in fish habitat, hydrology, and soil resource conditions. Nearly all threats to aquatic resources from cross-country motor vehicle travel, as described earlier, would be eliminated or at least greatly reduced with the prohibition of cross-country motor vehicle travel on 2.6 million acres of the Okanogan-Wenatchee N.F, about 675,000 of which are relatively low angle, open and accessible enough for cross-country OHV use. Thirty-three acres at the Funny and Moon Rock areas would continue to be open to cross country motor vehicle travel. These areas are located at sites of extrusive volcanic bedrock and have long been used by OHV enthusiast as "rock crawl" challenge areas. Soil development is limited due to the exposed bedrock, and the potential for accelerated erosion and sediment delivery would be limited due to the geomorphic and topographic setting. The cross country use here would have no effect on fish habitat, hydrology, or soil resources.

In areas currently open that would be closed, habitat quality across the Forest is expected to slowly recover in the long-term through passive restoration (freeze/thaw cycles, roots, vegetation regrowth, etc.) as cross-country motor vehicle travel and future motor vehicle route proliferation cease. Important areas with threatened, endangered, or sensitive aquatic species would be further protected from disturbance by the prohibition of cross-country travel. Future risks to water quality would be greatly decreased, as would risks of direct disturbance and other disruptions of the aquatic environment.

It is important to note that previous tables show National Forest System roads and do not show changes as a result of the closure of unauthorized motorized vehicle routes because the Forest does not have an inventory of all unauthorized routes. The cross-country closure would result in a prohibition of use of any unauthorized routes not adopted as an existing route in an alternative, which would eliminate further impacts to soil, water and aquatic species on these routes.

Road Network

Open Road Density and Functioning Watersheds

All action alternatives would result in a decrease in Open Road Density on FS Lands when compared to Alternative A and the Existing Condition, as displayed in Table 3.2-6 because all maintenance level 1

roads would be closed to motorized vehicles[14]. This would decrease open road density in 42 watersheds across the forest, and potentially decrease sediment production and delivery to aquatic habitats**.**

Although maintenance level 1 roads would be closed to vehicle use, this would not change the total road density. However, open road density would be 0.4 mi/mi^2 lower in all action alternatives when compared to total road density for an open road density of 0.8 mi/mi^2 on FS lands. While the maintenance level 1 roads will likely continue to impact watershed processes to some degree, the impacts will be reduced if there is no motorized use on the roads. The existing impacts to watershed function, especially accelerated sediment delivery to streams, should decrease as vegetation becomes established on the roads.

Miles of Road within Riparian Reserves/RHCAs

The action alternatives would not change the mileage of roads in RR/RHCAs, but would decrease the mileage of open roads within RR/RHCAs by closing all maintenance level 1 roads to motorized use. This would decrease the open road miles in RR/RHCAs by 317.5 miles. A total of approximately 995 miles of open roads would be open in riparian reserves, of which almost 828 are FS system roads. There would be a corresponding decrease in effects to RR/RHCAs including sediment delivery as described earlier, and damage to riparian vegetation and aquatic habitat where these roads access streams. Remaining open roads within RR/RHCAs would continue to affect floodplain and riparian function through changes to hydrologic function and alteration of vegetation, while being an efficient delivery pathway of sediment to streams. These effects in turn can affect aquatic habitat and organisms by increasing fine sediment in streams and elevating stream temperatures. These road miles would also have the potential to continue causing accelerated erosion dependent on the level of maintenance and use they receive, and the extent to which vegetation becomes established on the roads.

Miles of roads within 300 feet of Critical Habitat for listed fish species

The action alternatives would not change the mileage of roads within 300 feet of Critical Habitat for listed fish species, but all action alternatives would decrease the mileage of open roads within 300 feet of Critical Habitat for listed fish species by closing ML1 roads.

The Action Alternatives would reduce the open road miles in CHF by 23.3 miles, leaving 654 miles of open roads in riparian reserves, of which 259 would be FS system roads. There would be a corresponding decrease in effects as described earlier to CHF adjacent to those roads, such as reduction in sediment production, improvement of riparian vegetation, etc., which would locally improve conditions for aquatic habitat and species. Remaining open roads within CHF would continue to affect floodplain and riparian function through changes to hydrologic function and alteration of vegetation, while being an efficient delivery pathway of sediment to streams. These effects in turn can affect aquatic habitat and organisms by increasing fine sediment in streams and elevating stream

[14] Maintenance Level 1 roads would be closed to all motorized vehicles, with the exception of roads included in National Forest System motorized trails. These limited occurrences were tallied with the motorized trail information in this analysis.

temperatures. These road miles would also have the potential for accelerated erosion dependent on the level of maintenance and use they receive.

Effects of Limitations on Motorized Access for Dispersed Camping in Alternatives B, C, and D

Alternatives B, C, and D would all limit motorized access to dispersed camping by designating specific corridors, and restricting the use of motorized vehicles within the corridors to existing access routes, and other than at the improved sites, prohibiting vehicles within 100 feet of lakesides, riversides, and creek sides. This would prohibit the proliferation of new access routes, and reduce impacts to fish habitat, although violations of the rule would likely occur, especially in the first several years following publication of the MVUM, when people are learning the rules. Keeping vehicles at least 100 feet from water would reduce damage to riparian vegetation, and decrease erosion into the water from bank erosion and soil displacement. Riparian areas would be further protected by requiring the use of existing access routes. There would be no additional loss of vegetation or damage to soil since new access routes would be prohibited. As stated earlier, violations of this would likely occur, especially in the first few years after publication of the MVUM. It's assumed that the frequency of violations would be low, based on overall violation use data. The location of any potential violation cannot be estimated, therefore, the environmental effects of violations are not analyzed or projected.

Dispersed camping would be allowed at the improved sites for Alternatives B, C, and D. The Forest has implemented actions to contain motor vehicle access to dispersed campsites by either closing areas to dispersed camping or defining and limiting motorized access to some locations. Restoration efforts along access routes and within campsites have included soil de-compaction and stream bank plantings. Rock or wood barriers have been installed to limit the size and area of disturbance at the sites, and to limit motorized vehicle access within riparian areas as described in the in the Existing Condition. While these efforts have been largely effective at reducing impacts at some location, continued use and increases in the size and number of sites in other areas could perpetuate impacts to riparian areas and aquatic habitat. The effects to aquatic and riparian habitat at the improved sites is expected to continue although over the long term should be reduced from the existing condition as recreationists adjust to the new rules and the Forest is better able to take enforcement action against users camping outside the boundaries of the improved sties.

The number of acres of riparian reserves/RHCAs within corridors, and within 300 feet of CFH, and approximate number of established routes would vary by alternative, as shown in Table 3.2-7. The effects of these variations are discussed in the alternative-specific sections below.

Table 3.2-7. Acres of Designated Motorized Access Corridors and Approximate Number of Existing Access Routes within RR/RHCAs and as a percentage of Total RR/RHCA acres, and Within 300 Feet of Critical Fish Habitat

	Alternative B	Alternative C	Alternative D
Within RR/RRHCAs			
Acres	20,457	14,401	53,744
Percentage of Total RR/RHCA acres	4	3	11
Approximate number of established access routes within corridors	227	100	301
Within 300 Feet of Critical Fish Habitat			
Acres	5,042	0	15,175
Approximate number of established access routes within corridors	107	0	141

Effects of Monitoring and Mitigation Strategy for Corridors

With implementation of Alternatives B, C, or D, monitoring would be conducted to determine the effects of motorized access to dispersed camping and corridor designation, and to ensure compliance with the ACS and RMOs, and the mitigation measure would be implemented if warranted. The overall ACS and RMO objectives are to maintain or improve processes and functions necessary for healthy aquatic ecosystems at the watershed scale. The mitigation measure and monitoring plan are detailed in Chapter 2. Corridors designated for motorized access to dispersed camping would be monitored according to priority determined by their proximity to aquatic and watershed values. If monitoring results in the identification of impacts that approach or exceed ACS or RMO standards, actions would be implemented to return sites to conditions that are within standards. Due to the combined actions of monitoring and mitigation, the potential for the sites to increase sediment production and delivery to aquatic systems would be reduced.

ALTERNATIVE B

Acres of Riparian Reserves or RHCAs designated as Corridors.

Alternative B would have 20,457acres of Riparian Reserves/RHCAs within corridors, and approximately 227 established access routes. Motorized vehicle use within these corridors would continue the potential for sediment production and sediment delivery to stream networks resulting from soil and vegetation impacts. However, the large reduction of RR/RHCA acreage available to cross-country motorized travel and requirements listed design criteria for corridors (vehicles confined to existing routes) and the mitigation measure and monitoring plan (see effects common to all) would greatly reduce the potential for sediment production and sediment delivery to aquatic systems when compared to the current condition. Consequently, the potential for impacts to aquatic habitat and organism resulting from incremental increases in impacted areas and route proliferation in corridors within RRs/RHCAs projected to occur with Alt. A, would no longer occur.

Acres of Riparian Reserves within 300 feet of Critical Fish Habitat designated as Corridors.

Similarly, Alternative B would have approximately 5,042 acres of corridor within 300 feet of critical habitat for listed fish species, and approximately 107 established access routes. The use of the existing access routes would have a continuing potential for sediment production and sediment delivery to stream networks resulting from soil and vegetation impacts as described earlier. However, there would be a large reduction in the number of acres of Critical Fish Habitat within corridors compared to Alternative A. Limiting motorized vehicle use within the corridors to established routes and not allowing dispersed camping within 100 feet of water, with the corresponding monitoring and mitigation would greatly reduce the potential for sediment production and sediment delivery to aquatic systems when compared to the current condition. Consequently, the potential for impacts to aquatic habitat and organisms resulting from incremental increases in impacted areas and route proliferation in corridors within RRs/RHCAs projected to occur with Alt. A, would be greatly reduced over time.

ALTERNATIVE C

Acres of Riparian Reserves or RHCAs designated as Corridors

Under Alternative C there would be no corridors within RRs/RHCAs adjacent to CFH resulting in 14,401 acres (three percent of the RRs/RHCAs on the Forest) of designated corridors within RR/RHCAs. There would be approximately 100 established access routes within these corridors where continued motorized use would be allowed. Consequently, this alternative would result in the largest reduction in the potential for sediment production and delivery to aquatic systems when compared all alternatives.

Acres of Riparian Reserves or RHCAs within 300 feet of CH designated as Corridors

There would be no riparian reserves or RHCAs within 300 feet of CFH included in corridors with implementation of Alternative C, and therefore no established access routes where motorized use would be allowed. This would result in the largest reduction in the potential for sediment production and delivery to aquatic systems when compared to all other alternatives.

ALTERNATIVE D

Acres in Riparian Reserves or RHCAs designated as Corridors

Alternative D would designate 53,744 acres (44 percent) of RRs/RHCAs within corridors, and allow the continued use of the approximate 301 established access routes. Although this alternative would

establish corridors on all open roads[15], the motor vehicle limitations would reduce impacts, compared to Alternative A. Motor vehicles would be restricted to not traveling over 300 feet from the center line of open roads, using only existing access routes, and would not be allowed closer than 100 feet to water other than at improved sites. The potential for sediment production and sediment delivery to stream networks resulting from soil and vegetation impacts is expected to be greater than either Alternatives B or C but less than may be expected under Alternative A since motorized vehicles would be restricted, as described previously. The mitigation measure and monitoring plan for corridors would reduce the potential for sediment production and sediment delivery to aquatic systems when compared to the current condition because currently these areas are open without restrictions on use.

There would be 15, 071 acres of 5th level HU designated as Corridors under this alternative, with motorized use allowed on the approximate 301 established access routes. As described above, the motor vehicle limitations would reduce impacts, compared to Alternative A. Motor vehicles would be restricted to using only existing access routes, and would not be allowed closer than 100 feet to water. The areas would have a continuing potential for sediment production and sediment delivery to stream networks resulting from soil and vegetation impacts. However, due to the Monitoring and Mitigation Plan the potential for impacts to aquatic habitat and organisms resulting from incremental increases in impacted areas and route proliferation in corridors within Critical Habitat would not occur, recognizing successful implementation of the Monitoring and Implementation Plan may be more difficult with more areas included in motorized access corridors than in Alternatives B and C.

Acres of Riparian Reserves or RHCAs within 300 feet of CH designated as Corridors.

There would be 15,175 riparian reserves or RHCAs within 300 feet of CFH included in corridors with implementation of Alternative D, and 141 established access routes where motorized use would be allowed within 300 feet of CFH. This would result in the some reduction in the potential for sediment production and delivery to aquatic systems when compared to existing condition due to the prohibition of cross country travel and the Forest's ability to enforce travel management rules within the corridors..

Effects of WATV Routes in Alternative B and D

Under Alternatives B and D, 350 miles of currently open National Forest System roads will be open to WVAT (need the spelling out). Since these are currently open roads the effects of adding the new use are expected to be minor except for potentially an increased risk of off road travel where these vehicles will now be allowed depending upon the alternative.

[15] Alternative A does not include any corridors since people would be able to continue driving motorized vehicles off all open roads to access dispersed campsites. Refer to the Alternative A discussion for complete discussion and information.

Cumulative Effects

Past Actions

Effects of dam construction, over-harvest of fish and other human activities on the landscape (including timber harvest, off-road travel, flow management, mining, fish stocking and domestic livestock grazing) have contributed to reduced aquatic habitat quality and aquatic biota population levels currently present across the Okanogan-Wenatchee National Forest resulting in the current condition as described in the affected environment section and under Alternative A of this document.

Ongoing (Present), and Reasonably Foreseeable Future Actions

Actions that are planned in and around the Okanogan-Wenatchee National Forest that may act cumulatively to affect water and fisheries displayed in Table 3.0-1, with more detailed information in Appendix A. A generalized discussion of the potential effects of those actions is displayed in Table 3.2-8 below.

Table 3.2-8. Actions Planned on and adjacent to the Okanogan-Wenatchee National Forest

Project type	Negative or Beneficial effect	Possible effect to Soil, Fisheries and Water
Restoration - vegetation Management ,commercial harvest, thinning, fuels reduction projects	Both	Yarding systems and harvest locations have the potential to increase sediment production and delivery when employed in RR, may affect aquatic systems and habitat. Reduction of uncharacteristic, high severity fire risk through thinning and fuels reduction may reduce sediment production and delivery risk to aquatic systems.
Restoration - road, trail and motorized area construction, reconstruction and use	Negative	Use of roads and creation of new or temporary roads potentially increases sediment production and delivery to aquatic systems. Potentially decreases riparian vegetation depending on location and negatively effects hydrologic regimes. May degrade aquatic systems and habitat.
Restoration - Road and trail decommissioning and closures	Beneficial	Reduces potential sources for sediment production and delivery. Reduce potential for locally altering hydrology. Potentially improves riparian vegetation and sediment regime in aquatic systems leading to improved aquatic habitats.
Transportation System Management	Beneficial	Long term reduction in open road mileage across the Forest would reduce potential sources of sediment production and local hydrologic alterations. Potentially improves riparian vegetation and sediment regime in aquatic systems leading to improved aquatic habitats

Fuels Reduction/Management	Beneficial	Reduction of fuel loading has the potential to avert or reduce high intensity fires that can have a short term impact to sediment and hydrology regimes, as well as affect riparian and aquatic habitat.
Aquatic Habitat Restoration	Beneficial	Projects designed to improve aquatic habitat and reduce impacts to aquatic habitat from legacy management activities.
Road Maintenance/Management	Beneficial	Through identification and remediation of problem areas or sites, maintenance has the potential to reduce impacts to aquatic habitat and hydrologic systems.
Special Use Permits	Both	The vast majority of special uses have little to no effect on aquatic systems (e.g. repeater sites). Some Special Uses do have the potential to affect aquatic systems (e.g. transmission line permits). It is assumed that those projects would have permit conditions in place to minimize effects to aquatic systems and aquatic dependent species.
Grazing	Negative	Potential for reduction in riparian vegetation and increase in stream temperature. Potential for increasing streambank erosion and sediment delivery to aquatic systems. The potential negative effects may be reduced through the allotment management planning process and range administration.
Minerals	Negative	May directly affect streambeds and aquatic systems in the case of placer mining. Potential impacts to riparian vegetation and increases in sediment production and delivery.
Weed treatments	Beneficial	Reduces non-native species which typically provide less ground cover than natives, resulting in higher erosion and sediment delivery rates. Non-Natives can outcompete natives in RR.

Restoration projects, transportation system management, fuels reduction/management, aquatic habitat restoration, road maintenance and management, invasive species control, special use permits, minerals projects, recreation projects, facilities, or communication site projects could have effects that would mitigate or add to the effects of this action.

Typically, with these types of projects, there are a suite of effects to watershed processes, fish and aquatic biota. The effects are dependent on the design criteria of the projects and can be minimal or extensive. Ground-disturbing activities such as timber sales, mining and road building can displace sediments, which can be delivered to waterways and affect aquatic biota. Mining and minerals projects have the potential to affect water quality with increases in turbidity. Grazing allotments can contribute

to destabilization of banks and result in increases in turbidity as well. Most of these impacts can be mitigated or prevented, dependent on project design criteria.

Some of these actions, particularly restoration projects with a vegetation management component, have the potential to temporarily increase road density. Temporary roads are often constructed to harvest timber resources. Temporary roads are to be used only during the period of harvest and would not be open to public motor vehicle use, however they still function as road and have the resource effects listed in sec 2.2 until they are decommissioned or put into long term storage and passively restored. Present and reasonably foreseeable road management actions include decommissioning and closing of NFTS roads. The primary effects of increases in road density are related to increased risk to water quality parameters such as sediment production and temperature. Road management projects that decommission or close roads would decrease sediment levels and improve fish habitat over the long term.

There are currently 10,506 road/stream crossing, 7,150 FS system road crossings, and 709 motorized trail crossings on the Forest. Since none of the alternatives would decommission any roads, the number of crossings would not change with the implementation of any alternative. These crossings may contribute sediment directly to streams, and in some cases increase the potential for contributing chemical contaminants, including petrochemicals. There are approximately 183 miles of motorized trails within RR and RHCAs and 709 motorized trail-stream crossings. The location of these trails within RR/RHCAs and their proximity to watercourses increases the potential for these trails to deliver sediment to the stream network. None of the alternatives would change the existing motorized system trails, so the effects of motorized use on the existing trails will continue as described in the Existing Condition and Best Available Science and Rationale sections.

The Forest is proposing to close or decommission approximately 218.5 miles of road as part of reasonably foreseeable future restoration projects, and another 169.7 miles of road in a transportation system plan across the forest. These actions would likely further reduce sediment production and delivery to streams and would have a positive effect on fish and aquatic species.

Under all alternatives the Forest will continue management actions to minimize or avoid adverse effects to riparian and aquatic resources at the improved sites. Typical actions at these sites include restoration efforts along access routes and within campsites such as soil de-compaction and stream bank plantings. Rock or wood barriers will be maintained to limit the size and area of disturbance at the sites, and to limit motorized vehicle access within riparian areas. Management at the improved sites has been largely effective at reducing impacts, however at some locations, continued use, and increases in the size and number of sites are perpetuating impacts to riparian areas and aquatic habitat. The Forest's ability to manage the improved sites to reduce the effects to aquatic and riparian resources should be improved with implementation of the action alternatives as cross-country travel will no longer be permitted, and with the identification of designated routes and corridors the Forest will be in a better

position to enforce unauthorized uses including camping adjacent, to but outside the boundaries of the improved sites.

ALTERNATIVE A

Alternative A would not ban cross-country travel, or change the current Forest Service transportation system. The use and continued creation of both authorized and unauthorized motorized vehicle roads and trails would have negative impacts for soil, fish and aquatic species. Temporary road creation associated with reasonable foreseeable future actions may increase sediment production and delivery, or affect water quality which could increase impacts to aquatic resources. Future projects such as road decommissioning and mineral development (see Appendix A for specific projects) have both beneficial and negative impacts. The effects of management activities on overall watershed health, water quality, soils and fish cannot be quantified. Some actions would improve conditions others will degrade them. Most current project design criteria are developed to minimize negative effects, so although present and future projects may not increase impacts to soil, water and fish, the continued use of existing unauthorized routes and potential for the proliferation of additional unauthorized routes near water as a result of the Forest being open to cross-country travel would likely result in the production and delivery of sediment to stream networks, impacts to riparian vegetation, and site specific increases in detrimental soil conditions. These impacts could potentially degrade aquatic habitats by affecting spawning are rearing through elevated fine sediment, and impairing aquatic habitat through increases in stream temperature. The cumulative effect of Alternative A and the past, present, and reasonably foreseeable future actions would be a gradual degradation in watershed condition.

ALTERNATIVES B, C, and D

Alternatives B, C, and D would ban cross-country travel but not change the current Forest Service transportation system. The cessation of use of unauthorized motorized vehicle roads and trails would have positive impacts for soil, fish and aquatic species. Temporary road creation associated with reasonable foreseeable future actions may increase sediment production and delivery, or affect water quality which could increase impacts to aquatic resources. Future projects such as road decommissioning and mineral development (see Appendix A for specific projects) have both beneficial and negative impacts. The effects of management activities on overall watershed health, water quality, soils and fish cannot be quantified. Some actions would improve conditions others would degrade them. Most current project design criteria are developed to minimize negative effects, so although present and future projects may not increase impacts to soil, water and fish, the discontinuation of the use of existing unauthorized routes and potential for the proliferation of additional unauthorized routes near water as a result of the Forest being closed to cross-country travel would result in a reduction and delivery of sediment to stream networks, impacts to riparian vegetation, and site specific increases in

detrimental soil conditions. The cumulative effect of Alternative B, C, or D and the past, present and reasonably foreseeable future actions would be an improvement in watershed condition.

COMPLIANCE WITH LAWS AND REGULATIONS

Endangered Species Act (ESA)

All alternatives comply with the ESA. None of the alternatives, if implemented, would be likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Alternative A however would potentially adversely affect CFH more than the other alternatives and pose the greatest potential of the alternatives to contribute to threats to recovery of ESA listed fish. All required consultation will be completed prior to the Travel Management decision.

Land and Resource Management Plans (Forest Plan)

Standards and Guidelines for the WNF and ONF Forest Plans are superseded by the NWFP, INFISH, and PACFISH when the latter plans are more stringent. Wenatchee standards and guidelines for riparian, fish, and water resources are covered by ACS and NWFP standards. Okanogan Forest Plan standards and guidelines follow.

- ONF 2-1. Riparian Reserves and RHCAs were considered during alternative design and used for analysis. RR/RHCA distances exceed those of the ONF Forest Plan.

- ONF 2-2. See Northwest Forest Plan (NWFP), INFISH and PACFISH below.

- ONF 2-4. See Northwest Forest Plan (NWFP), INFISH and PACFISH below.
- ONF 2-5; 2-6, 2-7. While riparian impacts from dispersed recreation are not strictly a management activity, riparian habitat has been impacted in the past by this activity. Design criteria for corridors, and the Monitoring and Mitigation Plan would allow for the application of maintenance standards and provide a mechanism to insure that riparian habitat would be maintained or improved through time.

- ONF 2-9. See Northwest Forest Plan (NWFP), INFISH and PACFISH below.

- ONF 2-11. See Northwest Forest Plan (NWFP), INFISH and PACFISH below.

- ONF 2-12. See Northwest Forest Plan (NWFP), INFISH and PACFISH below.

- ONF 3-1. See Northwest Forest Plan (NWFP), INFISH and PACFISH below.

- ONF 3-3. Design criteria for corridors and application of the Monitoring and Mitigation plan would prevent an increase in sediment production. Reduction in open road miles both within

RR/RHCAs and within watersheds would reduce sediment production and delivery to aquatic systems.

- ONF 3-6. See ACS objectives below.

Northwest Forest Plan (NWFP), INFISH and PACFISH

NWFP, PACFISH and INFISH standards and guidelines are essentially the same in that they strive to avoid adverse effects on to the ACS, RMOs, and anadromous or inland fish. Compliance with the standards and guidelines are grouped and discussed below. All alternatives comply with the NWFP, PACFISH and INFISH. The management prescriptions for riparian areas were considered during the analysis process.

- **RF-2 (a-g).** Watershed analyses have been completed through previous efforts for all of the areas where changes to the motorized system are proposed on the Forest and the changes would not prevent attainment of ACS objectives or RMOs. This EA, as part of the larger Travel Management Planning effort, serves as another step in the development and implementation of a Road Management Plan that will be followed by Minimum Roads Analysis completed at the district level. This project would provide access to dispersed recreation through the use of corridors. Design Criteria and the Monitoring and Mitigation plan would ensure that these newly designated corridors meet ACS and RMO objectives, would not adversely affect anadromous and listed fish, and proliferation of roads within RR/RHCAs would not occur.

- **RF-3 (a-c)** Designation of corridors which allow motor vehicle use on existing access routes to established dispersed campsites within RR/RHCAs would be formally monitored and allow for improvement, repair, or removal if necessary to meet these standards. The Monitoring and Mitigation Plan would allow for the prioritization of repair and or closure of those sites that are having adverse effects on either anadromous or inland fish.

- **RM-2** The use of the Monitoring and Mitigation Plan would allow for adjustment of motorized vehicle use for dispersed camping when the use has the potential to retard or prevent attainment of ACS objectives or RMOs.

Aquatic Conservation Strategy Objectives

All action alternatives will be consistent with ACS objectives. Alternative C with the least amount of Corridors within RR/RHCA would be expected to provide the greatest benefit to riparian and aquatic resources while Alternative D would comparatively pose the most risk to maintaining or improving the ACS objectives, compared to the other action alternatives.

Objective 1: Maintain and restore the distribution, diversity and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Closure of the Forest to cross-country motorized travel would reduce localized impacts across the larger landscape and would help to reduce localized impacts to landscape scale features. Many of the actions made through this project are predominately local and occur at the site level, as such, none of these actions would affect landscape scale features. Current distribution, diversity, and complexity of

watershed and landscape-scale features would by maintained or improved by closing the vast majority of the Forest to cross-country motorized travel. Designation of corridors, with the provisions that limit motor vehicle access in proximity to streams would serve to maintain site features at both the site scale and within RR/RHCA in the larger landscape level maintaining or improving aquatic systems within the project area.

Objective 2: Maintain and restore spatial and temporal connectivity in and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Due to the site level scale of the actions proposed for the MVUM, none of the action alternatives would have a discernible effect on spatial and temporal connectivity between watersheds. Reducing the acreage open to cross-country motorized use would prevent proliferation of unauthorized routes in uplands and within RR/RHCAs and would maintain spatial and temporal connectivity locally. Designation of Corridors, and provisions within Corridors would maintain current levels of connectivity in RR/RHCAs by preventing incremental growth of disturbed areas in RR/RHCAs. Decreasing the mileage of open routes in RR/RHCAs and subsequent re-vegetation of currently open routes in RR/RHCAs would also restore some level of connectivity in watersheds within the project area.

Objective 3: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

The current condition has open routes within RR/RHCAs which can create and deliver sediment to aquatic systems, impact vegetation, and alter local hydrologic conditions. All action alternatives were screened to ensure actions would meet Forest Plan standards. Decreasing open road miles in RR/RHCAs, and designation of Corridors in the action alternatives with provisions for motorized use within Corridors would maintain, and may improve, the current integrity of aquatic systems by decreasing sediment production and delivery to aquatic systems and preventing incremental growth of disturbed areas. Through time, vegetation recovery resulting from these actions would improve the integrity of aquatic systems.

Objective 4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individual composing aquatic and riparian communities.

The action alternatives decrease open road mileage within RR/RHCAs and would maintain and lead to improvements in water quality by reducing the potential for sediment production and delivery to aquatic systems. Similarly, designation of corridors with provisions for the use of motorized vehicles within the corridors would also maintain water quality by preventing increases in the motorized footprint within RR/RHCAs and adjacent to waterways. Resulting vegetation recovery with time would

improve microclimate conditions within RR/RHCAs which would also improve water quality by maintaining thermal regimes.

Objective 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

The action alternatives would maintain the current sediment regimes in watersheds across the forest. Eliminating motorized cross country travel would decrease sediment production on unauthorized routes passing through RR/RHCAs, and from general cross country travel in RR/RHCAs. Decreases in open road mileage within RR/RHCAs would decrease sediment production and delivery to aquatic ecosystems locally at the site level. Similarly, limiting motorized travel in RR/RHCAs with designated corridors would prevent increases in sediment production and delivery locally, but site level improvements may not be recognizable at the watershed scale.

Objective 6: Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

The action alternatives would designate corridors and are designed to prevent increases in the motorized footprint within RR/RHCAs. Current flow hydrologic pathways would be maintained, and may be improved through revegetation near stream courses. Overall road densities would not change and the current changes to the drainage network and drainage efficiencies within watershed would stay the same. Reduction in open road density and subsequent re-vegetation of routes may lead to a decrease in drainage efficiencies which may serve to improve water routing and timing within watersheds to the benefit of aquatic species and functions but it is unlikely that the changes would be recognizable at the watershed scale.

Objective 7: Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Due to the site level scale of the actions proposed there would not be any change in the attributes of timing, variability, or duration of floodplain inundation which operate on a watershed scale. Corridor designation with provisions that prevent an increase in motor vehicle footprint would prevent increases of potential impacts to floodplains, meadows and wetlands by limiting the chance for increased rutting, and water routing at the local site level.

Objective 8: Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Eliminating cross-country motor vehicle use in RR/RHCAs in the action alternatives would prevent impacts to vegetation related to unregulated motor vehicle use within RR/RHCAs. The special provisions

within Corridors would prevent the increase of impacts to vegetation in RR/RHCAs, particularly adjacent to stream courses and would maintain or improve current thermal regulation at the site level by eliminating vegetation removal adjacent to streams. Preventing the proliferation of routes within corridors through the use of special provisions would maintain current conditions in RR/RHCAs. Designating only appropriate roads to access dispersed recreation outside of corridors in RR/RHCAs would reduce sediment production and delivery as undesignated routes re-vegetate.

Objective 9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

At the local site level, provisions which prevent the increase of the motor-vehicle footprint in RR/RHCA such as designation of Corridors, and reducing the open road density in RR/RHCAs would allow for re-vegetation through time of undesignated routes under the action alternatives, which would benefit native plant, invertebrate, and riparian dependent vertebrate species. It is unlikely that the benefits would be recognizable at the watershed scale.

Clean Water Act and 303(d)

The implementation strategy for the Wenatchee National Forest Water Temperature Total Maximum Daily Load is based on the amended Wenatchee National Forest Plan, specifically the Aquatic Conservation Strategy. Forest Plan standards and associated riparian protection levels contained within the plan, serve as a benchmark for design of the TMDL assessment and are fundamental components of the TMDL implementation (WDOE, 2003). Meeting regulatory requirements of ACS objectives infers compliance with the Clean Water Act and the TMDL for temperature of 303(d) streams. As stated in ACS objective #4 above, temperature would be maintained. Meeting INFISH, PACFISH, and Okanogan Forest Plan standards and guidelines for RHCAs, Riparian ecosystems, and streambank vegetation would ensure that vegetation and shading is maintained or improved along stream courses on the portion of the forest covered by the Okanogan Forest Plan. This would allow compliance with the CWA. None of the Travel Management alternatives would have any effect on dioxins, PCBs, dissolved oxygen, pH, copper, lead, mercury or silver and therefore would not affect the 303(d) listings for these.

Riparian Management Objectives

None of the alternatives would have any measurable effect on pool frequency or large woody debris. Water temperature, and bank stability, would be maintained on streams near designated open roads and trails because of either the prohibition of cross country travel off of designated routes, or the restrictions on motorized vehicle use in corridors. All designated open roads and motorized trails are currently already in use. Current impacts to RHCAs would be reduced forest-wide and watershed specific basis because of the closure of the Forest to cross country travel.

In summary, all action alternatives should maintain or improve the attainment of RMOs. The potential improvement in RMOs would be greatest with implementation of Alternative C as there would be the least amount of corridors within RHCAs. Alternative D would comparatively pose the most risk to maintaining or improving RMOs due to the project.

3.3 Wildlife

REGULATORY FRAMEWORK

The following regulatory framework gives the general framework for managing wildlife habitat. Some species have specific regulations and guidelines, which are included in the individual species or habitat discussions that follow. More detailed information is included in the Wildlife Report in the analysis file.

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.

Forest Plans

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.

Northwest Forest Plan

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

The Northwest Forest Plan amended the forest plans, establishing land allocations, and included standards and guidelines for Survey and Manage Species, Snags in matrix lands, and Riparian and Aquatic habitats. Refer to the Wildlife Report in the analysis file for a summary of these, and to the document itself for details.

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).

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.

Threatened, Endangered and Proposed Species

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

Table 3.3-1. 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.

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 3.3-2. 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 3.3-3. 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 3.3-4. 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 in corridors where the slope is less than 20% and there is less than 50% vegetation cover. This would cover approximately 6% of the Forest. Alternative C would include approximately 37,408 acres in corridors, covering approximately 0.9% of the overall forest. Alternative D would include approximately 92,611 acres, or 14% of the overall forest.

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

Analysis Area for 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.

Geographic 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:
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.

Construction and use of roads and trails has facilitated access for killing of wolves and reduced security habitat.

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.
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) for locations of these projects and additional details.

Table 3.3-5. Reasonably Foreseeable Future Actions Potentially Affection Wolves

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.

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 Specific to Grizzly Bear

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.

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[16], 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.

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

Table 3.3-6. Grizzly Bear Core Area by Bear Management Unit (BMU)

BMU	total Acres	Core Area	
		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 3.3-7. 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 3.3-8. 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 3.3-9. 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.

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.

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 Specific to Canada Lynx

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.

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 3.3-10. 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 Boundary

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.

1. 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.

2. 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 3.3-11. 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

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).

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 3.3-12. 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 3.3-13. 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 Boundary

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 Boundary

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.

Table 3.3-14. Reasonably Foreseeable Future Projects Potentially Affecting Critical Lynx Habitat

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.

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 Specific to Marbled Murrelet

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.

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 3.3-15. 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%**

Maintenance Level 1 Roads

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 3.3-16. 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 3.3-17. 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**	**% of Habitat that is security habitat**	**% of Habitat that is security habitat**	**% increase in security habitat**
	acres			
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 3.3-18. 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

Analysis Area for Cumulative Effects

Geographic Boundary
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.

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 Specific to the Northern Spotted Owl

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.

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 3.3-19. 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-successional 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 3.3-19 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 3.3-20. 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 3.3-20. 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 3.3-21. 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%**

Table3.3-22. 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.

Table3.3-23. 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

Analysis Area for Cumulative Effects

Geographic Boundary
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 4th 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 Appendix A. 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 3.3-24. 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.

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 Specific to Critical Habitat for Northern Spotted Owl

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.

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 3.3-25. 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

Analysis Area Boundary for 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.

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).

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 3.3-26. 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 3.3-27. Miles of Road and Motorized Trails Within Fisher Habitat by Subbasin

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 3.3-28. 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 3.3-29. 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

Analysis Area for 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 in Appendix A for specific information about these projects.

Table 3.3-30. 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.

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.

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 3.3-31. Summary of Management Indicator Species (MIS) for the Okanogan National Forest and the Wenatchee National Forest (from Okanogan-Wenatchee National Forest, 2011)

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 Specific to Management Indicator Species Requirements

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.

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 3.3-32. 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 3.3-33. 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 3.3-34. 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

Analysis Area Boundary for 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 are summarized in the following table. Refer to Appendix A for detailed information about specific projects.

Table 3.3-35. Reasonably Foreseeable Future Actions Potentially Affecting Late Successional Habitat

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).

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 Specific to Mountain Goat

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.

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 3.3-36. Access in Mountain Goat Habitat by Subbasin

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

Cross Country Motorized Travel

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.

Motorized Access for Dispersed Camping

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 3.37. 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 3.3-38. 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

Analysis Area Boundary for 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.

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 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.

Table 3.3-39. Special Status Species for Winter Range & Winter Range, Shrub, Grass, and Cover Habitat

Species	Habitat	Status
Mule Deer	Winter Range	Management Indicator
Elk	Winter Range, Shrub, Grass, and Cover	Management Indicator

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 3.3-40. Area Outside the Zone of Influence of a Road and Motorized Trails

Subbasin	Acres within forest boundary	Area outside the Zone of Influence of a Road and Motorized Trails	
		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 3.3-41. 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 3.3-42. 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

Analysis Area Boundary for 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 in Appendix A for locations of these projects.

Table 3.3-43. 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).

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

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.

Table 3.3-44. Special Status Species for Dead and Defective Tree Habitat

Three-toed woodpecker	Status	Habitat Present?	Species Present?
Black-backed woodpecker	Management Indicator Species	Yes	Documented
Downy woodpecker	Management Indicator Species	Yes	Documented
Hairy woodpecker	Management Indicator Species	Yes	Documented
Lewis' woodpecker	Management Indicator Species	Yes	Documented
White-headed woodpecker	Management Indicator Species	Yes	Documented
Williamson's sapsucker	Management Indicator Species	Yes	Documented
Red-naped sapsucker*	Management Indicator Species	Yes	Documented
Northern Flicker	Management Indicator Species	Yes	Documented
Pileated woodpecker	Management Indicator Species	Yes	Documented
Three-toed woodpecker	Management Indicator Species	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.

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 3.3-45. 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 remainder of the sensitive species will not be discussed in this report because the current motorized use is not affecting their habitat, and none of the alternatives would affect their habitat.

- 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.
- 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

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 3.3-46. 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 for Landbirds

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 Table 3.3-50.

Table 3.3-47 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 3.3-48. 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.

Sensitive Species, Survey and Manage Species, and Focal Landbirds Species Analysis

Because of the large number of sensitive species, survey and manage species, and focal landbird species, the effects of the alternatives is minor and largely beneficial, all the species, with the exception of bighorn sheep, are 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 Specific to Big Horn Sheep

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.

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 3.3-49. 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 3.3-51. 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.

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 3.3-50. Percent of Security Habitat Outside the Influence of Roads and Trails

Herd	Alternative A	Alternatives B, C, and D	Increase from Alternative A
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%**

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 3.3-51. 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

Analysis Area Boundary for 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

Appendix A includes details of reasonably foreseeable future actions. Refer to that appendix for detailed information.

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.

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.

Table 3.3-52. Dry and Mesic Forest Species

Species	Designation
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

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 3.3-53. 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 3.3-54. 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 3.3-55. 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

Analysis Area Boundary for 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 in Appendix A for locations of these projects.

Table 3.3-56. 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.

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.

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 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

Cold Moist Habitat Species

The following table includes the sensitive, survey and manage, and landbird species associated with cold moist habitat.

Table 3.3-57. Cold Moist Habitat Species

Species	Designation
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.

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 3.3-58. Cold Moist Habitat by Subbasin

	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 3.3-59. 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 3.3-60. 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 3.3-61. 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 Boundary for Cumulative Effects

Geographic Boundary
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 in Appendix A for locations of these projects.

Table 3.3-62. Reasonably Foreseeable Future Actions Potentially Affecting Cold Moist Habitat

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.

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.

Cold Dry Habitat Species

The following table includes all sensitive, survey and manage, and landbird species dependent on cold dry habitat.

Table 3.3-63. Cold Dry Habitat Species

Species	Designation
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

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 3.3-64. Cold, Dry Habitat by Subbasin

	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 3.3-65. 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 3.3-66. 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

Analysis Area Boundary for 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 in Appendix A for locations of these projects.

Table 3.3-67. 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.

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 Specific to Riparian Habitat

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.

Table 3.3-68. Riparian and Wetland Habitat Species

Species	Designation
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

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 approximately 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.

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. The approximate 301 existing routes would continue to be used. 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 habitat (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 3.3-69. 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%
Approximate Number of Existing Routes Within Corridors	227	100	301

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. Alternative B would allow the continued use of approximately 227 routes, while Alternative C would reduce this to 100 routes. Even in Alternative D where all 301 existing routes would continue to be used, the 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

Analysis Area Boundary for 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

The following projects would have a beneficial effect on riparian habitat. Details of these projects are included in Appendix A.

Table 3.3-70. 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.

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.

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).

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.

Table 3.3-71. Cliff/Talus Habitat Species

Species	Designation
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

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 3.3-72. 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[17]. 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.

[17] 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.

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

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 3.3-73. 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

Analysis Area Boundary for 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

Several restoration and transportation system management projects are reasonably foreseeable. Refer to Appendix A for details.

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.

Table 3.3-74. Non-Forest Habitat Species

Species	Designation
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

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.

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 3.3-75. 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

Analysis Area Boundary for 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 Forest-wide 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.

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.

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.

3.4 Botany

REGULATORY FRAMEWORK

Relevant Laws and Regulations

Endangered Species Act of 1973

Section 7 of the Endangered Species Act requires federal agencies to insure that any action authorized, funded, or carried out by agencies is not likely to jeopardize the continued existence of listed species or modify their critical habitat.

National Forest Management Act (NFMA)

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

Departmental Regulation 9500-4

This regulation directs the Forest Service to:
Manage "habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species."
Avoid actions "which may cause a species to become threatened or endangered."

Forest Plan Direction

Okanogan Forest Plan (Forest Plan, 1989).

The following Forestwide standards and guidelines apply to proposed, threatened, endangered or sensitive plants:

- 6-17 requires that threatened and endangered species be managed according to recovery plans, and that management be coordinated with U.S. Fish and Wildlife Service and Washington State Departments of Fish and Wildlife (p. 4-36).
- 6-18 requires that consultation be initiated with U. S. Fish and Wildlife Service when threatened or endangered species may be affected by resource proposals (p. 4-36), and
- 6-19 directs that sensitive plants be protected (p. 4-36).

Wenatchee Forest Plan (Forest Plan, 1990).

The following Forest-wide standards and guidelines apply to proposed, threatened, endangered or sensitive plants:

- Threatened, endangered and sensitive species will be identified and managed in cooperation with Washington Department of Natural Resources and Washington Natural Heritage Program (p. IV-78).

- All project environmental analysis will evaluate the effects of the project on threatened, endangered or sensitive species (p. IV-78).

Northwest Forest Plan (Northwest Forest Plan, 1994, 2001, 2003, 2011)

The NWFP sets up standards and guidelines for a group of late-successional and old-growth related species. These are termed survey and manage (S&M) species in the NWFP. The following standards and guidelines apply to survey and manage species (p. C-4 to C-6, 2011 S/M Settlement Agreement): Current and future known sites will be managed according to the management recommendations for the species.

Most species analyzed are in Category B in the table below. The six categories are based on level of relative rarity, ability to reasonably and consistently locate occupied sites during surveys prior to habitat disturbing activities, and the level of information known about the species or group of species.

Table 3.4-1. Standards and guidelines for survey and manage plant species

Relative rarity	Pre-disturbance surveys practical	Pre-disturbance surveys not practical	Status undetermined
Rare	Category A - 57 species Manage all known sites Pre-disturbance surveys Strategic surveys	Category B - 222 species Manage all known sites N/A Strategic surveys	Category E - 22 species Manage all known sites N/A Strategic surveys
Uncommon	Category C - 10 species Manage high-priority sites Pre-disturbance surveys Strategic surveys	Category D - 14 species Manage high-priority sites N/A Strategic surveys	Category F - 21 species N/A N/A Strategic surveys

Forest Service Policy

Management for threatened, endangered, sensitive plant (TESP) species follows Forest Service policy as identified in Section 2670 of the Forest Service Manual, which prohibit adverse effects to threatened and endangered species, and require the maintenance of species viability for sensitive species.

Analysis Area and Boundary Rationale

The Motorized Travel Management Project area covers the entire Forest outside the wilderness boundaries because this is the area currently open for motorized vehicle use (outside Wilderness and other management areas specifically prohibiting motorized vehicles). The boundary for the analysis is the Forest boundary because effects to plants are limited to their nearby area as described below.

Existing Condition

The Forest lies within the East Cascade Range and Okanogan eco-regions with considerable diversity from north to south and from the Cascade Crest eastward. Elevations range from over 8,000 feet at the crest, to below 1,000 feet along the Columbia River. Similarly, precipitation varies greatly over the

Forest. Gradients along the Cascade Crest of the Forest are typical of a maritime climate regime with a large rain shadow provided by the Cascade Range. Precipitation ranges from over 120 inches per year at the Crest, to below 10 inches along the Columbia River. On the northeastern portion of the Forest, the climate transitions into one more typical of the continental climate regime with precipitation around 10 inches per year along the Okanogan River, and about 20 inches per year in the Okanogan Highlands. Not only does the climate vary from north to south, so does the underlying geology. The northeast portion of the Forest is located on the Okanogan Highlands, the central and northern portions of the Forest are in the North Cascades geologic province, while the very southern part of the Forest is located in the Southern Cascades province.

Due to this diversity, the Forest supports a highly diverse botanical community. The variation in habitats and elevation supports numerous plant species, many of which are considered rare and/or unique to the area. Many of these plant species occur most often within small areas of microhabitat within the larger general habitat types. Theses microhabitats include riparian habitat, such as streamside, wet meadow, marsh, lakeshore, seep, fen, bog, hummock, and seasonally moist areas. Riparian habitats are particularly susceptible to disturbance from recreational activities, including motorized vehicle use. . Riparian reserves and riparian habitat conservation areas will collectively be referred to as riparian allocations in this section. Other microhabitats include talus field; alpine and sub-alpine meadows; and serpentine soils (serpentine soil is derived from rocks with low silica content, in particular serpentinite, a rock formed by the hydration and metamorphic transformation of rock from the Earth's mantle). The soils derived from low silica bedrock give rise to unusual and sparse associations of edaphic, or soil-dependent and often endemic, or unique to one location) plants that are tolerant of extreme soil conditions. By definition, S&M species are closely associated with late successional or old growth forest habitat.

Two listed endangered plant species are found within the project area; *Hackelia venusta* (showy stickseed) and *Sidalcea oregana* var. *calva* (Wenatchee Mountains checkermallow) and its designated critical habitat. Even though *Hackelia venusta* is located within the project area, it occupies a very small area that is only accessible by foot. Therefore, *H. venusta* will not be affected by project activities and will not be analyzed further.

S. oregana var. *calva* is restricted to wetlands and moist meadows of the Wenatchee Mountains of central Washington on the east side of the Cascade Range. This species is found at mid-elevations, ranging from 488 to 1,000 meters (1,600 to 3,300 feet). Populations of *S. oregana* var. *calva* are generally concentrated in the wetter portions of open forest-moist meadow habitats, in slight topographic depressions. The plant may also be found in open conifer forests dominated by *Pinus ponderosa* (ponderosa pine) and *Pseudotsuga menziesii* (Douglas-fir), on the perimeter of shrub and hardwood thickets dominated by quaking aspen (*Populus tremuloides*), along permanent or intermittent streams in sparsely forested draws, and near seeps, springs, or small drainages. The presence of surface water or saturated upper soil profiles in the spring and early summer is the feature common to the variety of habitats where the species is found. The recovery plan for *Sidalcea oregana* var. *calva*

designates 6,135 acres of critical habitat, all located in Chelan County, Washington. The primary constituent elements found in the areas designated as critical habitat for *S. oregana* var. *calva* include surface water or saturated upper soil profiles; a wetland community dominated by native grasses and forbs and generally free of woody shrubs and conifers that produce shade and competition for the species; seeps and springs on fine-textured soils (clay loams and silt loams), which contribute to the maintenance of hydrologic processes necessary to support meadows that remain moist into early summer; and elevations of 488 to 1,000 meters (1,600 to 3,300 feet). (USFWS 2004)

The primary threats to *Sidalcea oregana* var. *calva* include habitat fragmentation and destruction due to alterations of hydrology, competition from native and non-native plants, and recreation (USFWS 2004).

The following table lists the sensitive and S&M species known to be growing within the analysis area (Forest-wide outside wilderness). There are 1,163 known sites of sensitive species, and 400 of S&M species.

Table 3.4-2. Sensitive and Survey & Manage plant species

Scientific Name	Common Name	Scientific Name	Common Name
Sensitive Species			
Allium campanulatum	dusky onion	*Heterotheca oregona var. oregona*	Oregon false goldenaster
Astragalus arrectus	Palouse milkvetch	Iliamna longisepala	longsepal wild hollyhock
Botrychium ascendens	trianglelobe moonwort	Mimulus pulsiferae	candelabrum monkeyflower
Botrychium crenulatum	scalloped moonwort	Penstemon eriantherus var. whitedii	Whited's penstemon
Botrychium paradoxum	peculiar moonwort	*Phacelia minutissima*	small phacelia
Carex comosa	longhair sedge	*Pinus albicaulis*	whitebark pine
Carex heteroneura var. epapillosa	different-nerve sedge	*Platanthera obtusata*	bluntleaved orchid
Carex magellanica ssp. irrigua	boreal bog sedge	*Polytrichum strictum*	polytrichum moss
Carex media	closedhead sedge	*Pulsatilla patens ssp. multifida*	cutleaf anemone
Carex scirpoidea ssp. scirpoidea	northern singlespike sedge	*Pyrrocoma hirta var. sonchifolia*	tacky goldenweed
Carex sychnocephala	manyhead sedge	*Rubus arcticus ssp. acaulis*	dwarf raspberry
Carex tenuiflora	sparseflower sedge	*Sanicula marilandica*	Maryland sanicle
Carex vallicola	valley sedge	*Sidalcea oregana var. calva*	Oregon checkerbloom
Chaenactis thompsonii	Thompson's pincushion	*Silene seelyi*	Seely's catchfly
Chrysosplenium tetrandrum	northern golden saxifrage	*Spiranthes porrifolia*	creamy lady's tresses

Cicuta bulbifera	bulblet-bearing water hemlock	*Trifolium thompsonii*	Thompson's clover
Delphinium viridescens	Wenatchee larkspur	*Utricularia minor*	lesser bladderwort
Draba aurea	golden draba	*Vaccinium myrtilloides*	velvetleaf huckleberry
Geum rossii var. depressum	Ross' avens	*Viola renifolia*	white violet
Survey & Manage Species			
Scientific Name / Survey and Manage Category			
Albatrellus flettii B	*Cladonia norvegica B*	*Gyromitra californica B*	*Ptilidium californicum A*
Boletus piperatus D	*Clavariadelphus sachalinensis B*	*Helvella crassitunicata B*	*Ramaria amyloidea B*
Buxbaumia viridis D	*Clavariadelphus truncates B*	*Hygrophorus caeruleus B*	*Rhizomnium nudum B*
Cantharellus subalbidus D	*Cortinarius cyanites B*	*Leucogaster citrinus B*	*Tholurna dissimilis B*
Chaenotheca chrysocephala B	*Cudonia monticola B*	*Lobaria linita A*	*Tremiscus helvelloides B*
Chaenotheca furfuracea F	*Cypripedium fasciculatum C*	*Mycena overholtsii B*	
Chaenotheca subroscida E	*Cypripedium montanum C*	*Nephroma bellum F*	
Chaenothecopsis pusilla E	*Gomphus bonarii B*	*Polyozellus multiplex B*	

Table 3.4-3 shows species that are associated with either riparian or late successional/old growth habitats.

Table 3.4-3. Riparian and old growth habitat associated species

Riparian Associated Species	
Scientific Name	**Common Name**
Botrychium crenulatum	scalloped moonwort
Botrychium *paradoxum*	peculiar moonwort
Carex comosa	longhair sedge
Carex heteroneura var. epapillosa	different-nerve sedge
Carex sychnocephala	manyhead sedge
Carex tenuiflora	sparseflower sedge
Chrysosplenium tetrandrum	northern golden saxifrage
Cicuta bulbifera	bulblet-bearing water hemlock
Delphinium viridescens	Wenatchee larkspur
Mimulus pulsiferae	candelabrum monkeyflower
Platanthera obtusata	bluntleaved orchid

Rubus arcticus ssp. acaulis	dwarf raspberry
Sanicula marilandica	Maryland sanicle
Sidalcea oregana var. calva	Oregon checkerbloom
Spiranthes porrifolia	creamy lady's tresses
Late Successional/Old Growth Associated Species	
Scientific Name	**Scientific Name**
Albatrellus flettii	*Cypripedium montanum*
Boletus piperatus	*Gomphus bonarii*
Botrychium montanum	*Gyromitra californica*
Buxbaumia viridis	*Helvella crassitunicata*
Cantharellus subalbidus	*Hygrophorus caeruleus*
Chaenotheca chrysocephala	*Leucogaster citrinus*
Chaenotheca furfuracea	*Lobaria linita*
Chaenotheca subroscida	*Mycena overholtsii*
Chaenothecopsis pusilla	*Nephroma bellum*
Cladonia norvegica	*Polyozellus multiplex*
Clavariadelphus sachalinensis	*Ptilidium californicum*
Clavariadelphus truncatus	*Ramaria amyloidea*
Cortinarius cyanites	*Rhizomnium nudum*
Cudonia monticola	*Tremiscus helvelloides*
Cypripedium fasciculatum	

Cross Country Motorized Travel and Unauthorized Routes

Cross country motorized travel has damaged botanical resources across the analysis area. The impacts are concentrated on unauthorized routes that have developed over time scattered across the 675,000 acres currently open to motorized cross country travel, and flat and open enough for the activity. The impacts include reduced vegetation cover and growth rates, reduced perennial and annual plant cover and density, as well as overall above ground biomass. Additional direct impacts include increased potential for non-native grasses and pioneering species to become established, thus altering vegetation communities (Taylor 2010). Some indirect effects of cross country motorized travel on botanical resources are tied to soil properties altered by motorized vehicles, as soil properties typically influence vegetation growth.

Known locations of *S. oregana* var. *calva* and critical habitat occur in areas currently open to cross-country travel, along roads open to motorized vehicles. The risk of degradation and decline of these populations and critical habitat increases where existing locations of *S. oregana* var. *calva* are within areas open to cross-country travel and along routes that have motorized vehicle use. The primary constituent elements (PCE's) found in the areas designated as critical habitat for *S. oregana* var. *calva* include surface water or saturated upper soil profiles; a wetland community dominated by native grasses and forbs and generally free of woody shrubs and conifers that produce shade and competition for the species; seeps and springs on fine-textured soils (clay loams and silt loams), which contribute to

the maintenance of hydrologic processes necessary to support meadows that remain moist into early summer; and elevations of 488 to 1,000 meters (1,600 to 3,300 feet) (USDI 2004). Those PCE characteristics are particularly vunerable to resource damage from motorized use. Examples of damage to the species' habitat were documented in a location where allowed motorized activity was occurring in areas occupied by *S. oregana* var. *calva*.

Road and Motorized Trail Network

Motorized vehicle use on roads and trails is impacting plants in the vicinity. There are 7,923 miles of Forest Service system road on the Forest, and 998 miles system motorized trails. Maintenance level 1 roads (2,557 miles of the total 7,923 miles) are closed by definition, but most are currently open to motorized vehicles[18]. The Okanogan National Forest Travel Plan map specifically states that unlicensed OHVs are allowed on roads closed with berms (a typical closure method for maintenance level 1 roads). The Wenatchee Forest Plan does not specifically address motorized vehicle use on maintenance level 1 roads, but once a road is closed (put into maintenance level 1 status) is becomes part of the cross country landscape, and is therefore open as long as it falls within areas currently open to cross country motorized travel. Despite not being officially closed, many maintenance level 1 roads receive no motorized use because they have revegetated, blocking motorized vehicles, or because they do not provide access to a desirable location or are not part of an unauthorized trail.

Motorized use that is occurring on maintenance level 1 roads is contributing to the overall impacts from roads and trails. Roads and motorized trails create edge habitats, which can generate conditions that promote the encroachment of non-native and invasive plant species. Motorized vehicle traffic on these roads and trails creates airborne pollutants and dust. A blanket of fugitive dust on plant foliage can inhibit plant growth rate, size, and survivorship (Ouren 2007).

Motorized Access for Dispersed Camping

Motorized access for dispersed camping has damaged or destroyed vegetation in several places across the Forest. The popularity of dispersed camping has led to the creation of numerous unauthorized routes, compacted earth, lack of vegetation and bank erosion caused by vehicles and heavy use at within 100 feet of the water's edge (USDA 2012.).. The Forest is generally managed as "open" to dispersed camping, meaning motorized access for dispersed camping is allowed anywhere on the Forest unless specific restrictions are in place. The access routes and dispersed campsites were generally created by users as they gradually encroached into vegetated areas. Many of these routes are in riparian areas, so are potentially impacting the sensitive and S&M species that depend on that habitat, especially at those sites and access routes located within 100 feet or less of the water's edge.

The resource damage caused by the motorized access is having direct and indirect effects on vegetation. These include vehicles driving onto stream banks or wetlands, killing vegetation and compacting soil; numerous social trails to the water causing loss of riparian vegetation; high-use at campsites causing

[18] A few maintenance level 1 roads have been officially closed to motorized vehicles with specific closure orders.

large compacted browned-out areas and trails and unauthorized routes devoid of vegetation (USDA 2012). Motorized access for dispersed camping is also creating fugitive dust that, depending on particle size, can affect plants a distance of 8 meters to 1 kilometer away from the road or trail (Farmer, 1991).

The number of motorized access routes to dispersed campsites, and the footprint of the campsites themselves, and been increasing over the past decades. In some areas, particularly on the Naches and Cle Elum districts, the boundaries of some dispersed sites have grown due to increasing and heavier use. Such growth in the number and size of dispersed sites has led to loss of vegetation not just in the campsites or access routes, but also in the vicinity of the campsites as people walk in the forest around the campsites. This is especially true in the Little Naches River drainage, in the Icicle River drainage, and along the Cle Elum River.

During the past two to three decades, the Forest Service has taken some actions to reduce the impact of dispersed camping and the associated motorized access to the campsites. Some areas, such as the along the Icicle River on the Wenatchee River Ranger District, and along portion of the Cle Elum River on the Cle Elum Ranger District, were closed to dispersed camping. The "Respect the River" program was developed in the 1990s, and has been used at dispersed sites on most districts. It targets some popular dispersed recreation sites that were causing unacceptable impacts to vegetation and other resources. The restoration efforts included using rock or wood barriers to limit the size and area of disturbance at the sites, and to limit motorized vehicle access within riparian areas. The soil in blocked areas was de-compacted in some cases, and native vegetation replanted or reseeded. These sites are referred to as "Improved Sites" in this analysis.

While these efforts have been largely effective at reducing impacts at some locations, continued use, and increases in the size and number of sites in other areas are perpetuating impacts to vegetation within the riparian areas, potentially including sensitive and S&M species.
Environmental Consequences

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects

ALTERNATIVE A

Cross Country Motorized Travel

Alternative A would allow cross country travel to continue on 2.4 million acres of the Forest, of which about 675,000 acres are flat and open enough for motor vehicle use in land allocations that currently allow motorized use. All plant species and their habitat, including the sensitive species, located in these areas open to cross country travel would continue to be at risk of destruction from motorized travel,

which could damage, dislodge or crush plants, and degrade habitat. Motorized cross-country travel could also contribute to noxious weed and invasive species introduction into un-infested areas and contribute to expanding existing populations. Invasive species can out-compete native species and create monocultures that are prone to fire and that degrade wildlife habitat (WDFW 2003) (see Invasives Plants section).

The areas likely to receive to cross-country motorized travel encompass habitat and known populations of 147 sensitive or S&M species and one endangered species, *Sidalcea oregana* var. *calva*, (Wenatchee Mountains checker-mallow) and its critical habitat. The primary constituent elements (PCE's) found in the areas designated as critical habitat for *S. oregana* var. *calva* include surface water or saturated upper soil profiles; a wetland community dominated by native grasses and forbs and generally free of woody shrubs and conifers that produce shade and competition for the species; seeps and springs on fine-textured soils (clay loams and silt loams), which contribute to the maintenance of hydrologic processes necessary to support meadows that remain moist into early summer; and elevations of 488 to 1,000 meters (1,600 to 3,300 feet) (USDI 2004).

Alternative A poses the greatest potential risk to *S. oregana* var. *calva* due to the potential degradation to the species and its critical habitat and potential adverse effect on the populations from cross-country motorized travel. Over time, the habitat for this species may begin to erode and compromise the unique nature of this ecosystem.

Road and Motorized Trail Network

The existing impacts to vegetation from motorized vehicle use on the National Forest System roads and motorized trails would continue. The 2,557 miles of maintenance level 1 roads would still be open to motorized vehicles, with the exception of the few that are currently officially closed. Motorized use on these roads would continue, or potentially increase the impact on plants in the vicinity of the roads. The edge habitat along the maintenance level 1 roads receiving motorized use would perpetuate conditions that promote the encroachment of non-native and invasive plant species. The motorized vehicle traffic would also create airborne pollutants and dust, potentially blanketing plant foliage and inhibiting plant growth rate, size and survivorship (Ouren 2007).

Motorized Access for Dispersed Camping

Motorized access for dispersed camping would continue in the current, largely unregulated pattern. Motorized vehicles would continue to be used on established access routes, with new ones likely created over time in the areas most popular for dispersed camping. This would increase the potential impacts to *S. oregana* var. *calva*, compounding the potential impacts from cross country motorized travel. There could be a degradation to the species and its critical habitat and potential adverse effect on the populations from cross-country motorized travel and motorized access for dispersed camping. Over time, the habitat for this species may begin to erode and compromise the unique nature of this ecosystem.

There would also be a continued and potentially increasing impact to sensitive and S&M species dependent on riparian habitats. Motorized vehicles would continue to compact earth, damage vegetation, and cause bank erosion since there would be no limitation on how close vehicles could be drive to the water's edge. The motorized access would also continue to create fugitive dust that, depending on particle size, could affect plants a distance of 8 meters to 1 kilometer away from the access routes (Farmer, 1991).

Effects Common to Alternatives B, C, and D

Cross Country Motorized Travel

All plant species and their habitat, including the sensitive species, located in these areas open to cross country travel would benefit from implementation of Alternative B, C, or D because cross country motorized travel would no longer be permitted, except on the 33 acres of currently open Moon and Funny Rocks. Moon and Funny Rocks contain no habitat for *S. oregana var. calva*, and no riparian or old growth habitat, therefore the motorized use of these areas would have no effect on any threatened or endangered, sensitive, proposed, or S&M plant species.

Cross country motorized travel would no longer be allowed in riparian or late successional/old growth habitat, so all sensitive and S&M species associated with this habitat would benefit from the closure. The acres open to cross country travel in each alternative are displayed in the following table.

Table 3.4-4. Total Acres Open to Cross Country Motorized Travel, And Acres of Riparian and Late Successional/Old Growth (LS/OG) Habitat Open to Motorized Travel, by Alternative

Alternative	Acres open to cross-country travel	Acres of Riparian Habitat Open to Cross Country Travel	Acres of LS/OG Habitat Open to Cross Country Travel
Alternative A	675,000*	79,261**	140,390**
Alternative B	33	0	0
Alternative C	33	0	0
Alternative D	33	0	0

* Although about 2.4 million acres of the Forest lies outside wilderness, only about 675,000 are within areas amenable to motorized use (relatively flat, open topography) in allocations that are currently open to motorized use.

** These are the number of acres of this habitat amenable to motorized use (relatively flat, open topography).

All impacts to plants from motorized cross country travel would cease, and damage to plants that has occurred over time, such as dislodged or crushed plants and degraded habitat, would gradually repair. There would be no spread of noxious weeds by motorized vehicles into these areas closed by Alternatives B, C, or D, and species introduction, or contributions to the spread of existing populations would no longer occur.

Populations of *S. oregana var. calva* would benefit from Alternative B, C, or D over time due to the elimination of motorized cross country travel in its habitat.

Road and Trail Network

Implementation of Alternative B, C, or D would close all maintenance level 1 roads to motorized use, decreasing the miles of road open to motorized use by 2,557 miles, or a 32.3% reduction in open roads. This would reduce the existing road-related impacts to plants, including edge habitat perpetuating conditions that promote the encroachment of non-native and invasive plant species, and airborne pollutants and dust. This would benefit all plant species in the vicinity of the maintenance level 1 roads, including *S. oregana var. calva*, and sensitive and S&M species. The ongoing effects to plants from use of the maintenance level 2 through 5 roads and the motorized system trails would continue.

Effects of WATV Routes from Alternative B and D

WATVs would be allowed on 350 miles of open Forest Service roads in alternatives B and D. Fugitive dust may increase on 350 miles of WATV designated roads but, are currently receiving use, and the additional use is not predicted to result in a measureable change in traffic levels, therefore there would be no effect on roadside vegetation, including listed or survey and manage species.

Effects of Motorized Access for Dispersed Camping from Alternative B, C, or D

Alternatives B, C, and D would reduce impacts to plants from motorized access for dispersed camping, compared to the existing condition or Alternative A. Motorized use within corridors would be restricted to existing access routes only. Vehicles would not be allowed more than 300 feet from the road, and not closer than 100 feet to water. Direct effects to plants would be minimal because of these restrictions. No new ground-disturbing activities are included in any of the alternatives.

When comparing the three action alternatives, the effect to plants, such as fugitive dust; damaging, dislodging, or destroying plants; and habitat alteration, would change in proportion to the number of acres of corridors. The actual acres where the motorized use would be likely to occur was estimated by determining the number of acres with slopes less than 20%, and areas with less than 50% vegetation cover within corridors. The actual area of impact would be much smaller than this, however, since no new access routes would be allowed.

The following table includes details about the size of corridors and the number of acres within corridors by alternative.

Table 3.4-5. Size and Acres of Corridors, and Acres Where Motorized Use Would Likely Occur, by Alternative B, C, and D

	Alternative B	Alternative C	Alternative D
Corridor width (feet), on both sides of the road	300 feet	300 feet	300 feet
Setback From Water	100 feet	100 feet	100 feet
Total corridor acres	117,625 acres	103,533 acres	327,558 acres
Corridor acres Where Motorized Use is likely to Occur	43,124 acres	37,408 acres	92,611 acres

Riparian habitats, such as streamsides, wet meadows, marshes, lakeshores, seeps, fens, bogs, hummocks, and seasonally moist areas, are especially susceptible to the effects of motorized vehicle use within corridors because many routes for access to dispersed camping are within riparian habitat. By definition, all S&M species are closely associated with late-successional or old-growth forest habitat and also susceptible to the effects of motorized vehicle use within corridors for access to dispersed camping. Sensitive and S&M species were analyzed for effects to those habitats and known populations within corridors.

The table below compares acres of those habitats in Alternatives B, C, and D.

Table 3.4-6. Comparison of Acres of Riparian and Late Successional Habitat in Corridors by Alternative.

Alternative	Acres of corridors in riparian habitat	Acres of corridors designated in LS/OG habitat
B	20,457	29,847
C	14,401	22,975
D	53,744	91,927

Table 3.4-7 displays endangered and sensitive species that would occur in riparian habitats within the corridors designated by Alternatives B, C, and D.

Table 3.4-7. Endangered and Sensitive species found in riparian habitat within corridors

Riparian Associated Species	
Scientific Name	**Common Name**
Botrychium crenulatum	scalloped moonwort
Botrychium paradoxum	peculiar moonwort
Carex comosa	longhair sedge
Carex heteroneura var. epapillosa	different-nerve sedge
Carex sychnocephala	manyhead sedge
Carex tenuiflora	sparseflower sedge
Chrysosplenium tetrandrum	northern golden saxifrage
Cicuta bulbifera	bulblet-bearing water hemlock
Delphinium viridescens	Wenatchee larkspur
Mimulus pulsiferae	candelabrum monkeyflower

Platanthera obtusata	bluntleaved orchid
Rubus arcticus ssp. acaulis	dwarf raspberry
Sanicula marilandica	Maryland sanicle
Sidalcea oregana var. calva	Oregon checkerbloom
Spiranthes porrifolia	creamy lady's tresses

The following twenty-nine S&M species would be located within corridors.

Table 3.4-8. Survey and Manage species within corridors

Scientific Name	
Albatrellus flettii	*Cypripedium montanum*
Boletus piperatus	*Gomphus bonarii*
Buxbaumia viridis	*Gyromitra californica*
Cantharellus subalbidus	*Helvella crassitunicata*
Chaenotheca chrysocephala	*Hygrophorus caeruleus*
Chaenotheca furfuracea	*Leucogaster citrinus*
Chaenotheca subroscida	*Lobaria linita*
Chaenothecopsis pusilla	*Mycena overholtsii*
Chamonixia caespitosa	*Nephroma bellum*
Cladonia norvegica	*Polyozellus multiplex*
Clavariadelphus sachalinensis	*Ptilidium californicum*
Clavariadelphus truncatus	*Ramaria amyloidea*
Cortinarius cyanites	*Rhizomnium nudum*
Cudonia monticola	*Tremiscus helvelloides*
Cypripedium fasciculatum	

Table 3.4-9 shows the species and number of known sites found in corridors under each alternative. The table compares the total number of known sites in the alternative to the total number of known sites on the Forest for context because all known sites could potentially be affected by cross-country use under Alternative A. This determines the percentage of known sites that could be potentially affected in each alternative. Any sites that are within 100 feet of water within corridors would not be affected by motorized access for dispersed camping since motorized vehicles would not be allowed closer than 100 to water, except at improved sites.

Any species at five percent or higher is considered at risk for the direct and indirect effects described above. This percentage derives from the literature that describes a common rule-of thumb, the “1 in 20 rule”, for mitigating the effects of plant collection on plant populations (Norton, et al, 1994; Wagner, 1995). The viability of a population is not necessarily at risk just because the population may have indirect or direct effects from motorized use.

Motorized access for dispersed camping within corridors in each action alternative would potentially cause direct and indirect effects to the species shown in Table 3.4-9. However, the limitation on motorized vehicles within corridors in Alternatives B, C, and D, including restricting them to existing routes and prohibiting them within 100 feet of water and the mitigation measures that would be implemented if monitoring discovers unacceptable impacts, coupled with closing the forest to motorized cross country travel would result in not reducing the viability of any of the species.

Table 3.4-9. Number of known sites found within corridors by species by Alternative

Species	Forest total of known sites (Alternative A)	Alternative B		Alternative C		Alternative D	
		Sites in corridors	% of total known sites	Sites in corridors	% of total known sites	Sites in corridors	% of total known sites
Albatrellus flettii	3	0	0	0	0	1	33
Boletus piperatus	2	0	0	0	0	1	50
Buxbaumia viridis	11	0	0	0	0	3	27
Cantharellus subalbidus	5	0	0	0	0	4	80
Chaenotheca chrysocephala	16	6	38	5	31	6	38
Chaenotheca furfuracea	9	0	0	0	0	5	56
Chaenotheca subroscida	28	2	7	1	4	5	18
Chaenothecopsis pusilla	6	3	50	2	33	4	67
Cladonia norvegica	3	1	33	1	33	1	33
Clavariadelphus sachalinensis	1	0	0	0	0	1	100
Clavariadelphus truncatus	3	0	0	0	0	2	67
Cortinarius cyanites	1	0	0	0	0	1	100
Cudonia monticola	2	1	50	0	0	1	50
Cypripedium fasciculatum	147	18	12	17	12	42	29
Cypripedium montanum	45	13	29	12	27	21	47
Gomphus bonarii	3	0	0	0	0	2	67
Gyromitra californica	6	1	17	0	0	3	50
Helvella crassitunicata	3	0	0	0	0	2	67
Hygrophorus caeruleus	1	0	0	0	0	1	100
Leucogaster citrinus	1	1	100	1	100	1	100
Lobaria linita	11	1	9	0	0	6	55
Mycena overholtsii	33	10	30	5	15	16	49
Nephroma bellum	2	1	50	0	0	1	50
Polyozellus multiplex	15	1	7	0	0	2	13
Ptilidium californicum	16	0	0	0	0	1	6
Ramaria amyloidea	2	0	0	0	0	1	50

Rhizomnium nudum	21	0	0	0	0	2	10
Tholurna dissimilis	2	0	0	0	0	2	100
Tremiscus helvelloides	2	0	0	0	0	1	50
Allium campanulatum	1	1	100	1	100	1	100
Astragalus arrectus	4	0	0	0	0	2	50
Botrychium ascendens	6	1	17	1	17	2	33
Botrychium crenulatum	43	9	21	8	19	21	49
Botrychium paradoxum	5	0	0	0	0	1	20
Carex comosa	1	0	0	0	0	1	100
Carex heteroneura var. epapillosa	7	0	0	0	0	3	43
Carex magellanica ssp. irrigua	15	0	0	0	0	4	27
Carex media	1	1	100	1	100	1	100
Carex scirpoidea ssp. scirpoidea	4	1	25	0	0	1	25
Carex sychnocephala	2	0	0	0	0	1	50
Carex tenuiflora	3	0	0	0	0	1	33
Carex vallicola	14	2	14	2	14	7	50
Chaenactis thompsonii	33	2	6	2	6	2	6
Chrysosplenium tetrandrum	14	4	29	4	29	5	36
Cicuta bulbifera	1	0	0	0	0	1	100
Delphinium viridescens	19	7	37	7	37	9	47
Draba aurea	2	0	0	0	0	2	100
Geum rossii var. depressum	2	0	0	0	0	1	50
Heterotheca oregona var. oregona	1	1	100	0	0	1	100
Iliamna longisepala	83	9	11	8	10	33	40
Mimulus pulsiferae	2	1	50	1	50	2	100
Penstemon eriantherus var. whitedii	2	0	0	0	0	1	50
Phacelia minutissima	2	2	100	2	100	2	100
Pinus albicaulis	675	67	10	67	10	110	16
Platanthera obtusata	60	28	47	28	47	32	53
Polytrichum strictum	2	0	0	0	0	1	50
Pulsatilla patens ssp. multifida	6	3	50	3	50	3	50
Pyrrocoma hirta var. sonchifolia	11	5	45	5	45	6	55
Rubus arcticus ssp. acaulis	2	0	0	0	0	1	50
Sanicula marilandica	14	9	64	0	0	13	93

*Sidalcea oregana var. calva**	4	1	25	1	25	1	25
Silene seelyi	18	0	0	0	0	4	22
Spiranthes porrifolia	7	0	0	0	0	1	14
Trifolium thompsonii	5	0	0	0	0	3	60
Utricularia minor	8	0	0	0	0	2	25
Vaccinium myrtilloides	2	0	0	0	0	2	100
Viola renifolia	10	5	50	5	50	7	70

*Alternative D includes corridors on all open roads, however motorized access for dispersed camping would not be allowed on roads gated closed. Three of the known sites of *Sidalcea oregana* var. *calva* are located on two of those gated roads; therefore they would not be at high risk for the direct or indirect effects described.

The information in Table 3.4-9 is totaled in Table 3.4-10 to show the number of species and known sites within corridors in Alternatives B, C, and D.

Table 3.4-10. Endangered, Sensitive and S&M known sites within proposed corridors by Alternative

Alternative	Number of ES and S&M species	Total number of known sites
B	33	218
C	25	190
D	67	430

Some species would be at elevated risk of impact because 100% of their known sites would be located within corridors. These are listed below, by alternative.

Alternative B: *Leucogaster citrinus, Allium campanulatum , Carex media, Heterotheca oregona var. oregona and Phacelia minutissima*

Alternative C: *Leucogaster citrinus, Allium campanulatum and Phacelia minutissima*

Alternative D: *Cortinarius cyanites, Hygrophorus caeruleus, Leucogaster citrinus, Allium campanulatum, Carex comosa, Carex media, Cicuta bulbifera, Draba aurea, Heterotheca oregona var. oregona, Mimulus pulsiferae, Phacelia minutissima, Sidalcea oregana var. calva, Tholurna dissimilis, and Vaccinium myrtilloides*

No new damage from motorized vehicles to these species, or any listed in Table 3.4-9 would be anticipated since the vehicles would be restricted to existing access routes. There would be a risk of impact, however, since illegal use or creation of new access routes could damage or destroy sites if a motorized vehicle is driven through the site. The risk would increase with the number of known sites within corridors in the different alternatives. Given this possibility, the risk of impacts to the species would be greatest with Alternative D, followed by Alternative B. Alternative C would have the lowest risk of impacts. Even in Alternative D, the prohibition on driving a motorized vehicle off an existing route would reduce the risk of new damage to known populations.

The mitigation measure of modifying access routes if unacceptable or unanticipated impacts occur would further reduce the risk to these plant species. The monitoring plan included in Alternatives B, C, and D would ensure that the populations within corridors are protected. If unacceptable impacts to these and other plant species are found, the impacts would be mitigated by modifying the access route.

Motorized access in corridors could have indirect effects on all plant species, including endangered, sensitive, and survey and manage species, when motorized users leave their vehicles and travel on foot off existing routes within corridors. Effects of traveling on foot would consist of damaging, dislodging, or destroying the plants and altering habitat. Habitat alteration includes changes in soil conditions (compaction and erosion), moisture regime, vegetation coverage, and species composition. Compacted soil inhibits infiltration of precipitation, and soil moisture available to vegetation is diminished. Additionally, soil compaction may inhibit root growth among plants, in which case organic matter, litter, soil fertility, and vegetative cover are diminished (Ouren 2007). Other indirect impacts to vegetation from people leaving their vehicles and traveling on foot include reduced growth rates, and increased potential for non-native grasses and pioneering species to become established by people carrying seed or plant parts on their clothes or equipment, thus altering vegetation communities.

Cumulative Effects

Analysis Area and Boundary Rationale

The analysis area for cumulative effects of the Motorized Travel Management Project is the Forest boundary since the known sites analyzed are located across the Forest outside wilderness, and Motorized Travel Management actions cannot affect plants beyond the Forest boundary. The temporal boundary begins with European settlement and disturbance from the extraction economy of mining, grazing, and logging in the late 1800s. Motorized travel is expected to continue in perpetuity on the Forest. However, future decisions that affect motorized travel management, such as Forest Plan revision, are likely to change management direction within about 10 years, which is used as the outer boundary of this analysis.

Past Actions

The aggregate effects of past actions are displayed under the affected environment and Alternative A above. All ground disturbing activities (trapping, mining, sheep grazing, logging, road and trail construction, house building, activities associated with the railroad, fire suppression, construction and maintenance of power-line corridors and electronic communication sites) in the past, starting with Euro-American settlement in the 1880s, have possibly affected TESP and S&M species. Past actions have resulted in the environmental conditions described in the affected environment above, although actual effects to TESP and S&M plants would be difficult to evaluate since inventory and mapping of TESP plant species did not begin systematically until the 1900s, long after much of the disturbing activities associated with European settlement. Fire suppression, which began in the early 1900s, has also led to

changes in species composition and population dynamics in fire adapted ecosystems. The effect of past road and trail construction on the potential to impact TESP and S&M plants is described in the existing condition and under Alternative A.

Ongoing (Present) and Reasonably Foreseeable Future Actions

Plant species are, and would continue to be, directly affected by fugitive dust raised by motorized traffic near roads and trails. Processes that may be affected by dust include photosynthesis, respiration, and transpiration due to blocked stomata (a pore found in the leaf and stem external layer that is used for gaseous exchange) and cell destruction (Spellerberg and Morrison, 1998), all of which could result in reduced plant growth, size, productivity, and/or survivorship. Depending on particle size, the fugitive dust can affect plants a distance of 8 meters (26 feet) to 1 kilometer (.6 miles) away from the road or trail (Farmer, 1991).

The Swauk Pine, South Summit, Little Crow, Annie and Light restoration projects are currently being planned or implemented across the Forest. These projects are designed to create landscapes that are more resilient to changing climates and disturbances, enabling landscape results that restore natural processes, patterns, and functions; using treatments such as thinning, prescribed burning, and road closures. All resources, including botanical resources, benefit when ecosystem function is restored. Therefore the cumulative effect of restoration projects and Alternatives B, C, or D would improve habitat for botanical resources particularly as a result of cross-country motorized vehicle closure, and limitations on motorized vehicle use for dispersed camping.

Actions resulting from implementation of minimum roads analysis, such as road closure or decommissioning, may result in decreased access to known sites of sensitive plant species. The Chewuch Transportation Plan would result in closure or decommissioning of 118 miles of system road in the Methow Valley Ranger District. The Peshastin and Chumstick Road Decommissioning Project would close or decommission 51.7 miles of road in the Wenatchee area.

Projects such as the Chewuch River Restoration project and those implemented under the ongoing Respect the River program would continue to modify vehicle access to dispersed campsite when needed and eliminate poorly located roads and dispersed campsites. These actions would restore riparian vegetation and function in areas impacted by dispersed camping. There would be a cumulative improvement for botanical resources from this program and the Motorized Travel Management Project.

The Forest is developing a Forest-wide Invasive Species EIS for invasive species treatment through integrated weed management methods. When implemented, the Forest would have the ability to more effectively and efficiently manage for invasive species. This, along with the elimination of cross-country motorized travel resulting from the Motorized Travel Management Project, would be improve habitat for botanical resources.

Table 3.4-11. Summary of Effects of Forest-wide ongoing and foreseeable future actions that may affect botanical resources

Project type	Negative or beneficial effect	Possible effects to botanical resources
Restoration	Beneficial	Botanical resources habitat improves when ecosystem function is restored
Decisions resulting from Minimum roads analysis	Beneficial	Decreased access to known sites of endangered, sensitive and S&M plant species
Respect the River projects	Beneficial	Restores riparian vegetation and functioning plant communities
Invasive species management	Beneficial	Reduces invasive species that can compete with native and sensitive species

ALTERNATIVE A

The cumulative effect of all past, present, and reasonably foreseeable future actions and Alternative A would be somewhat of an improvement to botanical resources, including threatened, endangered, sensitive, proposed, or S&M species from forest restoration projects, road decommissioning, and invasive species control. Any improvements from these projects would be offset to some degree by the continued cross country motorized travel, and the unmanaged or regulated motorized access for dispersed camping.

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 a substantial improvement to botanical resources, including threatened, endangered, sensitive, proposed, or S&M species. Reducing access by eliminating cross-country motorized travel, and limiting motorized access to dispersed camping, combined with a number of other projects to restore biodiversity and manage access, would improve habitat for all plant species across the Forest compared to the existing condition.

CONSISTENCY FINDINGS

All action alternatives reduce the risk for the direct and indirect effects to botanical species by designating corridors where motorized access for dispersed camping would be restricted to existing routes and not allowing vehicles closer than 100 feet to water, except at improved sites, by closing the Forest to cross country motorized travel, and closing maintenance level 1 roads to motorized vehicles. By providing less motorized access across the Forest (both within corridors and eliminating cross-country travel), the action alternatives would not reduce, and may improve, the viability of the population compared to Alternative A and the existing condition. Based on these findings and with

implementation of mitigation, this project complies with the provisions outlined in the Forest Service direction detailed above, which requires that activities not result in a loss of species viability across their range or result in a species becoming threatened or endangered, or create trends toward federal listing. Alternatives B, C, and D would meet Okanogan Forest Plan requirements to protect sensitive plants by reducing motorized access and would comply with the Wenatchee Forest Plan analysis requirements. The Forest will consult with the United States Fish and Wildlife Service on compliance with the Endangered Species act once an alternative is selected.

Populations of *S. oregana var. calva* would benefit from Alternative B, C, or D over time due to the substantial reduction of the area where motorized activity would be allowed for dispersed camping, and the elimination of all cross country motorized travel within habitat for these species. These alternatives may effect, but will not likely adversely affect *S. oregana var. calva.* The alternatives will not result in a loss of species viability of any sensitive species.

DETERMINATION

Alternative A would may affect, and is likely to adversely affect *Sidalcea oregana* var *calva* and its critical habitat due to the effects of cross country travel. All plant species and their habitat, including the sensitive species, located in these areas open to cross country travel would continue to be at risk of destruction from motorized travel, which could damage, dislodge or crush plants, and degrade habitat. Alternatives B, C, or D "may affect, but are not likely to adversely affect" *Sidalcea oregana* var *calva* or its critical habitat due to the closure of the forest to cross-country travel. Alternatives B, C, or D "may impact individuals or habitat, but will not likely contribute towards federal listing or cause a loss of viability to the population or species" due to the closure of the forest to cross-country travel .
Cross country motorized travel would no longer be allowed in riparian or late successional/old growth habitat, so all endangered, sensitive and S&M species associated with this habitat would benefit from the closure.

3.5 Invasive Species

REGULATORY FRAMEWORK

Relevant Laws and Regulations

The following laws, rules, regulations, management direction, and policy govern invasive species on the Forest.

Executive Orders

Executive Order 13112 (February 1999) directs Federal Agencies to prevent the introduction of noxious weed species and to detect and control such species.

Regional Management Direction

Region 6 Invasive Plant Environmental Impact Statement and Record of Decision(R6 IP EIS) (USDA 2005) provides nineteen Standards that apply to actions on NFS lands, two of which are relevant to the Motorized Travel Management project:

- **Standard 1**
  Prevention of invasive plant introduction, establishment and spread will be addressed in watershed analysis; roads analysis; fire and fuels management plans, Burned Area Emergency Recovery Plans; emergency wildland fire situation analysis; wildland fire implementation plans; grazing allotment management plans, recreation management plans, vegetation management plans, and other land management assessments (ROD, p. 10).

- **Standard 10**
  Require the establishment of a system of roads, trails, and areas designated for motor vehicle use; and prohibit the use of motor vehicles off the designated system that is not consistent with the classes of motor vehicles and if applicable, the time of year, designated for use (ROD, p. 19).

Forest Plan Direction

Okanogan Forest Plan (Forest Plan 1989)
The following standards and guidelines apply to invasive plant species (p. 4-45):

- 12-1: Control noxious weeds
- 12-2: New infestations take priority for eradication
- 12-3: Emphasis on prevention

Wenatchee Forest Plan (Forest Plan 1990)

- Conduct noxious weed assessment for all significant ground disturbing project activities to determine risk (p. IV-89).
- Contain, control, and eradicate existing populations (p. IV-89).

Forest Service Policy

Forest Service Manual 2900 (USFS 2011) direction includes:

- **Prevention:** protect native species and ecosystems from the introduction, establishment, and spread of invasive species,
- **Early detection and rapid response**: quickly detect invasive species infestations, and subsequently implement immediate and specific actions to eradicate those infestations before they become established and/or spread,
- **Control and management:** contain, reduce, and remove established infestations of invasive species, and
- **Restoration**: manage Forest lands to increase their ability to be self-sustaining and resistant to the establishment of invasive species.

Forest Policy

Okanogan and Wenatchee National Forests Weed Management and Prevention Strategy and Best Management Practices (USDA Forest Service 2001 and 2002) outline the steps that the Forest needs to take to prevent and better manage noxious weeds including monitoring and project planning and NEPA analysis.

Analysis Area and Boundary Rationale

The Motorized Travel Management project area covers both the Forest boundary outside of wilderness and adjacent lands. The Forest boundary outside wilderness is used because all corridors and cross-country motorized use is within the Forest boundary outside of wilderness; adjacent lands managed privately or by other agencies are added because invasive species can invade from adjacent lands.

EXISTING CONDITION

Invasive species, which include noxious weeds, were identified in 2005 by then Chief of the Forest Service Dale Bosworth as one of the four threats to forest and grasslands. 'Noxious weed' is the traditional, legal term for any invasive, non-native plant that threatens agricultural crops, local ecosystems or fish and wildlife habitat.

The source of many weed infestations and other introduced plant species has been traced to disturbed sites such as travel corridors (roads, trails, skid trails, etc.), trailheads, parking areas, campsites, harvest units, landings, and fire suppression activity areas. Vehicles, material from gravel pits, livestock, wildlife and birds, camping/fishing gear and clothing, straw and mulch, and livestock feed (hay and grain) can spread unwanted plants. Noxious weed infested acres continue to increase due to a variety of factors including increasing use; the ability of noxious weeds to out-compete native plants for space, nutrients, water, and sunlight; lack of funding and workforce to treat all invasive species every year; and changing climate conditions. Many invasive plants are species that can thrive in the presence of disturbance and other environmental stressors, have broad climatic tolerances, large geographic ranges, and possess other characteristics that facilitate rapid range shifts. The predicted changes in climate are thought to contribute additional stressors on ecosystems, including those on national forests, making them more susceptible to invasion and establishment of invasive plant species (Joyce et al. 2008).

Invasive plants create a host of harmful environmental effects to native ecosystems including: displacing native plants; degrading or eliminating habitat and forage for wildlife; threatening endangered species; impacting recreation; affecting fire frequency; altering soil properties; and decreasing biodiversity (USDA 2012).

Currently, 48 invasive plant species with a total of 125,506 acres of infestation are documented on the Forest, mostly outside of Wilderness.

Table 3.5-1. Acres of invasive infestation by species

Scientific Name	Common Name	Acres Infested by Species
Amsinckia menziesii	common fiddleneck	1.65
Artemisia absinthium	absinthium	31.51
Artemisia biennis	biennial wormwood	45.57
Arctium lappa	greater burdock	2.91
Berteroa incana	hoary alyssum	135.39
Bromus tectorum	cheatgrass	226.74
Capsella bursa-pastoris	shepherd's purse	0.32
Cardaria draba	whitetop	15.99
Carduus acanthoides	spiny plumeless thistle	0.40
Carduus nutans	nodding plumeless thistle	143.09
Centaurea debeauxii	meadow knapweed	136.68
Centaurea diffusa	diffuse knapweed	4835.36
Centaurea repens	russian knapweed	3.94
Centaurea solstitialis	yellow star-thistle	1.55
Centaurea stoebe ssp. micranthos	spotted knapweed	963.15
Cichorium intybus	chicory	150.88
Cirsium arvense	Canada thistle	959.89
Cirsium vulgare	bull thistle	490.93
Crupina vulgaris	common crupina	93.27
Cynoglossum officinale	gypsyflower	2587.57
Cytisus scoparius	Scotch broom	88.66
Daucus carota	Queen Anne's lace	0.79
Digitalis purpurea	purple foxglove	0.20
Gypsophila paniculata	baby's breath	0.21
Hieracium aurantiacum	orange hawkweed	161.09
Hieracium caespitosum	meadow hawkweed	101.94
Hyoscyamus niger	black henbane	3.04
Hypericum perforatum	common St. Johnswort	1333.55
Hypochaeris radicata	hairy cat's ear	447.69
Kochia prostrata	Kochia	1.03

Leucanthemum vulgare	oxeye daisy	901.19
Linaria dalmatica ssp. dalmatica	Dalmatian toadflax	1585.39
Linaria vulgaris	butter and eggs	3.06
Lysimachia	yellow loosestrife	6.37
Myriophyllum spicatum	Eurasian watermilfoil	0.02
Onopordum acanthium	Scotch cottonthistle	0.17
Phalaris arundinacea	reed canarygrass	84.71
Poa bulbosa	bulbous bluegrass	44.36
Polygonum cuspidatum	Japanese knotweed	1.51
Polygonum polystachyum	cultivated knotweed	0.80
Potentilla recta	sulphur cinquefoil	501.36
Rubus armeniacus	Himalayan blackberry	0.09
Salsola tragus	prickly Russian thistle	3.45
Senecio jacobaea	stinking willie	16.24
Senecio sylvaticus	woodland ragwort	1.26
Senecio vulgaris	old-man-in-the-Spring	0.24
Sonchus arvensis ssp. arvensis	field sowthistle	0.51
Tanacetum vulgare	common tansy	76.33
Tripleurospermum perforatum	scentless false mayweed	2.24
Verbascum thapsus	common mullein	87.38

1/ Some species overlap with other species, so total acres by species will not equal total forest infestation acres.

Existing infestations vary in size and extent across the Forest landscape; some infestations occupy small areas of less than an acre while others involve hundreds of acres. Due to the ability of invasive plants to spread rapidly, it is likely that not all existing infestations are mapped and that new species of invasive plants could invade the Forest. Site-specific conditions are expected to change within the life of the project: treated infestations could be reduced in size, untreated infestations could continue to spread, and/or new invasive plants could invade the project area.

Cross Country Motorized Travel

Cross country motorized travel is currently allowed on approximately 2.4 million acres of the Okanogan-Wenatchee National Forest, however is concentrated on the 675,000 acres flat and open enough for the use. This activity is contributing to the establishment of invasive species in relatively undisturbed ecosystems through the loss of native vegetation and soil disturbance, and transport of seed on stock, people and vehicles. There are approximately 16,281 acres of area infested with invasive species across the 675,000 acres.

Maintenance Level 1 Roads

Roads act as movement corridors for invasive species, aiding dispersal or population expansion and facilitating invasion (Christen et al. 2006). Vehicles can pick up large numbers of seeds, especially when driven off-trail, but vehicles still collect seeds even when staying on roads and trails (Taylor et al. 2011).

Vehicles caked with mud acquired elsewhere potentially introduce or disperse seeds of non-native and invasive species; thus, route margins often become populated with exotic and invasive species that eventually may spread and outcompete native species at the landscape level (Ouren et al. 2007).

There are currently 7,923 miles of National Forest System roads on the Forest, including 2,557 miles of maintenance level 1 roads. Maintenance level 1 roads are actually open to motorized vehicles because they become part of the cross country landscape once placed in maintenance level 1 status. The motorized vehicles using these maintenance level 1 roads are contributing the spread of invasive species.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping is currently occurring in a largely unregulated manner across the Forest. People are allowed to drive motorized vehicles off open roads to access existing dispersed campsites, or to pioneer routes to new campsites, as long as no resource damage occurs. This use is spreading invasive species in the same manner described above as a result of cross country motorized travel, and motorized vehicle use on system roads and trails.

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects

ALTERNATIVE A

Cross Country Motorized Travel

Alternative A would allow motorized cross country travel on the approximate 2.4 million acres of the Forest within land allocations that currently allow motorized use, of which about 675,000 acres are flat and open enough for motorized vehicle use. Motorized vehicles would continue to act as vectors for introducing noxious weed and invasive species into uninfected areas, resulting in expanding and new populations.

Maintenance Level 1 Roads

Implementation of Alternative A would allow motorized vehicle use on 7,923 miles of road, including the 2,557 miles of maintenance level 1 roads. This would continue the existing introduction and spread of noxious weeds into undisturbed and un-infested areas. The motorized vehicles would continue to be vectors in dispersing and expanding existing populations, and facilitating invasion. Vehicles could pick up seeds along the roads, and vehicles caked with mud acquired elsewhere could potentially introduce new invasive species, establishing new populations in the disturbed area along the roads. These new and expanding populations eventually out-compete native species at the landscape level.

Motorized Access for Dispersed Camping

Alternative A would not change the regulations pertaining to motorized access for dispersed camping, so the existing condition of people driving motorized vehicles off roads to access dispersed campsites would continue. This could result in expanding of existing populations of invasive species, and the potential to introduce invasive species into currently uninfested areas. The amount of spread would most likely expand in the future as new access routes and dispersed campsites are developed. This would potentially impact native plant populations, especially in riparian areas where much of the dispersed camping is occurring.

Effects Common to Alternatives B, C, and D

Cross Country Motorized Travel

Alternatives B, C, and D would substantially reduce the potential for the spread of noxious weeds over Alternative A by prohibiting motorized cross country travel, with the exception of the 33 acres within Moon and Funny Rocks. Motorized vehicles would no longer be vectors for the spread of existing populations or potentially leading to the establishment of new populations across the 675,000 acres currently at risk by this activity.

Maintenance Level 1 Road

Alternatives B, C, and D would reduce the potential for new invasive plant infestations compared to Alternative A by prohibiting motorized vehicle use on the 2,557 miles of maintenance level 1 roads. Motorized vehicles would no longer serve as vectors for invasive plants on these 2,557 miles. This would be a 32.3% reduction in the miles of road available to motorized vehicles, reducing the likelihood that motor vehicles would contribute to the introduction and spread of invasive species from these roads to un-infested areas.

WATV Routes in Alternatives B and D

WATVs would be allowed on 350 miles of open Forest Service roads in alternatives B and D. An engineering safety analysis has been completed on these roads. These roads are currently receiving use, and the additional use is not predicted to result in a measureable change in traffic levels, therefore would not change the current potential for introduction and spread of invasive species.

Effects of Motorized Access for Dispersed Camping from Alternative B, C, or D

Alternatives B, C, and D would designate corridors for motorized access to dispersed camping. Motorized vehicles would be restricted to using only existing access routes, so would have the potential

to continue spreading invasive species populations that exist along the access routes. There would also be the potential to introduce invasive species into currently un-infested areas within the designated corridors. This would reduce the spread of invasive species compared to Alternative A and the existing condition however, since motorized vehicle use would not lead to additional degradation of native habitat, and would only occur where the degradation already exists. Motorized vehicles would be prohibited within 100 feet of water (except at Improved Sites), so there would be no spread of invasive species by motorized vehicles within this zone. All alternatives include monitoring and mitigation that would be site and species specific and could include modification or closure of motorized access routes or dispersed campsites if invasive species populations increase or become established.

The amount of potential spread of invasive species within corridors would vary between the alternatives based on the number of acres within corridors, and the amount of the corridors currently infested with invasive species. Alternative D would have the greatest potential, followed by Alternative B, with Alternative C having the least potential. All these alternatives would reduce the potential spread of invasive species that would result from implementation of Alternative A, however, where motorized access for dispersed camping would continue in a largely unregulated manner over a much larger area.

The following table displays the total acres and the invasive species-infested acres in corridors by alternative.

Table 3.5-2. Total Acres and Acres Infested With Invasive Species Within Corridors, by Alternative

	Alternative B	Alternative C	Alternative D
Total corridor acres	117,625 acres	103,533 acres	327,558 acres
Corridor acres Where Motorized Use is likely to Occur	43,124 acres	37,408 acres	92,611 acres
Acres Within Corridors Invested by Invasive Species	4,165 acres	3,781 acres	9,691 acres

Monitoring and Mitigation

The mitigation measure of modifying access routes if unacceptable or unanticipated impacts occur would further reduce the risk of the spread of invasive species. The monitoring plan included in Alternatives B, C, and D would reduce the risk of existing populations expanding, or new ones becoming established. If either of these occur, the impacts would be mitigated by modifying the access route.

While managing dispersed recreation is outside of the scope of this decision, the indirect effects of dispersed recreation on invasive species that could occur because of this decision would be monitored. The monitoring plan defines conditions that may result in mitigation as defined in Chapter 2 of the EA. The expected result of this mitigation is that impacts to and from invasive species would be reduced or eliminated.

Cumulative Effects

Analysis Area and Boundary Rationale

The analysis area for cumulative effects of the Motorized Travel Management Project is the Forest boundary since the documented invasive plant infestations available for quantitative analysis are located across the Forest outside wilderness, as well as adjacent lands managed privately or by other agencies because invasive species can invade from adjacent lands or be spread from National Forest System lands to other adjacent lands. The temporal boundary begins with European settlement and disturbance from the extraction economy of mining, grazing, and logging in the late 1800s. Motorized travel is expected to continue in perpetuity on the Forest. However, future decisions that affect motorized travel management such as decisions stemming from minimum roads analysis implementation and the Forest Plan revision decision are likely to change management direction and associated effects within about 10 years, which is used as the future boundary of this analysis.

Past Actions

The aggregate effects of past actions are displayed under the affected environment and Alternative A above. In order to understand the incremental effect of the proposed action on past actions, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions on natural events that have affected the environment and might contribute to cumulative effects. By looking at current conditions, residual effects of past human actions and natural events, such as road and trail construction, grazing, timber harvest, and dispersed and developed recreation, are captured regardless of which particular action or event contributed those effects. The introduction and spread of invasive, noxious weeds are the result of previous human activity.

Present and Reasonably Foreseeable Future Actions

Appendix A lists the on-going and reasonable foreseeable future actions. Those that affect invasive plants are discussed below.

The Pacific Northwest Region signed a Record of Decision for management of invasive species in 2005. This document establishes standards for both the prevention and treatment of invasive species, including specific requirements to be used in site-specific projects, like motorized trail construction or reconstruction projects. These requirements have resulted in and are expected to continue to result in the reduction or elimination of invasive species infestations.

Most Forest activities have the potential to affect invasive plant populations, either by providing a vector for spread or by causing ground disturbance, which removes or weakens native plant communities and provides an opportunity for invasion. The following is a summary of major categories of Forest activities that are currently ongoing or reasonably foreseeable future actions, found in Appendix D of the *R6 PNW Preventing and Managing Invasive Plants FEIS* (Kimberling et al. 2005), discussing the potential influences of Forest Service management on invasive plant species. Findings are summarized below for each activity.

Livestock Grazing

The Forest has 1,061,551, acres in active sheep and cattle grazing allotments; 510,441 acres of inactive allotments; and 58,269 acres of closed allotments, of which approximately 1.4 million acres overlap with the project area. Future grazing is likely to be at current active levels, or lower, due to the reduction in the markets, especially for sheep grazing. Livestock may spread invasive plants by moving seeds, either on their bodies or by passing them through their digestive systems. Grazing removes native plant cover, allowing growing space for invasive plants. Livestock may also physically alter sites in ways that favor invasive plants; for example through trampling, disturbance of soil crusts, creation of bare soil, and adding nitrogen to the soil through urine and feces. Forest Service roads and trails are used as travel corridors for livestock and roads and trails are located within grazing allotments. Therefore, grazing activities overlap in time and space with motorized travel management activities both in corridors and through the closure of the Forest to cross-country use. The closure of cross country motorized travel on the Forest is expected to reduce or eliminate spread into closed areas, potentially off-setting impacts from grazing.

Tree Harvest, Fuels Reduction (thinning and burning), and Restoration

The Teanaway, Walter Springs, Table Mountain Fire, Iron Thin, Moe Forest Restoration, Preston Fox, Buck Forest and Fuels, Glass Angel, Baily, Crawfish, Swauk Pine, Upper Yakima, South Summit 2, Little Crow, Microwave, Annie, Light, and Upper Peshastin restoration projects are currently being planned or implemented across the Forest. Logging creates patches of open habitat that are susceptible to invasive plants. Logging roads, skid trails, landings, and other associated soil disturbances create areas more vulnerable to invasive plants. Any new roads constructed for these projects or use of the existing road system provides vectors for spread of invasive species. Thinning of dense forests creates open habitat, which may be more vulnerable to invasion. However, fuel reduction may reduce future fire intensity and allow a fire regime more likely to benefit native plant communities, making them less vulnerable to invasion. Treatments such as thinning, prescribed burning, and road closures, restoration projects are designed to create landscapes that are more resilient to changing climates and disturbances, enabling landscape results that restore natural processes, patterns, and functions. All resources benefit when ecosystem function is restored. Therefore tree harvest, fuels reduction and restoration activities could have a neutral effect on invasive species since construction and use of logging roads can contribute to invasive species introduction and spread, but restoration activities such as decommissioning of roads can reduce the risk for invasive species. In addition, Travel Management actions to close the Forest to cross-country travel and designate corridors could further reduce the risk for invasive species.

Wildfire, Fire Suppression, and Prescribed Burns

Wildfires and fire suppression occur every year at random locations across the forest. The forest is implementing the Falls Coyote, Bear Mountain, Forest Mountain, East Pine Zone, Lost Driveway, Bannon, Crum Canyon, and Mission area fuel reduction projects. After fires sites are often more vulnerable to invasive plants (Milberg and Lamont 1995). Fire creates many of the conditions favored by invasive plants, such as increased light, bare ground, reduced competition, and available water

and nutrients. Prescribed fires, especially spring burns, provide the open space, greater sunlight, and darker surface area favored by invasive winter annuals (Hulbert 1988; Sans and Masalles 1995). Fire lines constructed to suppress or contain fires are vulnerable to invasive plant invasion and potential vectors for spread. NFS roads and trails are used as travel corridors for the actions described above. Even though activities associated with wildfire, fire suppression, and prescribed burns overlap in time and space with motorized travel management activities to close the Forest to cross-country travel and designate corridors there would be no change to the risk for invasive species with above described fire activities.

Road Management (closing, building, maintaining)

There are 7,923 miles of road are present on the Forest, of which approximately 2,000 are maintained each year. Total miles of road are likely to be reduced in the future given Forest focus on reducing road miles to a maintainable level following minimum roads analysis. Roads and roadside habitat are particularly susceptible to invasive plants because of the lack of plant cover and the continual disturbance through road maintenance (grading, etc.). Roads are vectors for spread, so closing and decommissioning roads with other projects can add to the legal closure of maintenance level 1 roads in this project by further reducing the risk for introduction and spread of invasive species.

Trail Management/ Recreational Use

The Forest has 4,587 miles of motorized and non-motorized trails and 174 developed campgrounds and picnic areas. Recreational users of the Forest may spread invasive plant seeds, which can cling to gear, clothing, tires, or boots. Horses and pack animals may also transport seeds on their bodies or through their digestive systems. Many of these recreational activities take place within dispersed sites included in corridors that would be designated in the Motorized Travel Management Project which would maintain the potential for invasive species to be spread from dispersed sites in corridors to other areas. Closure of the Forest to motorized use except on designated roads and trails and within designated areas would reduce the potential for invasive species to be spread along trails and through general recreational activity.

Invasive Species

Invasive species are currently being treated as part of other Forestwide Integrated Weed Management decisions (1997, 1998, 1999, 2001); under site-specific decisions for fuels management or other projects to either pre-treat or use early detection-rapid response to treat invasive species that are caused by those projects; and under weed specific integrated weed management projects, such as the Crupina project in the Lake Chelan-Sawtooth Wilderness, and the Blue Buck Hawkweed project on the Methow Valley Ranger District. These projects are designed to contain, control or eradicate invasive species populations.

The current monitoring of motorized travel routes, especially high-use roads, would continue, as would the treatment for invasive species infestations under existing integrated weed management

decisions in 1998 on the Wenatchee portion of the Forest and 1997, 1999 and 2002 on the Okanogan portion of the Forest.

The Forest will soon release a Forest-wide Invasive Species EIS for invasive species treatment through integrated weed management methods. When implemented, the Forest would have the ability to more effectively and efficiently manage for invasive species in all areas, including within corridors designated under this project. These, along with the elimination of cross-country motorized travel resulting from the Motorized Travel Management Project, would reduce introduction and spread of invasive species.

On private lands adjacent to National Forest System lands, the control of invasive species is regulated under the state's basic weed law, RCW 17.10, (Revised Code of Washington). Weed laws establish all property owners' responsibility for helping to prevent and control the spread of noxious weeds. Since plants grow without regard to property lines or political jurisdictions, everyone's cooperation is needed. Washington's weed laws spell out these responsibilities, and create the government infrastructure needed to educate citizens and ensure that the laws are respected. Washington's weed laws also direct the state Noxious Weed Control Board to create and maintain the state's official list of noxious weeds that landowners may be required to control. Thirty-eight of Washington's 39 counties, including the four counties which contain the Forest, have county weed boards. County weed board control of invasive species on non-NFS lands varies by county; some are more effective than others, though there is not a good mechanism for tracking the effectiveness of the four county weed boards that overlap with the Forest.

The cumulative effect of all these actions and the Motorized Travel Management Project actions would be variable, but an overall reduction in invasive and noxious weed population is anticipated.

ALTERNATIVE A

Continued invasive species treatment under bot the existing integrated weed management decision and the future invasive species Record of Decision would reduce the risk for the introduction of new species and the spread of existing infestations. Other reasonably foreseeable future actions would restore biodiversity and manage access, improving habitat for all plant species across the forest compared to the existing condition. All ground disturbing projects, including livestock grazing, vegetation management, fuels reduction, road and trail construction, and prescribed burns are required to implement prevention standards, and restoration projects are helping to establish healthier native vegetation. Other projects like road closure and decommissioning are also preventing weed spread by denying access, however continued use and maintenance or roads and trails could spread or introduce invasive species. Under Alternative A, the no action alternative, unauthorized routes would continue to be used and created in those areas of the Forest open to cross-country motorized travel leading to the spread of invasive species, and off-setting the potential reduction in the spread of invasive species from

other projects. The cumulative effect of the past, present, and reasonable foreseeable future actions with Alternative A has the highest potential to result in impacts to other resources from invasive species.

ALTERNATIVES B, C, and D

Virtually eliminating cross-country travel (except on 33 acres), closing maintenance level 1 roads to motorized vehicles, and managing motorized access to dispersed recreation would substantially reduce access and the effects currently caused by past and ongoing actions. This, combined with a number of other projects to restore biodiversity and manage access, would improve habitat for all plant species across the Forest compared to the existing condition. All ground disturbing projects, including vegetation management, fuels reduction, road and trail construction, and prescribed burns are required to implement prevention standards, and restoration projects are helping to establish healthier native plant communities. Other projects like road closure and decommissioning are also preventing weed spread by denying access, which would be strengthened by any of the action alternatives through closure of cross-country motorized travel, including on maintenance level 1 roads.

Compared to Alternative A, Alternatives B, C, and D would reduce the risk of the spread or introduction of invasive species across the forest.

COMPLIANCE WITH LAWS AND REGULATIONS

Based on the above and with the implementation of monitoring and mitigation measures, this project complies with Executive Order 13112, the R6 Invasive Plant Management ROD Standard 1 and both the Okanogan and Wenatchee Forestwide prevention noxious weed standards to prevent the introduction, establishment and spread of invasive species by closing the Forest to cross-country use, and designating corridors where only existing routes can be used for motorized access and not within 100 feet of water except at Improved Sites.

3.6 Heritage Resources

INTRODUCTION

On the Okanogan-Wenatchee National Forest, heritage resources are archaeological and historic sites defined by artifacts and/or the remains of buildings and structures; places and landscapes of religious, sacred and traditional importance to contemporary culture; and single artifacts or objects that represent past human activities/culture.

Heritage resources are important because they provide insight into human adaptation to the environment over time. Individually and cumulatively they reflect the challenges faced by humans and through their study, they explain and define success, failure and ultimately, the origin of cultural diversity today. For many Americans heritage resources are windows to the past; of importance in terms of explaining and understanding their cultural origin. Heritage resources with the greatest potential to provide insight into human nature, and/or that are associated with culturally important individuals, events, and objects are listed on or eligible for nomination to the National Register of Historic Places (NRHP) and as such, are given consideration in planning for federally licensed, approved or funded activities. The protection and preservation of these resources is the goal of heritage resource management on the Okanogan-Wenatchee National Forest.

REGULATORY FRAMEWORK

Regulatory direction relevant to travel management and its effects to heritage resources includes:

The National Historic Preservation Act (NHPA) of 1966, as amended

This Act and its implementing regulations (36 CFR 800) provide comprehensive direction to federal agencies about their historic preservation responsibilities. The Act established the federal government's policy and programs on historic preservation, including the establishment of the National Register of Historic Places (NRHP). Section 106 of the Act requires federal agencies having direct or indirect jurisdiction over a proposed federal or federally assisted or permitted undertaking to take into account the effect an undertaking may have on historic properties listed on or eligible for the National Register, and it affords the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on such undertakings. It allows federal agencies to develop programmatic agreements for complying with Section 106 of the Act. On the Okanogan-Wenatchee National Forest, Section 106 is implemented in accordance with a 1997 programmatic agreement entitled, "Cultural Resources Management on National Forests in the State of Washington".

Executive Order 11593: Protection and Enhancement of the Cultural Environment

Issued May 13, 1971, this E.O. directs federal agencies to inventory heritage resources under their jurisdiction; to nominate heritage resources to the National Register of Historic Places; to use due

caution until inventory and nomination processes are completed, and to assure that federal plans and programs contribute to preservation and enhancement of non-federally-owned properties.

USDA Forest Service Policy for Section 106 Compliance in Travel Management: Designated Routes for Motor Vehicle Use

This policy was developed in 2005 in consultation with the Advisory Council on Historic Preservation. It outlines minimal requirements for considering possible effects to historic properties that may be associated with designating routes and areas as part of a national forest's transportation system. While it clearly recognizes that establishment of policy is a planning effort with no potential to affect historic properties, the following actions/activities are considered "undertakings" with the potential to affect heritage resources and as such, trigger consideration under Section 106 of the NHPA:

- construction of a new road or trail;
- authorization of motor vehicle use on a route currently closed to vehicles; and
- formal recognition of an unauthorized (usually user-developed) route as a designated route open to motor vehicles.

It further states that existing, formally established system (classified) roads and trails, already open to motor vehicle travel, generally need not be re-evaluated for purposes of this rule. Designation of the existing system on a motor vehicle use map (MVUM) will not generally be considered an undertaking for the purposes of NHPA and not subject to Section 106 review because it is actively being managed.

The proposed action and alternatives considered in this Travel Management project do not include any construction of new roads or trails, authorization of motor vehicles use on a route currently closed to vehicles, or formally designating unauthorized routes open to motor vehicles. They do include designating corridors for motorized access to dispersed camping, where motorized vehicles would be allowed on existing user-created routes only. These user created routes would not be individually designated.

The Area of Potential Effect (APE) for the road, trail, or area shall include corridors or zones adjacent to the road, trail, or area that the Forest determines to be subject to direct or indirect effects due to local environmental factors or the proximity of particularly sensitive resources. This will include the road, trail, or area surfaces, passing or parking areas, and campsites or other features established as part of the road or trail. It shall also include additional affected areas or properties if the designation would facilitate increased access to those historic properties. When a Forest proposes an unclassified, user-created road, trail, or area for addition to the designated route system, or when opening an existing route to a new use, the agency official must make a determination as to the potential for that designation to have an effect on historic properties. If there is no effect to any historic properties because there are no historic properties present or because the designation will not affect any historic properties, then the process may conclude with this determination provided that the Forest issues a determination of no effect.

Designations of new or unclassified routes must be based on appropriate inventory of historic properties within the APE, considering local conditions and inventory protocols, the degree to which designation of a route will change existing use patterns, and the probability of finding historic properties. Monitoring of impacts to historic properties as the result of motor vehicle activity is a critical component of forest plan monitoring and OHV designation.

Okanogan and Wenatchee National Forest Plans

The Forest Plans provide guidance for heritage resource management. Management direction in both plans requires compliance with federal laws and regulations governing heritage resource management and emphasizes protection, and evaluation and nomination of heritage resources to the National Register of Historic Places (USDA Forest Service 1989, 1990).

Analysis Area & Boundary Rationale

The area of analysis for determining direct and indirect effects to heritage resources is the Forest outside of designated wilderness areas; more specifically, heritage resources located within a corridor. The Moon Rocks and Funny rocks motorized use areas have been inventoried for heritage resources and no heritage resources are present within these areas. While it is possible for a heritage resource located on an inholding or on private and public lands adjacent to the Forest boundary to be affected because it's visible (e.g. cabin, rock shelter), the effort to identify heritage resources within a corridor is designed to capture those resources as well.

EXISTING CONDITION

Heritage resources are nonrenewable resources that can be affected by motorized vehicles. Soil erosion, crushing of artifacts, relocation of artifacts, and destruction of a feature such a hearth or foundation, are examples of direct effects attributed to vehicles.

More than 2,500 heritage resources have been documented on the Okanogan-Wenatchee National Forest since passage of the National Historic Preservation Act in 1966. Seasonal hunting, gathering and fishing camps, and large permanent villages associated with American Indians are scattered throughout the Forest. Discoveries of stone tools, pictographs and radiocarbon dating of a few heritage resources indicates use of the Forest as far back as 9,000 years ago and that large permanent villages were firmly established 2,000-3,000 years ago along major rivers that flow into the Columbia River. Many of these heritage resources are of cultural, religious and traditional importance to local tribes residing on the reservations of the Confederated Tribes of the Colville Reservation and the Confederated Tribes and Bands of the Yakama Nation.

Euro-American settlement across the Forest began in the 1800s and is represented in the archaeological record by homesteads, mines, seasonal camps, town sites, agricultural and ranching sites, by vast transportation systems (railroads, roads, trails, ditches, communication lines) and by isolated artifacts.

Active and abandoned Forest Service administrative sites (e.g. ranger stations, guard stations, fire lookouts) dot the landscape along with more than 600 recreation residences and numerous organizational camps associated with use of the national forest since its inception in the early 1900s.

A total of 15 heritage resources are listed on the National Register of Historic Places, Standouts due to public interest include the Stevens Pass Historic District, Bonaparte Lookout, the Leavenworth Ranger Station, and the Salmon La Sac Guard Station.

The majority of the heritage resources documented to date were located during field inventories in support of Forest Service activities such as timber sales, prescribed burns, forest ecosystem restoration and even small scale projects like toilet replacements in existing campgrounds. For some ranger districts, coverage is in excess of 80 percent. The Naches and Cle Elum Ranger Districts have the highest number of heritage resources due to terrain and the high number of projects requiring heritage resource inventories on those districts.

Cross Country Motorized Travel

There are 1,541 documented heritage resources scattered across the 2.4 million acres currently open to cross country motorized travel. Fifteen of them are listed, 487 are eligible, and 1,039 are unevaluated.

Cross country motorized use on the Forest can and has caused damage to heritage resources. Artifact scatters are most prone to direct effects from vehicles while structural sites like cabins are more likely to be avoided due to visibility yet more prone to indirect effects such as vandalism and looting. This unmanaged motorized travel currently threatens the integrity of some National Register eligible, listed or unevaluated heritage resources

Maintenance Level 1 Roads

There are 7,923 miles of system Forest Service roads, including 2,577 miles of maintenance level 1 roads. The maintenance level 1 roads are closed by definition, but are considered part of the cross country landscape, and therefore most are still open to motorized vehicles. Motorized vehicles on these roads have the potential to damage any heritage resource in or directly adjacent to the road. The risk of this occurring is proportional to the miles of road open to motorized vehicles. As with cross country motorized travel, artifact scatters are most prone to direct effects from vehicles while structural sites like cabins are more likely to be avoided due to visibility yet more prone to indirect effects such as vandalism and looting.

Motorized Access for Dispersed Camping

The Forest's heritage resource probability model was developed to identify high, moderate, and low probability areas where there is a risk of damage to unidentified heritage resources. All there probability areas include terrain with 15% slope or less, with the proximity to perennial water sources being one of the determining factors separating out the high, moderate, and low probability. The existing dispersed campsites and access routes leading to the sites are located in areas with slopes less

than 20%, with most of the sites concentrated along rivers, lakes, and streams. This puts nearly all of the dispersed camping and access routes within the high or moderate probability areas.

Motorized access for dispersed camping is occurring in a mostly unregulated pattern, with people driving vehicles on existing access routes, or pioneering new routes to new or existing campsites. This unmanaged motorized vehicle use within these high and moderate probability areas has the potential to damage heritage resources through soil erosion, crushing of artifacts, relocation of artifacts, and destruction of a feature such a hearth or foundation.

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects

ALTERNATIVE A

Cross Country Motorized Travel and Maintenance Level 1 Roads

The potential for motorized vehicle damage to documented and undocumented heritage sites across the 2.4 million acres of Forest that would remain open to cross country motorized travel would continue, and likely increase over time as new unauthorized trails are developed. This unmanaged motorized travel would continue to threaten the integrity of some National Register eligible, listed or unevaluated heritage resources.

Maintenance Level 1 Roads

Motorized vehicles would continue to be allowed on the 2,577 miles of maintenance level 1 roads. There would be a continued risk of damage from the motorized vehicles to any heritage resources in or directly adjacent to the roads. Artifact scatters would be the most prone to direct effects from vehicles while structural sites may be vandalized or looted.

Motorized Access for Dispersed Camping

Motorized access for dispersed camping would continue in a largely unregulated pattern in much of the high and moderate probability areas of the forest. Current impacts to heritage resources would continue, and likely increase in the future as new access routes are developed.

Effects Common to Alternatives B, C, and D

Alternatives B, C, and D would reduce or eliminate impacts to heritage resources through inventory, monitoring and mitigation of adverse impacts and restriction of motorized vehicles to designated

routes, corridors and the motorized use areas of Moon Rocks and Funny Rocks. Management of motorized travel will reduce or eliminate inappropriate motorized use that currently threatens the integrity of some National Register eligible, listed or unevaluated heritage resources. Designation of ML 2-5 roads, system motorized trails, corridors with route restrictions, and two motorized use areas, will be easier to monitor and mitigate and will reduce the potential for damage to heritage resources that are currently being impacted by unauthorized motorized use across the Forest.

Cross Country Motorized Travel

Eliminating unrestricted cross-country motor vehicle use would ultimately protect heritage resources across a broad landscape. The potential for damage from motorized vehicles to the 1,541 known sites, and all unknown heritage resources would be eliminated or substantially reduced.

Maintenance Level 1 Roads

Motorized vehicles would no longer be allowed on the 2,557 miles of maintenance level 1 roads, reducing the miles of road open to motorized vehicles by 32%. Any heritage resources in or directly adjacent to maintenance level 1 roads, such as scatters or structures, would no longer be at risk of damage from motorized vehicles.

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

Corridors for motorized access to dispersed camping would be designated in Alternatives B, C, and D. Vehicles would be limited to existing access routes only, not farther than 300 feet from the open road, and not closer than 100 feet to water[19] This would reduce impacts to sites within corridors because people would be prohibited from driving off existing routes, so the risk of damage to currently un-impacted sites would be substantially reduced compared to Alternative A or the existing condition. There would be variation in the risk between Alternatives B, C, and D however because of the number of known sites that would be in the designated corridors, and the difference in the acres of high, moderate, and low probability within corridors.

Based on the Forest's heritage resource GIS data, the number of documented National Register listed, eligible or unevaluated heritage resources varies from a low of 252 under Alternative C to 676 under alternatives A and D. The tables that follow illustrate that as the number of corridors increase so too do the number of heritage resources potentially affected.

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[19] Except at Improved Sites where vehicles would be allowed within the defined route, regardless of the distance from roads or to water.

Table 3.6-1: Number of Heritage Resources in Corridors By Alternative

Alternative	Listed HR	Eligible HR	Unevaluated HR	Total
B	3	117	267	387
C	2	72	178	252
D	11	249	416	676

The probability of damage occurring to heritage resources from motorized vehicles within corridors varies by the amount of high, moderate, and low probability acres. The following table lists the number of acres in each category by alternatives.

Table 3.6-2: Heritage Resource Probability Acres Within Corridors by Alternative

Alternative	High Probability	Moderate Probability	Low Probability	Total Acres
B	22,411	17,946	74,198	114,555
C	16,574	17,151	66,996	100,721
D	50,050	36,129	223,538	309,717

Where National Register listed, eligible, or unevaluated heritage resources and motorized routes overlap, heritage resources could be affected. Comparing Tables 1 and 2, Alternative D has the highest number of heritage resources and as such, the highest potential for impacts. In terms of site probability Alternative D has a higher risk of impacts since it would include at least twice as much high probability area within corridors as Alternatives B or C. Alternative C would have the smallest number of listed, eligible and unevaluated heritage resources and the smallest acreages of high, moderate and low site probability. Of all the alternatives, Alternative C has the least potential to affect heritage resources and would require less inspection, monitoring and survey.

The risk of damage to heritage resources would be reduced and mitigated because of the mitigation and monitoring that would be included in Alternatives B, C, and D.

Effects of Allowing WATVs on Some Open Roads in Alternatives B and D

Allowing WATVs on the 350 miles of currently open road would have no additional effects, or increase in the probability to damage to heritage resources. All the roads are currently open to, and receiving use from highway legal vehicles. Adding the new class of motorized vehicles onto these roads would not add additional effect because the WATVs would be traveling in the same road way as the current vehicles.

Cumulative Effects

The cumulative effects analysis for heritage resources considers the incremental contribution of effects of the alternatives with all other actions. The geographic scope of the cumulative effects analysis is 2.6

million acres open to motorized travel. The scope of cumulative effects to heritage resources located outside the Forest boundary is limited to points of Forest ingress and egress, the distance of which is defined by physical mobility. The temporal boundary extends from the early to mid-1900s when road and trail construction began on National Forest System land until approximately 10 years into the future when Forest Plan Revision may change management direction.

Past actions (e.g. timber sales, road construction, fire management) across the Forest have resulted in the discovery of heritage resources but for actions conducted prior to passage of the1966 National Historic Preservation Act (NHPA) which requires federal agencies to consider effects of their actions on National Register listed or eligible heritage resources, there was likely little or no consideration of effects to heritage resources. Unless the Forest choose avoidance, heritage resources may have been both knowingly or inadvertently damaged or destroyed during ground disturbing activities such as road construction, logging, fire prevention, trail and campground construction.

Even with passage of the NHPA, avoidance of heritage resources pending formal evaluation, has had and continues to have unintended consequences. Avoidance during prescribed burning projects for example, has contributed to unnatural and heavy fuel loading within heritage resources which puts them at even higher risk during a wildfire when protection may not be possible. The Forest's emphasis on avoidance pending evaluation has resulted in the protection of hundreds of heritage resources that may not warrant management yet remain subject to the cumulative effects of past, present and foreseeable future actions as well as to unrestricted human activities (looting and vandalism) and natural environmental processes such as erosion, wildfire, and exposure to the elements.

ALTERNATIVE A

The cumulative effect of all past, present, and reasonably foreseeable future actions and Alternative A would be the continued risk of damage to heritage sites across the forest. All present or reasonably foreseeable future actions included in Appendix A of the EA (e.g., timber sales, watershed restoration, prescribed burning, road construction, winter motorized use, campground maintenance) would be subject to review in accordance with Section 106 of the National Historic Preservation Act. This would partially offset the continued and likely increasing potential for damage from the cross country motorized travel and unregulated motorized access for dispersed camping from Alternative A.

ALTERNATIVES B, C, D

The cumulative effects the past, present, and reasonably foreseeable future actions and Alternatives B, C, or D would be an overall reduction in the potential for damage to heritage resources. The incremental contribution of Alternatives B, C, and D to the effects of the other present and reasonably foreseeable

future actions would be substantial protection or heritage resources by eliminating cross country motorized travel, and restricting motorized access for dispersed camping. Heritage resources listed or eligible for the National Register would be protected though avoidance or appropriate mitigation, and all present and reasonably foreseeable future actions (e.g., restoration, prescribed burning, road construction, campground maintenance, etc.) would be subject to review in accordance with Section 106 of the National Historic Preservation Act.

CONSISTENCY FINDING

Travel Management planning is consistent with Section 106 of the National Historic Preservation Act (36 CFR 800) which requires federal agencies having direct or indirect jurisdiction over a proposed federal or federally assisted or permitted activity to take into account the effect that undertaking may have on historic properties listed on or eligible for the National Register. This includes planning documents involving a decision. Through its past, present and continued consultation with the Confederated Tribes of the Colville Reservation and the Confederated Tribes and Bands of the Yakama Nation, this plan is consistent with the American Indian Religious Freedom Act (AIRFA) which directs federal agencies to consider how their actions might affect tribal practitioners. This planning effort is consistent with the standards and guidelines for heritage resource management outlined in the Wenatchee National Forest Plan and the Okanogan National Forest Plan. Both plans require compliance with all federal laws and regulations pertaining to heritage resources. The methodology used to consider effects to heritage resources is consistent with the 2005 USDA Forest Service Policy for ***"Section 106 Compliance in Travel Management: Designated Routes for Motor Vehicle Use***".

3.7 Economics

INTRODUCTION

Social and economic elements, which are interrelated and interdependent with ecological elements, comprise the human dimensions component of the ecosystem. The purpose of this analysis is to inform the decision-making process through disclosing the current economic effects of motorized and non-motorized recreation activities and the potential impacts to the public from the alternatives. The social effects are described qualitatively in the Recreation Specialist Report.

The implications of resource management decisions for the Okanogan-Wenatchee National Forest (Okanogan-Wenatchee National Forest) Motorized Travel Management project to the social and economic uses and values are of interest to residents of the project area and users of the area. These people have made their interests known through organized groups and personal efforts. It is these interests and concerns that have helped identify the issues connected with the proposed action.

Analysis Area and Boundary Rationale

The Okanogan-Wenatchee National Forest extends into parts of four counties in Washington State (Chelan, Kittitas, Okanogan, and Yakima) as well as a very small portion of one more (Skagit). This analysis provides a description of the social and economic environment and trends in the four counties plus six other counties in the area surrounding the Okanogan-Wenatchee National Forest. The other six are: Ferry, King, Snohomish, Benton, Douglas, and Grant. National Forest System (NFS) land covers approximately six million acres of the land, which accounts for 31 percent of the land within the eleven county study area.

All eleven counties are included because the Okanogan-Wenatchee National Forest, like other national forests, caters to a regional population including those metropolitan areas within reach of the Forest. These sub-regions are part of what Forest Service researcher, Ken Cordell, terms a recreational “market zone” (Cordell, 1999). The study area stretches beyond the four central counties of the Okanogan-Wenatchee National Forest to include the metropolitan area of Seattle in the market zone as well as the other counties in the region of direct social and economic relationships.

EXISTING CONDITION

Introduction

This section examines the population and demographic trends, general economic data, as well as recreation use and economic contributions of motorized and non-motorized forest uses.
Population Trends

In 2010, the latest census available, the population of the eleven-county planning area was nearly 3.5 million. As Table 3.7-1 below reveals, county populations within the study area vary dramatically, from a low of 7,551 in Ferry County to nearly two million in King County. In the aggregated data, trends in King County dominate, masking changes in relatively smaller counties. The disaggregated data in Table 1 allows for the analysis of the differences among counties.

As Table 3.7-1 shows, the study area, in aggregate, has grown more quickly than the nation, which grew by nearly 10 percent in the past decade. The population of the study area has grown nearly 13 percent. Looking at the trends for individual counties tells a different story. There is considerable variation among them. Benton County grew by 23 percent. Douglas, Snohomish, and Grant also grew quickly. Ferry and Okanogan counties' population grew by only about 4 percent. Chelan and Yakima counties also grew slightly more slowly than the nation.

Table 3.7-1. Current population and growth trends (2010)

Geography	Population	
	2010	% change 2000-2010
Chelan County	72,453	8.8 %
Kittitas County	40,915	14.1%
Okanogan County	41,120	3.9%
Yakima County	243,231	9.3%
Ferry County	7,551	4.0%
King County	1,931,249	11.2%
Skagit County	116,901	13.5%
Snohomish County	713,335	17.7%
Benton County	175,177	23.0%
Douglas County	38,431	17.9%
Grant County	89,120	19.3%
Eleven county aggregate	3,469,483	12.9%
Washington State	6,724,540	14.1%
United States	308,745,538	9.7%

Source: US Census Bureau State and County Quick Facts (http://quickfacts.census.gov/qfd/states/53/53017.html)

Increases in population can increase user demands on existing travel routes, access, and recreation opportunities (Cordell and Overdevest 2001). When the increase is primarily through migration into the study area, it can also increase demand for a different combination of uses and level of those uses. For example, baby boomers living in urban areas of Washington are likely to have different values and recreation patterns than people living in small communities in central Washington. When large numbers of baby boomers move from Washington to eastern Washington, the difference in values between the newcomers and those of the long-time residents of the community may lead to friction in the community. The addition of new users with different values has the potential to result in conflict. People with different values often have different behaviors, which also may lead to conflict.

While high population growth rates may lead to economic growth and diversity, they may also strain community capacity, including physical and civil infrastructure. The remaining analysis will seek to add context and clarity to trends and potential issues in these counties and the study area as a whole.

Population Density

Population density can serve as an indicator for a number of socioeconomic factors of interest – urbanization, availability of open space, and socioeconomic diversity. More densely populated areas are generally more urban, diverse, and offer better access to infrastructure. In contrast, less densely populated areas provide more open space, which may offer amenity values to residents and visitors.

Table 3.7-2 gives population densities in the study area. King County far exceeds the population density of the rest of the counties in the planning area; the next most densely populated county is Snohomish County, which is one of the fastest growing counties in Washington. Washington is a relatively densely populated state – it is more densely populated than the national as a whole. However, several counties in western Washington, including King County, are primarily responsible for the state's high density. King County, which includes the Seattle metropolitan area, has more than 900 people per square mile. Ferry and Okanogan counties have extremely low population densities. In Ferry County, there are fewer than four people per square mile. Ferry and Okanogan are among the least dense counties in the state. These counties are both located in northcentral Washington.

Table 3.7-2. Population density (2010)

Location	People/square mile
Chelan County	24.8
Kittitas County	17.8
Okanogan County	7.8
Yakima County	56.6
Ferry County	3.4
King County	912.9
Skagit County	67.5
Snohomish County	341.8
Benton County	103.0
Douglas County	21.1
Grant County	33.3
Eleven county study area	144.5
Washington State	101.2
United States	87.4

Source: US Census Bureau, Census 2010, Fact Finder 2

Age

Median age can reveal information relevant to travel management decisions. Areas with a large proportion of retirees may have different needs and preferences than communities populated primarily

with working age families. Table 3.7-3 provides the median age by county as well as the state and national averages.

Table 3.7-3. Median age (2010)

Geography	Total	Male	Female
Washington State	37.3	36.2	38.3
Benton	35.6	34.6	36.6
Chelan	39.3	38.1	40.5
Douglas	36.8	35.9	37.7
Ferry	47.3	46.5	48.1
Grant	32.1	31.3	32.9
King	37.1	36.3	37.9
Kittitas	31.9	30.5	33.2
Okanogan	42.9	41.9	43.8
Skagit	40.1	39.1	41.3
Snohomish	37.1	36.1	38.1
Yakima	32.2	31.3	33.2

Source: US Census Bureau, Census 2010, Fact Finder 2, File Name DP-10.

In general, the median age in the study area is about the same as the state and the nation. However, substantial variation exists among counties. Kittitas County is relatively young (median age 31.9), likely related to the presence of Central Washington University in Ellensburg, where approximately 8,000 students are enrolled (CWU-OIR-2009). In contrast, Ferry county's residents are, on average, relatively old (47.3). This suggests that this has relatively high proportions of retirees and comparatively few young adults and families with children at home.

Per Capita Income

Per capita income (income per person in a population) is a key indicator of the socioeconomic well-being of a county. High per capita income may signal greater job opportunities, highly skilled residents, greater economic resiliency, and well developed infrastructure. Table 3.7-4 provides data on per capita income for 1990 and 2009 (both in 2009 U.S. Dollars).[20] Per capita income increased in every county in the planning area during the 19-year period. For some counties in the planning area, however, per capita income is markedly lower than the state average. Average per capita income in the eleven-county planning area is approximately 83 percent of the state figures. While average per capita personal income is well above the state average in King County, all of the other counties in the planning area are below the state average, except Snohomish. Despite the gains in per capita income since 1990, more than half of the counties in the study area have not grown at a comparable rate to the state.

[20] Per capita income data for 2010 were not available at the time this draft was written.

Table 3.7-4. Per capita personal income (inflation adjusted to 2009 dollars) [21]

Area	1990	2009	Percent Change
Washington State total	$32,234	$42,870	33%
Benton, WA	$29,127	$38,307	32%
Chelan, WA	$28,011	$35,237	26%
Douglas, WA	$24,315	$29,565	22%
Ferry, WA	$20,347	$25,284	24%
Grant, WA	$23,918	$29,025	21%
King, WA	$41,259	$56,904	38%
Kittitas, WA	$24,206	$32,149	33%
Okanogan, WA	$23,225	$32,136	38%
Skagit, WA	$28,873	$38,225	32%
Snohomish, WA	$31,286	$43,616	39%
Yakima, WA	$25,326	$31,265	23%
11 County Average	$27,263	$35,610	31%

Source: Bureau of Economic Analysis Table CA1-3 http://www.bea.gov/iTable/iTable.cfm?ReqID=70&step=1&isuri=1&acrdn=5
Note: Adjusted using BLS Inflation Calculator http://data.bls.gov/cgi-bin/cpicalc.pl

Earnings per Job

Per capita personal income offers an incomplete picture of the economic health of an area. Table 3.7-5 and Table 3.7-6 present data on earnings per job. In all of the counties in the planning area except Ferry, earnings per job increased by 15-40 percent. Whereas Ferry County's per capita personal income grew by 24 percent between 1990 and 2009, earnings per job decreased by 2 percent from 1990 to 2010. More precisely, earnings per job decreased by 12 percent from 1990 to 2000 then rose by 10 percent between 2000 and 2010.

Increasing per capita income coupled with decreasing earnings per job is possible, since employment income is only one element of personal income. Non-labor income, which includes rent, transfer payments, and dividend payments, is included in calculations of personal per capita income, but not earnings per job. In Ferry County, the increase in per capita income may be due to increasing numbers of retirees, whose income comes from non-labor sources. Income from retirees can enable per capita income to increase even as earnings per job stagnate or decrease.

[21] The original data are not inflation adjusted, the BLS Consumer Price Index inflation calculator is used to compare between years (http://data.bls.gov/cgi-bin/cpicalc.pl).

Table 3.7-5. Earnings per job (adjusted to 2010 dollars)

Area	Year		
	1990	2000	2010
Washington State total	$38,176	$47,544	$49,354
Benton, WA	$40,775	$44,493	$50,732
Chelan, WA	$28,853	$33,490	$34,512
Douglas, WA	$23,866	$29,645	$31,674
Ferry, WA	$34,440	$30,477	$33,623
Grant, WA	$29,170	$30,918	$35,655
King, WA	$43,783	$60,258	$61,146
Kittitas, WA	$27,159	$29,320	$32,339
Okanogan, WA	$24,178	$27,057	$27,814
Skagit, WA	$31,299	$35,356	$38,146
Snohomish, WA	$39,966	$44,467	$48,681
Yakima, WA	$27,897	$32,577	$34,524

Table 3.7-6. Earnings per job trends (percentages based on figures adjusted to 2010 dollars)

Area	Percent change 1990 - 2000	Percent change 2000-2010	Percent change 1990 - 2010
Washington State total	25%	4%	29%
Benton, WA	9%	14%	24%
Chelan, WA	16%	3%	20%
Douglas, WA	24%	7%	33%
Ferry, WA	-12%	10%	-2%
Grant, WA	6%	15%	22%
King, WA	38%	1%	40%
Kittitas, WA	8%	10%	19%
Okanogan, WA	12%	3%	15%
Skagit, WA	13%	8%	22%
Snohomish, WA	11%	9%	22%
Yakima, WA	17%	6%	24%

An increase in retirees is important for travel management planning. The values of retirees may be different than those of the long-time members of the community. Retirees and long-time residents may have different beliefs about the appropriate use of national forests and may use them for different types of recreation.

Decreases in earnings per job and per capita income may also affect planning area residents' perceptions of economic health and their attitudes toward travel management planning. Long-time residents who are extremely concerned about jobs are more likely to favor management actions that maintain or create jobs. Retirees, on the other hand, may be less concerned with job loss.

Unemployment

The unemployment rate provides insight into the relationship between residents' skills and employment opportunities. The natural rate of unemployment has been posited to be around 5 percent. This is the called natural rate because the rate allows for movement between jobs and industries, but does not signal broad economic distress. During the recession, the national unemployment rate has been about 10 percent, although it is currently (May 2015) at 5.5% nationally (Bureau of Labor Statistics, http://data.bls.gov/timeseries/LNS14000000).

Washington's unemployment rate has converged with the national rate in the middle of the 2000s. The average unemployment rate for the eleven-county area is slightly higher than that of the state. However, the average unemployment rate for the planning area obscures the diversity among counties. Five of the counties (Benton, Chelan, Douglas, King, and Kittitas) had lower rates of unemployment than the state. On the other hand, six of the counties (Ferry, Grant, Okanogan, Skagit, Snohomish, and Yakima) had unemployment rates that exceeded that of the state. Ferry had the highest unemployment rate in the State. Because employment is a primary source of personal income, employment and unemployment have major impacts on consumer spending and overall economic health. A breakdown of unemployment rates by county between 2001 and 2010 is shown in Table 3.7-7.

Table 3.7-7. Unemployment rates by county

Annual	Benton	Chelan	Douglas	Ferry	Grant	King	Kittitas	Okanogan	Skagit	Snohomish	Yakima	Eleven-county average	Washington
2001	5.7	8.1	7.3	11.2	8.9	5.1	6.6	9.9	7.1	5.3	9.4	7.7	6.2
2002	6.3	8.7	7.6	10.6	9.5	6.1	7.2	10.1	8.3	7.0	9.6	8.3	7.3
2003	6.9	8.4	7.7	13.5	9.3	6.2	7.7	9.5	8.2	7.1	9.6	8.6	7.4
2004	6.0	6.9	6.3	10.7	8.2	5.2	6.9	7.9	6.9	5.8	8.5	7.2	6.2
2005	5.7	5.9	5.4	9.1	7.2	4.7	5.9	7.1	5.9	5.1	7.4	6.3	5.5
2006	5.7	5.1	5	9.2	6.5	4.2	5.2	6.6	5.1	4.6	6.8	5.8	4.9
2007	4.8	4.9	4.7	7.9	5.7	3.9	4.8	6.2	4.7	4.3	6.2	5.3	4.6
2008	5.0	5.5	5.3	8.8	6.4	4.7	5.9	6.4	5.7	5.5	6.8	6.0	5.5
2009	7.2	8	8	13.3	9.9	8.5	9.1	9.6	10.1	9.9	8.9	9.3	9.3
2010	7.2	8.6	8.2	14.4	10.5	8.8	9.2	10.3	10.4	10.3	9.7	9.8	9.6

Source: Bureau of Labor Statistics Local Area Unemployment (http://data.bls.gov/cgi-bin/dsrv?la)

Recreation Use

Between October 2009 and September 2010 (USFS 2010), the National Visitor Use Monitoring (NVUM) survey was conducted on the Okanogan-Wenatchee National Forest.[22] The second column in Table 8 shows the total proportion of people participating in an activity, including those visitors who

[22] For a complete description of methodology, background, and summary data from other Forests and national statistics, visit the NVUM website at: www.fs.fed.us/recreation/programs/nvum.

participated in multiple activities on their visit to the Forest. As shown in the table, only 2 percent of all people who recreate on the Okanogan-Wenatchee National Forest ride OHVs. NVUM respondents also identify a single activity that they consider their primary activity on their visit to the Forest. The survey found that only 0.9 percent of people who recreate on the Okanogan-Wenatchee National Forest travel to the forest for the primary purpose of riding OHVs.[23] It is important to note, however, that NVUM does not have statistically significant figures for recreation activities that have low percentages of participation, including OHV use on the Okanogan-Wenatchee National Forest.

The NVUM study design, including the days and locations in the sample pool, also affects the accuracy of the OHV visitation figures. If some of the OHV use occurs at one or two sites that did not have enough sampling days during the NVUM sample period, OHV use would be underestimated. The sampling does appear to have missed some high-use areas for OHV use on the Okanogan-Wenatchee National Forest. For example, the 2010 NVUM data showed 0 percent participation in OHV use as a primary activity on the Okanogan portion of the Okanogan-Wenatchee National Forest, but ranger district managers observe that the trails in the Sawtooth backcountry and routes in the Granite Mountain Trail system have consistent OHV use (Yankoviak, et al, 2016).

Data from the 2010 National Visitor Monitoring study indicated that 5.5 percent of visitors to the engaged in dispersed (primitive) camping during their visit. Big-game hunting has historically been a popular activity on the Forest during designated hunting seasons, and is often associated with camping at dispersed sites during the fall season. Results of the 2010 NVUM study indicate that 4.2 percent of visitors to Forest engaged in big game hunting during their Forest visit.

While the NVUM sampling may have missed some high-use areas for OHV use specifically, the data does show almost twice as many visitors engage in non-motorized recreation activities than those who choose motorized recreation activities (Yankoviak, et al, 2015). An estimated 32 percent of visitors (440,496 individuals) to the Forest engaged in motorized use during their visit (including driving for pleasure, OHV use, motorized trail use and other motorized activities), while approximately 53 percent of visitors (722,304 individuals) engaged in non-motorized activities(which includes backpacking, hiking/walking, horseback riding, bicycling, and other non-motorized activities). Only 9 percent of respondents engaged in motorized use as their primary activity, as compared to 18 percent who primarily engaged in non-motorized activities (Yankoriak, et al, 2016).

For more information on recreation and recreation trends, see the Recreation Specialist's Report, section on National and Regional Recreation Trends.

[23] Non-primary represents visitors who reported that the main reason for their current trip was for some purpose other than visiting the national forest.

Economic Contributions of Recreation Use

One of the main elements in travel planning is the economic contributions of recreation uses. This section discusses the economic contributions of current recreation uses.

Except for the recreation areas that charge an entry fee, National Forest recreation is a non-market good. Non-market goods are those that are not exchanged in markets, but clearly provide great value to society. Economic ties between recreation on National Forest System lands and local communities are estimated by tracking how visitors spend their money in local businesses and by estimating how much those businesses spend on materials and wages in order to provide goods and services to the recreationists. One-third of the NVUM questionnaires ask visitors how much they spent in local communities and on what goods and services. The spending information is reported by visitor characteristics such as whether they were local residents or non-locals and whether they were just day users or if they spent the night. These survey categories have the highest effect on how recreationists spend their money and who in the local economy enjoys the economic benefit.[24]

Recreation visits to the national forests, including visits for OHV use, impact local economies. Some communities have looked to recreation as a source of income as commodity production of timber and other resources have declined. As part of the process for determining economic impact, NVUM identifies average spending of individual visitors and total spending associated with recreation use.[25] The spending that occurs on all recreation trips is greatly influenced by the type of recreation trip taken. Visitors on overnight trips generally have to purchase more food during their trip, in restaurants and grocery stores then visitors on day trips. Visitors who have not traveled far from home to the recreation location usually spend less than visitors traveling longer distances, especially on items such as fuel and food.

The IMPLAN model uses 2010 data to construct the regional impact area. This impact area covers the eleven counties described in previous sections. Visitor expenditures from NVUM are matched to corresponding economic sectors in the model. The economic effects attributable to Okanogan-Wenatchee National Forest recreation visitor spending that stem from the private sector are shown below in five activity groups (see Table 10). For each activity group, the annual average contribution to jobs and income in the eleven-county impact study area is estimated using the following categories: local primary visits; non-local primary visits; and non-primary visits. The NVUM survey defines local visitors as individuals traveling from within 50 miles of national forest recreation sites, while non-local visitors are those traveling more than 50 miles. Local visits consist mostly of day visits; while non-local visits usually involve a day trip or an overnight stay in the area. Recreation visitor spending is greatly influenced by the type of visit. Whether the visit is local or non-local and whether it is a day trip or over-night trip is more important economically than the activity type (White and Stynes 2008). For this

[24] Stynes, Dan and Eric White. Spending Profiles of National Forest Visitors, Round 2 Update. March, 2010
[25] National Visitor Use Monitoring Results, February 2009, Data collected CY2000 and FY 2005, USDA Forest Service, Region 6, Okanogan National Forest, updated February 10, 2009, p. 1.

reason, the economic contributions are calculated and reported (Table 10) by local and non-local visitors.

The non-motorized group includes backpacking, hiking/walking, horseback riding, bicycling, cross-country skiing and 'other non-motorized' recreation. The motorized group includes OHV use, driving for pleasure, snowmobiling and 'other motorized' activities. Nature related recreation consists of fishing, hunting, viewing wildlife, viewing natural features, nature center activities, nature study and 'other nature-related' activities. Downhill skiing is shown in its own group in this analysis since it had the highest primary activity participation rate. The last category, 'all other', consists of the recreation activities not included in the other four categories: motorized water activities, non-motorized water activities, developed camping, primitive camping, resort use, picnicking, visiting historic sites, relaxing, gathering forest products and sightseeing.

The number of jobs that IMPLAN® reports includes both full and part-time wage and salary employees, as well as self-employed workers. The number of jobs is reported as an annual average, which is consistent with the reporting convention that Bureau of Labor Statistics and other employment reporting systems. Total labor income includes all forms of employment income such as wages, benefits and proprietor income. Spending from all non-local visitors supports approximately 579 jobs and $22 million in labor earnings within the eleven-county area. Local visitor spending supported approximately 274 jobs and $10 million in labor earnings. Visitor spending from all non-motorized use (local and non-local) supports approximately 208 jobs and $8 million in labor earnings. Visitor spending from all motorized use (local and non-local) supports approximately 42 jobs and 1.6 million in labor earnings (Table 3.7-8).

Table 3.7-8. Estimated income and labor income effects for all recreation use reported by NVUM

Recreation Activity Group	Employment Effects (full and part time jobs)			Labor Income (2010 dollars)		
Visits	Local	Non-Local	NP	Local	Non-Local	NP
Non-Motorized	66	142	8	$2,573,347	$5,427,725	$295,395
Motorized	15	27	5	$574,573	$1,012,153	$173,678
Nature Related	52	114	11	$2,056,971	$4,446,143	$429,079
Downhill Skiing	61	135	12	$2,400,738	$5,283,710	$454,969
All Other	80	161	8	$3,263,085	$6,366,839	$315,689
Total	**274**	**579**	**44**	**$10,868,713**	**$22,536,571**	**$1,668,810**

Figures for jobs and income related to OHV use on the Okanogan-Wenatchee National Forest are only rough estimates. As mentioned in the previous section, at the forest-level, NVUM does not have statistically significant figures for recreation activities that have low percentages of participation, including OHV use. The NVUM study design, including the days and locations in the sample pool, also affects the OHV visitation figures. Some of the OHV use may occur at one or two sites that did not have enough sampling days leading to an underestimation of OHV use. If the recreation use is underestimated, the estimates for jobs and income will also be underestimated. The rough estimates for

the economic contributions of OHV visits are approximately 6 jobs and $240,000 in labor earnings for the study area (see Table 3.7-8).

Table 3.7-9. Estimated employment and labor income effects from OHV use

	Employment effects (full and part time jobs)			Labor income (2010 dollars)		
Visits	Local	Non-local	Non-primary	Local	Non-local	Non-primary
OHV	3	3	0	$105,576	$135,405	--

While NVUM does not have statistically significant figures for recreation activities that have low percentages of participation, figures for the sum total for all recreation activities are statistically significant. In 2010, visitor spending from all recreation visits to the Okanogan-Wenatchee National Forest contributed close to 900 jobs and approximately $35 million in labor earnings to the private sector in the eleven-county impact area (see Table 3.7-8 above). It is important to note that all of these jobs and labor earnings constituted a very minor portion of the area economy, as displayed in Table 3.7-10.

Table 3.7-10. Current role of Okanogan-Wenatchee National Forest's recreation visitors spending to the local economy (eleven-county impact area)

	Employment (jobs)		Labor income (2010 dollars)	
Industry	Eleven-county area totals	Okanogan-Wenatchee National Forest recreation contribution	Eleven-county area totals	Okanogan-Wenatchee National Forest recreation contribution
Agriculture	66,554	23	$2,686,721,329	$401,680
Mining	1,443	3	$82,618,831	$444,241
Utilities	2,076	3	$258,276,850	$447,836
Construction	113,501	6	$7,258,512,009	$345,606
Manufacturing	181,023	47	$16,809,279,161	$2,996,578
Wholesale trade	82,677	35	$6,771,769,043	$2,600,416
Transportation & warehousing	209,628	37	$7,642,918,472	$1,807,844
Retail trade	62,953	119	$4,079,262,701	$3,218,315
Information	90,428	14	$12,306,616,120	$1,335,862
Finance & insurance	112,592	26	$8,043,433,807	$2,228,376
Real estate & rental & leasing	107,518	29	$2,383,222,946	$871,951
Professional, scientific, & technical services	199,588	37	$16,278,033,157	$2,743,350
Management of companies	25,822	8	$3,159,496,582	$913,086
Admin, waste management & remediation services	110,531	44	$5,158,500,885	$1,424,116
Educational services	38,976	8	$1,275,503,632	$267,957
Health care & social assistance	205,160	43	$11,837,564,972	$2,076,519
Arts, entertainment, and recreation	55,047	71	$1,151,211,672	$2,041,100
Accommodation & food services	139,582	298	$3,149,775,139	$6,996,243
Other services	114,529	31	$4,327,539,993	$851,691
Government	294,183	15	$19,883,878,651	$1,061,329
Total	**2,213,812**	**897**	**$134,544,135,952**	**$35,074,094**
FS contribution (Percent of Total)	---	**0.04%**	---	**0.03%**

The eleven-county economy supports a total of 2.2 million full and part time jobs in 2010. These jobs generate $134 billion in labor income. Figure 3.7-1 shows the distribution of the area's employment; Figure 3.7-2 shows the distribution of the area's labor income. The retail trade sectors each comprise about 3 percent of the employment and labor income. The arts, entertainment and recreation sectors make up 2 percent of the employment and 1 percent of the labor income, while the accommodation and food services sectors make up 6 percent of the employment and 2 percent of the labor income in the local economy. In comparison, visitor spending by recreation visitors to the Okanogan-Wenatchee National Forest in 2010 only contributed 0.04 percent of all employment and 0.03 percent of all labor income in the eleven-county area.

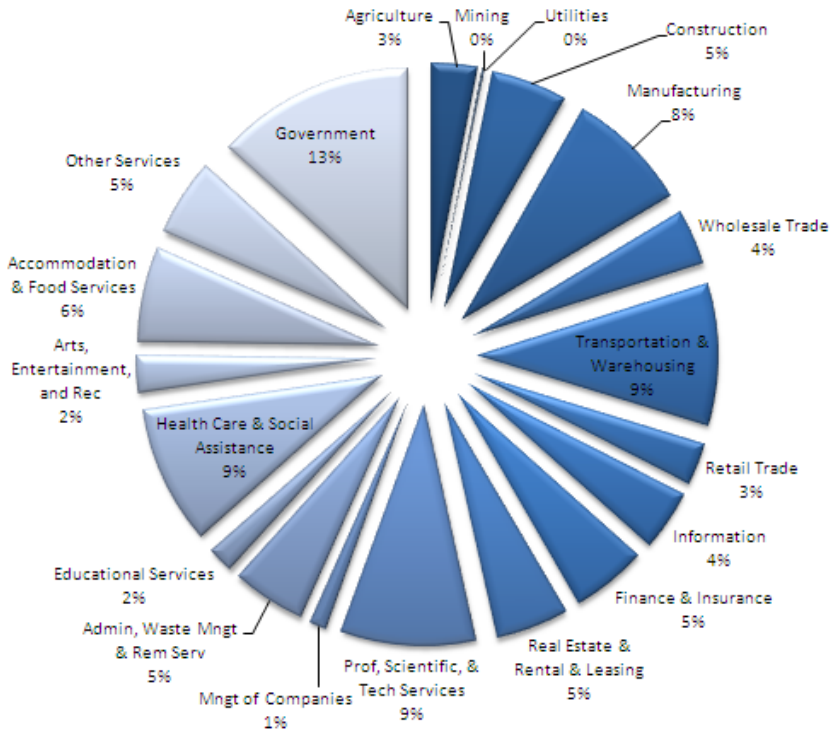

Figure 3.7-1. Local industry employment distribution

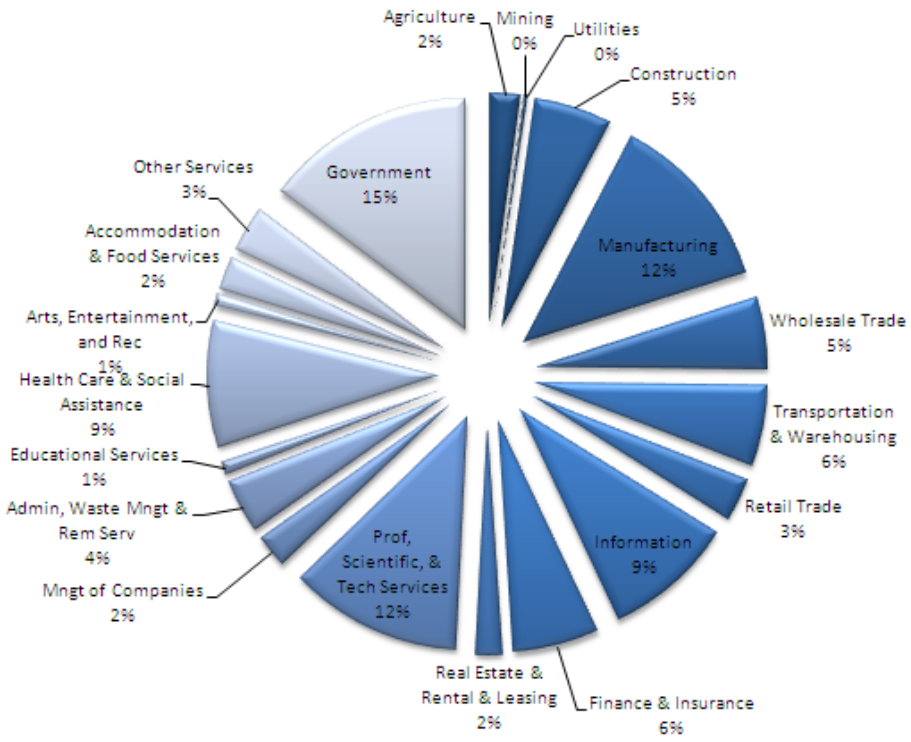

Figure 3.7-2. Local industry labor income distribution

Communities of Interest

Four communities of interest were identified in the public scoping process. A community of interest is a group of people who share a common interest in work, leisure, or other values, such as a club, occupational category, or church. They are not easily defined by a particular geographical area. A community of interest is different than a community of place, which is a group of people bound together by an identifiable location, such as a town, county, or watershed.

The communities of interest discussed in this report are OHV/Motor vehicle users, non-motorized users, aging and less physically able population, and county governments. The concerns held by the members of one community of interest are often also held by members of other communities. Table 3.7-10 displays the four communities of interest and the values and issues involved.

Table 3.7-11. 4Values and issues listed by community of interest

Community of interest	Concerns/preferences
OHV/motor vehicle users	Access OHV access opportunity Family experience Hunting/gathering Dispersed Camping Safety/crowding
Non-motorized users	Backpacking Hunting Camping Viewing Safety/crowding Access Noise/dust Environmental condition Disturbance
Aging and less physically able population	Access Game retrieval Camping Viewing Safety/crowding
County governments	Economic impacts Social impacts

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects on Economic Contributions of Recreation Use for All Alternatives

There is no difference in the economic contributions among alternatives because the projections in the number of people engaging in different recreation activities are the same for all alternatives. Alternatives B, C, and D could cause a reduction in the number of people visiting the forest for motorized recreation activities, without statistically reliable projections showing how the number of people will change from the existing condition, or between alternatives, it is not possible to estimate changes in expenditures or the resulting changes in jobs and income for any of the action alternatives.

Direct and Indirect Effects on Communities of Interest

This section discusses the direct and indirect effects on the four communities of interest identified in the scoping process and described in the Communities of Interest section above. The following narratives identify the main qualitative differences among each alternative for the communities of interest. It is important to note that the concerns and preferences associated with each community and the effects of alternatives on the members of a community are not absolute. People belong to more than one community of interest. Within communities, members often have diverse values, attitudes, and beliefs in addition to those that they hold in common.

OHV/Motor Vehicle Users

The OHV/motor vehicle community in general has the same concerns and preferences as other user groups that access the Okanogan-Wenatchee National Forest. These preferences include the opportunity to hunt, fish, camp, and enjoy the natural surrounds individually or in groups. One of the main differences between this community and the community of non-motorized users is the method used to access their activities. The concerns of the OHV/motor vehicle users are directly related to the access available for OHV use, especially the miles of routes available for motorized use as well as the area available for cross-country travel. Based on these concerns, the alternatives with the greatest number of cross country acres and miles of road or trail open to OHV use would support their preferences by providing opportunities to ride OHVs. Greater number of acres and miles for OHV use means more solitude and safety; it also means less crowding for OHV users.

The number of acres available for cross-country travel off designated routes is an important difference between the no action and the action alternatives. For OHV/motor vehicle users, the number of acres available affects opportunities for finding solitude, hunting, retrieving game, and accessing sites not connected to the road and trail system. Alternative A, the no action alternative, would not change any designations and would not prohibit motorized cross-country travel. Use of unauthorized routes and maintenance level 1 roads would continue on approximately 675,000 acres of land and 2,557 miles of maintenance level 1 roads that are currently open to motorized use and are level and open enough for cross-country use. All action alternatives would prohibit cross-country travel off of the existing designated motorized system. Of the 675,000 acres currently open to cross-country travel, only 33 acres at Moon and Funny Rocks would be designated as areas open for motorized use in each of the action alternatives. As a result of the prohibition on cross-country travel, all maintenance level 1 roads that are not already designated as motorized trails would be closed to motorized vehicles, and all unauthorized trials would be closed to motorized vehicles.

The OHV community would gain approximately 350 miles of road that would be opened to WATVs with Alternative B and D. These miles would be divided between 6 routes that would link communities, and

tie into non-National Forest System roads and trails currently open to WATVs. This would partially off-set the loss of OHV opportunities with the closure of cross-country travel, however would only benefit riders with vehicles outfitted and licences to be considered WATVs.

Non-motorized Users and Environmental Advocacy Groups

Many of the concerns and preferences of the non-motorized use community are the same as other recreation visitors to the Okanogan-Wenatchee National Forest. The major difference is their strong preference to access and use the Okanogan-Wenatchee National Forest through non-motorized means. A quiet experience, without noise from motorized vehicles, is a key preference for this group.

Like the non-motorized users, the environmental advocacy group community expressed concerns related to the condition of the environment, environmental disturbance to plants and animals, and existence value. Existence value is a term used by economists to describe the value that individuals may attach to the mere knowledge of the existence of something, as opposed to having direct use of that thing. This group believes that cross-country OHV travel designated routes has the potential to harm the natural environment.

The impacts on the preferences of the non-motorized users and the members of the environmental advocacy groups are inversely related to the amount of access available for OHVs use and acres designated for cross-country travel. Based on this inverse relationship, all action alternatives greatly improve non-motorized users recreational experience because all action alternatives would prohibit cross-country travel on 2.6 million acres, of which 675,000 acres are currently level and open enough for cross-country travel; only 33 acres of designated cross-country travel would continue. All action alternatives would improve safety, reduce noise and dust impacts, and increase opportunities for quiet and solitude except in the 33 acres of designated area of Moon and Funny Rocks. Recreational experience by non-motorized users within corridors would remain unchanged within corridors because of proximity to roads (all corridors are within 300’ of roads). Most non-motorized users would reach these dispersed camping areas by vehicle.

Aging and Less Physically Able Population

The impacts of the alternatives on the aging and the less physically able population are similar to those of the OHV/motor vehicle community. The primary difference is that members of this group may have limited opportunities for non-motorized use access as an alternative to motorized use. Large decreases in motor vehicle access, including OHV use and access within corridors, may result in the displacement of these users. Like OHV users, the impacts on the preferences of these people are directly related to access available for OHV use. The aging and less physically able population may also currently rely on cross-country travel for retrieving game and gathering other forest products. Based on these relationships, all action alternatives would equally reduce cross-country access on 675,000 acres.

Limiting motorized access to dispersed camping in Alternatives B, C, and D could also impact the aging and less physically able. People would be restricted to using established routes only, and not be

permitted to drive vehicles closer than 100 feet to water. The corridors in Alternative B would allow people to drive to approximately 56% of the established campsites, while Alternative C would allow access to 40% of the sites, and Alternative D, approximately 70% of the sites. All alternatives would limit the ability of aging and less physically able people to access established campsites, with Alternative C having the greatest potential of substantially limiting opportunities for this population.

County Governments

Analysis of the impacts to the interests represented by county governments reflects broader economic and social impacts of the alternatives on the project area population in general and identifies additional indirect effects of the alternatives. Changes in the type and quality of the opportunities and activities associated with access and travel on the Okanogan-Wenatchee National Forest may affect the types and amounts of purchases of goods and services from businesses in the area as well as the jobs and income that businesses provide. A change in the management direction and the support for or against the management change can create conflict and affect community cohesion. Loss in economic activity or community cohesion may impact local government and local residents.

As discussed above, using input-output modeling shows no discernible difference among all of the alternatives in terms of economic contributions. There is no difference in the economic contributions among alternatives because there are no statistically reliable projections for how the number of people recreating on the forest would change with any alternative. Without reliable projections, it is not possible to estimate changes in expenditures or the resulting changes in jobs and income for any of the action alternatives.

Since the amount of displacement or change in the type of activity is not predictable, access to camping within corridors and changes in cross-country travel are used to show how the alternatives differ with regard to the potential for economic change. The potential for change is important because some of the towns in the project area are under economic stress as described in the Per Capita Income, Earnings Per Job, and Unemployment sections. The loss or gain of a single job is relevant.

While it is not possible to predict what the overall economic impacts to the study area would be under any of the action alternatives, all action alternatives have equal potential for a negative economic impact on businesses which support or are dependent on motorized activities when compared to the no-action alternative. Conversely, all action alternatives have equal potential for a positive economic impact on those businesses which support non-motorized users. The potential positive impacts on those businesses which support non-motorized activities may compensate or do more than compensate for the negative impacts on businesses that support motorized activities.

Changes in dispersed camping opportunities is also an important difference between the no-action and action alternatives. Currently, motorized access for dispersed camping is occurring in a farily unreglated pattern, with people driving off open roads to established or new dispersed campsites. A 2010 survey of the dispersed campsites located 1,115 unauthorized access routes to dispersed sites scattered along

roads across the forest. Alternative A would not change this, so people would be able to continue driving motorized vehicles to all established campsites, regardless of their distance from roads, or closeness to water.

Alternatives B, C, and D would designate corridors for motorized access to dispersed camping. People would be allowed to drive motorized vehicles on established access routes only within the corridors, and would be prohibited from driving further than 300 feet from the open system road, and not closer than 100 feet to water. Alternative D would designate corridors on all open roads, so all existing access routes would be open to motorized vehicles for the purpose of access dispersed campsites. People would not be able to drive all the way to some establishes, however. Approximately 30% of the established campsites are located further than 300 feet from roads, or closer than 100 feet to water, so people would only be allowed to drive directly to approximately 70% of the established dispersed campsites.

Alterantives B and C would designate corridors on only a portion of the open road network. In Alternative B, direct motorized access would be available for approximately 56% of established sites. Alternative C would allow direct motorized access to approximately 40% of established sites.

None of the alternatives would put any limitations on dispersed camping itself, but limiting motorized access to the dispersed campsites could displace campers, and potentially reduce the number of people engaging in this activity. Alternative C has the greatest potential for displacement because direct motorized access would be allowed to approximately 40% of the established campsites. There are no stastically valid estimates of the actual effect any of the action alternatives would have on the number of people visiting the area.

Economic benefits to businesses from motorized dispersed camping would be highest in Alternative A (which does not restrict such camping), followed by Alternative D. Alternative C would have the lowest economic benefit. Alternative B would have a moderate economic benefit compared to the other alternatives.

Cumulative Effects

The spatial boundary for this analysis is the eleven-county study area, along with some discussion of the trends across the Pacific Northwest. The temporal boundary goes back over 100 years to road and trail construction for the purpose of timber harvest, mining, and European settlement. Motorized travel on the Forest is expected to continue in perpetuity because this project establishes a management approach of open to motorized access where designated on the MVUM for the Forest. However, Forest Plan Revision and recommendations brought forward as proposed actions from minimum roads analysis currently being conducted across the Forest are likely to affect future travel management direction within 10 years. Therefore, this analysis uses 10 years as the practical future temporal boundary of this project's effects.

The national forests surrounding the eleven-county study area are either in the process of travel management planning or implementing existing Travel Management Plans. The Bureau of Land Management and Washington State land management agencies also have made decisions to designate routes for OHV use. All of the new decisions and the implementation of past land use and travel management decisions are generally resulting in fewer opportunities for cross-country OHV uses and fewer miles of open routes for OHV use. The past decisions include the establishment of wilderness areas and other areas that prohibit motor vehicle recreation, reducing any previous motor vehicle access to the Okanogan-Wenatchee National Forest. Although these past decisions are not part of current planning for the Okanogan-Wenatchee National Forest Motorized Travel Management project, they are relevant because the project would incrementally change the effects of these past actions. All Alternatives eliminate cross-country access except on 33 acres.

The cumulative effects of limiting OHV use in all action alternatives and the ongoing and reasonably foreseeable future actions would be a decrease in motorized access across the Okanogan-Wenatchee National Forest. The addition of the WATV routes would partially off-set this loss, but only for drivers with vehicles licensed as WATVs. The cumulative effect would be an increase in the qualities of the recreational opportunities valued by non-motorized users.

On a larger scale, OHV opportunities are being reduced cumulatively by travel management decisions on other national forest lands and other public lands throughout the Pacific Northwest. These reductions in opportunities would displace some users from currently accessed areas, roads, and trails. What is not known is whether the reduced OHV opportunities would also reduce the overall amount of OHV use, or the current use would just become concentrated into the smaller system where OHV opportunities are authorized. If the overall use is reduced, neither the magnitude of this reduction nor the location of these reductions is predictable. Without this knowledge, making reliable predictions about the social and economic cumulative effects based on reduced use is not possible. If the current levels of OHV use from areas outside of the Okanogan-Wenatchee National Forest are concentrated into smaller areas on the Forest, safety concerns and potentially lower quality OHV experiences could result. Conversely, as OHV opportunities are reduced across the region resulting in increasing non-motorized opportunities, the quality of the experience for these users may be improved.

In sum, the cumulative social and economic impacts of all of the action alternatives are similar and are not quantifiable.

Compliance Laws, Regulations and Management Direction

This analysis complies with NEPA in discussing economic and social effects that are relevant to the interrelated natural and physical effects of this project.

3.8 Environmental Justice

Regulatory Framework

In 1994, President Clinton issued Executive Order 12898. This order mandates that all federal agencies analyze the potential for their actions to disproportionately affect minority and low-income populations. The Council on Environmental Quality (CEQ) issued supplemental guidance to assist agencies' compliance (CEQ 1997). The CEQ suggests the following criteria for identifying potential Environmental Justice populations:

> *"Minority population: Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis…"*
>
> *"Low-income population: Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americas), where either type of group experiences common conditions of environmental exposure or effect."*

Existing Condition

Understanding the racial composition and poverty characteristics of the surrounding area helps to identify whether there are environmental justice concerns.

Minorities

According to the 2010 U.S. Census data reported in Table 13 below, it is suggested that Hispanic and Native American populations meet the Environmental Justice criterion as a monitory population meaningfully greater than the general population. Therefore, decision makers in the planning area should give particular consideration to the potential impacts of management actions on those ethnic groups.

Table 3.8-1 shows the ethnic mix of the population in the study area. In all eleven counties, whites are the most numerous ethnic group. In Ferry, Skagit, Okanogan, and Yakima counties, the percentage of American Indians is higher than the state and the nation. The population of American Indians is above 10 percent in Okanogan and Ferry counties. In Yakima County, the population of American Indians is 4.3 percent. Relative to the state and the nation, American Indians/Alaska Natives are found in higher proportion in much of the study area.

The total of non-White people in Yakima County is about 36 percent. The non-White population of the state is approximately 22 percent. More than a quarter of Yakima's population identifies as "Some Other Race." This category includes races other than White alone, American Indian alone, Black or African American alone, Asian alone, or Native Hawaiian and Pacific Island alone.

Hispanic populations of several counties in the study area are relatively high. In the state of Washington, more than 11 percent of the population is Hispanic or Latino. In the U.S., more than 16 percent of the population is Hispanic or Latino. The Hispanic populations of Chelan, Okanogan, Yakima, Benton, Douglas, Grant, and Skagit are higher than the state. Grant and Yakima counties have the highest populations; Grant is approximately 38 percent; and, Yakima is 45 percent Hispanic or Latino.

Table 5. Population by race (2010)

Geography	White (one race)	Black or African American (one race)	American Indian and Alaska Native (one race)	Asian (One Race)	Native Hawaiian and other Pacific Islander (one race)	Some other race (one race)	Two or more races (one race)	Hispanic or Latino (of any race)
	Percentage							
Washington	77.3	3.6	1.5	7.2	0.6	5.2	4.7	11.2
Benton	82.4	1.3	0.9	2.7	0.1	9	3.6	18.7
Chelan	79.3	0.3	1	0.8	0.1	15.7	2.7	25.8
Douglas	79.6	0.3	1.1	0.7	0.1	15.6	2.6	28.7
Ferry	76.3	0.3	16.7	0.7	0.1	1.2	4.8	3.4
Grant	72.8	1.1	1.2	0.9	0.1	20.4	3.5	38.3
King	68.7	6.2	0.8	14.6	0.8	3.9	5	8.9
Kittitas	89.3	0.9	1	2	0.1	3.7	3	7.6
Okanogan	73.9	0.4	11.4	0.6	0.1	10.1	3.5	17.6
Skagit County	83.4	0.7	2.2	1.8	0.2	8.7	3.2	16.9
Snohomish	78.4	2.5	1.4	8.9	0.4	3.8	4.6	9
Yakima	63.7	1	4.3	1.1	0.1	26.1	3.7	45
Eleven-county area	77.1	1.4	3.8	3.2	0.2	10.7	3.7	20

Source: US Census Bureau, Census 2010, Fact Finder 2, File Name DP-10.

Note: Individuals may identify as a member of more than one race, therefore, totals will not sum to 100 percent.

Nearly 17 percent of Ferry County's population identifies itself as American Indian or Alaska Native. The Okanogan-Wenatchee completed government-to-government consultation on the Travel Management proposed action with the Confiderated Tribes of the Colville Reservation and the Yakama Nation. Neither tribe expressed concerns, or identified issues or values that may be affected by the proposed action. Okanogan and Yakima counties also have relatively large American Indian/Alaska Native

populations. Forty-five percent of the population of Yakima County identified itself as Hispanic or Latino. Yakima is also a majority-minority county, which means that racial and ethnic minorities account for more than 50 percent of the population.

In most of the counties in the planning area, except King county, there are fewer individuals identifying as Black/African American or Asian. Nevertheless, the diversity between counties highlights the importance of analyzing environmental justice issues on a county-by-county basis.

Poverty

Table 3.8-2 reports the number of individuals below the poverty level and poverty rates in 2010. Poverty rates in the study area are relatively high. The average poverty rate for the nation is 13.8 percent. The average poverty rate for the state is 12 percent. Benton, Douglas, Ferry, Grant, Kittitas, Okanogan, and Yakima all have poverty rates that are higher than the state. Kittitas, Yakima, Okanogan, Grant and Ferry have the highest poverty rates, with about one-fifth of the population living in poverty. Each of these instances is highlighted in Table 14. The relatively high rates of poverty across the planning area highlights the importance of considering potential Environmental Justice impacts in the decision-making process.

Ferry and Okanogan counties are among the counties with the highest poverty rates. These counties also have the highest percentages of American Indian/Alaska native residents, suggesting overlap between race and poverty. None of the alternatives would interfere with subsistence gathering on the Forest because the Travel Management Rule recognizes valid existing rights and will not modify those rights, nor take away any statutory or treaty rights.

Table 3.8-2. Poverty rates (2010 estimate)

Geography	Percent below poverty level
Washington	12.1
Benton	12.7
Chelan	11.5
Douglas	14.3
Ferry	20.8
Grant	20.4
King	10.2
Kittitas	21.2
Okanogan	19.5
Skagit	11.7
Snohomish	8.4
Yakima	21.8

Source: US Census Bureau, Census 2010, Fact Finder 2, File Name DP-10.

Table 3.8-3 displays the poverty rate by race and ethnicity for each of the eleven counties and Washington State. As the table reveals, the poverty rate often varies substantially across races and ethnicities. In all considered geographies, non-Hispanic white residents experience the lowest levels of poverty in the study area. Overall, the table indicates a strong correlation between minority status and poverty in the planning area.

Black/African American and Latino/Hispanic residents of Ferry County have the highest rates of poverty reported among all races or ethnicities in the study area. The poverty rate is 100 percent for the 58 Black/African American residents of Ferry County. The poverty rate is 56 percent for the 221 Latino/Hispanic residents of Ferry County. In total, the poverty rate exceeds 25 percent in 32 instances in the planning area. Each of these instances is highlighted in Table 3.8-3.

Table 3-8.3. Poverty by race and ethnicity (2010 estimate)

	One race							
Geography	**White**	**Black or African American**	**American Indian and Alaska Native**	**Asian**	**Native Hawaiian and Other Pacific Islander**	**Some other race**	**Two or more races**	**Hispanic or Latino origin (of any race)**
Washington	10.5	24.1	26.3	10.6	18.6	27.1	15.5	25.1
Benton	10.4	13.7	36.7	10.2	10.2	29.8	16.4	30.3
Chelan	10.6	17.4	7.5	17.8	25	26.9	4.4	15.8
Douglas	10.1	5.7	9.7	16.3	41.4	30.6	19	28.3
Ferry	17.2	100	28.5	11.5	41.9	96.5	21.1	56.1
Grant	16.5	35.5	27.6	4.2	0	32.5	21.9	31.6
King	8	26.7	24	10	20	20.1	12.4	20.3
Kittitas	19.8	42.2	53	29.3	0	34.8	24.9	36.1
Okanogan	17	2.6	33.2	9.5	57.4	19.9	34.6	25.7
Skagit	9.5	24	37.6	14.7	11.4	31.5	13.9	24.2
Snohomish	7.6	15.7	16.8	8.5	14.6	16.6	11.2	17.9
Yakima	19.1	22.4	29.3	9.7	49.3	31.7	18.5	33.1

Source: US Census Bureau, Census 2010, Fact Finder 2, File Name DP-1

In the study area for the Okanogan-Wenatchee National Forest Travel Management project, several of the counties have minority populations that are greater than the state of Washington. Several of the counties also have poverty rates which are higher than the state. The disproportionately high numbers of minorities, Hispanic and Latino people as well as Tribal people, and people living in poverty, trigger an environmental justice analysis.

Environmental Consequences

A review of the alternatives, however, demonstrates that the economic effects are negligible for the entire population. There are immeasurably small effects to jobs and income in the impact area studied. And, OHV use generates a small portion of the overall jobs and income, less than 1 percent. Therefore, the impacts are similar for the groups identified by the Environmental Justice Executive Order. In terms of social effects, none of the alternatives would have a disproportionate effect on any minority or low-income community as the travel management decisions are spread throughout the Forest and do not cause any adverse environmental effect to any particular community.

Potentially affected Tribes have been consulted and effects considered on their rights and concerns within the analysis of alternatives. The American Indian population would not be disproportionately impacted under any alternative with avoidance of heritage resources consideration of traditional values, and reasonable access allowed through agreements, permits and recognition of their sovereignty and legal rights.

Compliance Laws, Regulations and Management Direction

This analysis is provided consistent with the Executive Order for Environmental Justice.

3.9 Specifically Required Disclosures

Wild, Scenic, and Recreation Rivers

On October 2, 1968, Congress enacted the Wild and Scenic Rivers Act (PL 90-542), which established the National Wild and Scenic Rivers System. Section 1(b) of the Act states that rivers within the Wild and Scenic Rivers system "shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations."

The Forest Plans allocate eighteen rivers and creeks totaling 459 miles that flow through the Forest to Wild, Scenic or Recreation River management. All have been found eligible for designation. The following table lists each river and identifies the classification.

Table 3.9-1. Rivers Potentially Eligible for Wild and Scenic River Designation, Including Classification

River	Eligible Classification
American	Wild, Scenic
Canyon	Wild, Scenic
Chewuch	Wild, Scenic
Chiwawa	Wild, Recreation
Cle Elum	Wild, Scenic, Recreation
Entiat	Wild, Scenic, Recreation
Icicle	Wild, Recreation
Granite	Scenic
Lost	Wild, Scenic
Methow	Wild, Scenic, Recreation
Napeequa	Wild, Recreation
Pasayten	Wild
Ruby	Scenic
Twisp	Wild, Scenic, Recreation
Waptus	Wild
Wenatchee	Recreation
White	Wild, Scenic, Recreation
Wolf	Wild, Recreation

Lands within ¼ mile of these rivers have management direction to protect attributes of these rivers and creeks pending Congressional action on river designation. On the Okanogan portion of the Forest, motorized recreation vehicle use is currently prohibited in Wild segments, restricted to designated routes and areas in Scenic sections, and allowed on Recreation segments, but may be restricted to designated routes and areas. On the Wenatchee portion, motorized use is appropriate when compatible with the management goal on Scenic and Recreational Segments and may be appropriate depending on the current uses and adjacent allocations for Wild segments. Currently, motorized cross country travel, motorized vehicle use on maintenance level 1 roads, and unmanaged motorized access to dispersed camping has the potential to affect the outstanding remarkable values on these rivers by

damaging riverside vegetation, degrading fish and wildlife habitat, and degrading the wild and scenic values with motorized vehicle use.

Alternative A would continue the current potential impacts. Alternatives B, C, and D would reduce the potential of impacting the outstandingly remarkable values by prohibiting motorized cross country travel and motorized vehicle use on maintenance level 1 roads, and limiting motor vehicle access to dispersed campsites along these rivers. Damage from motor vehicle cross use to riverside vegetation would be minimized or eliminated by prohibiting cross country travel. Elimination of motorized vehicles on maintenance level 1 roads would avoid any impacts to the wild or scenic values that could be caused by motorized use of these roads. Limiting motorized vehicles used to access dispersed camping within designated corridors would minimize impacts to riverside vegetation, and keep vehicles at least 100 feet from the river edges, helping to maintain or restore the scenic value. The only reasonably foreseeable future actions that could affect these eligible rivers are aquatic habitat restoration projects. These would benefit the outstandingly remarkable values of fish and wildlife habitat, and be designed to avoid unacceptable impacts to the scenic and recreation values. The cumulative effect would be an improvement or maintenance of the current outstandingly remarkable value conditions along the rivers.

Inventoried Roadless and Potential Wilderness Areas

The Forest has 37 designated Inventoried Roadless Areas (IRAs) under the Roadless Area Conservation Rule (RACR) of 2001. Under Forest Plan management direction, some IRAs are currently closed to cross-country motorized use; the RACR prohibits road construction and tree cutting except under limited exceptions in all IRAs. IRAs on the Forest total 1,038,254 acres, 155,881 acres of which are within the 675,000 acres of land open to motorized use that is level and vegetation free enough to accommodate such use.

Forest Plan Revision has also resulted in the preparation of a draft inventory of 35 Potential Wilderness Areas (PWAs), the vast majority of which overlap with IRAs. No management direction has been completed for the PWAs since they are only inventoried as part of the Forest Plan Revision process, which is not yet complete. PWAs on the Forest total 1,070,659 acres, 169,291 acres of which are within the 675,000 acres of land open to motorized use and level and clear enough to use.

In some cases, current cross-country use is damaging resources within IRAs and PWAs and this damage would be likely to continue under Alternative A.

Cross-country travel would be prohibited on all 155,881 acres of IRAs and 169,291 acres of PWAs under all action alternatives (the 33 acres of cross-country travel area in each of the action alternatives is located in neither IRAs nor PWAs). All motorized travel within IRAs and PWAs would be limited to currently designated National Forest System motorized trails, and only in those IRAs that currently allow for motorized travel. This would enhance the ability to protect resources within these special areas. Alternatives B, C, and D would include portions of IRAs, as shown in Table 3.9-2, but none of these alternatives would permit any new road construction or tree cutting, and would therefore consistent

with the Roadless Area Conservation Rule. Alternatives B, C, and D also include some PWA acres in corridors, but PWAs have no management direction except where they overlap with IRAs. Requiring motorized use to remain on existing routes within IRAs and PWAs would help protect resources within those areas.

Table 3.9-2. Acres of IRA and PWA Open to Cross Country and Within Corridors by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
IRA acres open to cross country	155,881 acres	0 acres	0 acres	0 acres
IRA acres in corridors	n/a	1,209 acres	1,076 acres	9,909 acres
PWA acres open to cross country	169,291 acres	0 acres	0 acres	0 acres
PWA acres in corridors	n/a	1,473 acres	1,249 acres	5,000 acres

Special Use Authorizations

Special use authorizations are permits, term permits, leases, or easements which allow occupancy, use, rights, or privileges of NFS land (36 CFR 251.51). The issuance and administration of special use authorizations would continue to provide for a variety of recreation and non-recreation activities on the Forest. Since special uses and activities are specifically authorized by the Forest Service or some other agency, any necessary use of roads or trails may also be authorized within the same instrument. The 2005 Travel Management Rule recognizes that motor vehicle use may be authorized as part of a special use authorization, and as such, the permit holder may use routes that are otherwise not open for general public use. Special use permits could affect all Forest resources including wildlife, vegetation, fisheries, watershed, and heritage sites. Project-level analysis must be completed before permits are implemented and, with the application of appropriate mitigation measures, any environmental effects from permittees using roads or trails not open to the general public would be minor. Therefore, there would be no effects from the special use permits that would cumulatively add to, or change the projected environmental effects of Alternatives B, C, or D.

Unavoidable Adverse Effects

Implementation of any action alternative would cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects result from managing the land for one resource at the expense of the use or condition of other resources. Most adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of effects. The application of Forest Plan standards and guidelines, mitigation measure and monitoring are all intended to further limit the extent, severity, and duration of potential effects. The mitigation measure monitoring are discussed throughout Chapter 3 and the purpose of this section is to fully disclose these effects.

Table 3.9-3 below summarizes the unavoidable potential adverse effects to the environment associated with the action alternatives considered in this EA.

Table 3.9-3. Unavoidable adverse effects (presented in order of effects analysis in this chapter)

Unavoidable adverse effects	Chapter 3 section(s) with detailed analysis	Summary of unavoidable effects	Rationale and mitigation for unavoidable effect
Limiting where visitors may use motorized vehicles	Recreation	Non-designated motorized travel would be prohibited and use within corridors would be restricted	Required by the Travel Management Rule.
Noise, exhaust, sight of OHVs	Recreation; Socio-economic	The sight, sound, and exhaust from OHVs on Forest are unavoidable unless OHV use is eliminated entirely. The sight, sound, and exhaust from OHV use is one of the most common complaints from non-motorized users. OHV noise was specifically identified as a key significant issue as a result of public input and analyzed.	The Forest Plans specifically recognize the appropriateness of OHV use on the Forest. Noise is mitigated by standard muffler requirements on OHVs and by providing enough motorized and non-motorized trails to provide separation of uses. Exhaust standards are set by Washington Department of Ecology.
Community impacts	Socio-economic	Prohibiting motorized use off the designated, finite system of roads, trails, and areas open to motorized use would likely decrease the current level of OHVs in some areas under all alternatives which may decrease the amount of money spent by visitors in local communities.	The Travel Management Rule requires designation of a finite system and closing the remainder of the Forest to cross-country motorized travel.
Sedimentation	Aquatic Resources	Sedimentation from motorized vehicles may occur in some site-specific locations within designated corridors, although use near water is restricted.	Sedimentation would be substantially lower in action alternatives because of the closure of the Forest to non-designated motorized travel. Monitoring of effects on water resources within corridors would allow for adjusting or removing access where effects cannot be mitigated.

Unavoidable adverse effects	Chapter 3 section(s) with detailed analysis	Summary of unavoidable effects	Rationale and mitigation for unavoidable effect
Disturbance of aquatic species	Aquatic Resources	Disturbance of aquatic species and spawning areas within corridors.	Disturbance would be substantially lower in action alternatives because of the closure of the Forest to non-designated motorized travel, Monitoring of effects on aquatic resources within corridors would allow for adjusting or removing access where effects cannot be mitigated.
Effects on botanical resources	Botany	Some native plants may be injured or killed motorized use within corridors	Closing the Forest to non-designated motorized use would decrease effects of current use. Monitoring of effects on botanical resources within corridors would allow for adjusting or removing access where effects cannot be mitigated.
Introduction and spread of invasive species	Invasive Plants	Motor vehicle use within corridors could introduce or spread invasive species, which impact native plants.	Closing the Forest to non-designated motorized use would decrease current potential for introduction and spread. Monitoring of effects of invasive species within corridors would allow for and adjusting or removing access where effects cannot be mitigated.
Disturbance of wildlife	Wildlife	Disturbance from human presence and noise which can increase heart rates and cause animals to flee.	Closing the Forest to non-designated motorized use would decrease current potential for disturbance to wildlife. Monitoring of effects on wildlife would allow adjusting or removing access where effects cannot be mitigated.

Unavoidable adverse effects	Chapter 3 section(s) with detailed analysis	Summary of unavoidable effects	Rationale and mitigation for unavoidable effect
Noise, exhaust, and sight of OHVs in IRAs/PWAs	IRAs and PWAs in Specifically Required Disclosures	Motorized use within corridors within IRAs and PWAs may result in unavoidable sights, sounds, and exhaust from motorized vehicles.	The Forest Plans specifically allocate certain semi-primitive areas on the Forest to motorized use. Noise is mitigated by standard muffler requirements on vehicles. Current motorized use designations provide some separation of uses. Exhaust standards are set by Washington Department of Ecology.

Short-term Uses and Long-term Productivity

The closure of the Forest to non-designated motorized travel would allow for natural closure of unauthorized routes as these routes begin to re-vegetate, a process that could take 20 years or longer. Unmanaged OHV use, particularly cross-country travel, can threaten ecosystem sustainability, including trampling of native species, disturbance and harassment of wildlife, increasing soil erosion and reducing water quality, impacting riparian function, and crushing, eroding, displacing, vandalizing or destroying heritage artifacts or features. Unmanaged OHV use may also result in increasing conflicts between motorized and non-motorized users. These problems would continue to increase as popularity of OHV use grows and more visitors come to the Forest under Alternative A. All alternatives eliminate cross-country motorized travel except on 33 acres. The designation of corridors is a use that may affect long-term productivity, although less than the unmanaged motorized dispersed access that is currently occurring and would continue to occur under Alternative A. As long as existing routes are used by motorized vehicles, they would not provide for long-term productivity. Unlike under Alternative A, other non-route areas of corridors may begin to recover since motorized vehicles would no longer be allowed off existing routes.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species, the removal of mined ore, or the destruction of a heritage artifact. Irretrievable commitments are those that are lost for a period, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road and trails. Implementation of any of the action alternatives would not produce irreversible commitment of resources.

Implementing all action alternatives would allow for recovery of 675,000 acres of area where cross-country motorized travel is currently not prohibited (excluding the 33 acres at Moon and Funny Rocks) and areas within corridors, except on existing routes.

Possible Conflicts with Other and Use Plans, Policies, and Controls

Based on comments received during scoping, preliminary consultation meetings, and analysis in this environmental assessment, none of the alternatives under consideration would conflict with the plans or policies of other jurisdictions, including those of the Yakama Nation and Colville Confederated Tribes. Nothing in the Travel Management final rule, which this project would implement, revokes any rights held by miners. Reasonable access for and reasonably incident to mining operation is authorized by U.S. Mining Laws. Motorized vehicle use inconsistent with the MVUM could be authorized under an approved Plan of Operations. The approved Plan of Operations would serve as written authorization and would exempt involved parties from specified MVUM regulations. This project would not conflict with any other laws, regulations, or policies as described in the preceding resource sections regulatory frameworks and consistency findings.

Energy Requirements and Conservation Potential/Natural or Depletable Resource Requirements and Conservation Potential

Closing the Forest to cross-country motorized travel and designating corridors for access to dispersed camping would not result in any energy requirements, beyond the minimal requirements to produce the actual map. Publication of the MVUM itself would require the printing of maps which are printed on paper, a natural (though not depletable) resource. Current regulations require that all government documents, including the MVUM be printed on recycled paper. Given that publication of the MVUM is likely to occur in the west, it is unlikely that printing of the MVUM would be done using depletable energy sources; most electricity in the west is from renewable energy sources.

However, publication of the MVUM would require enforcement using motor vehicles (which use depletable energy sources) and would allow for motorize use to occur. Most vehicles use gasoline, a depletable resource. However, this use is already occurring, and any increases in use of gasoline from use of motorized vehicles is likely to result from general population changes unrelated to the Motorized Travel Management Project. All alternatives, however, restrict OHV use on the Forest by closing the

Forest to cross-country motorized travel and may reduce the current amount of use occurring, thereby decreasing the use of gas from activities on the Forest.

Urban Quality, Historic and Cultural Resources, and the Design of the Built Environment

No urban resources or built environment are present on the Forest. All alternatives have the potential to effect historic and cultural resources, although effects would be mitigation and monitoring. See the Heritage Resource section earlier in this chapter for details.

Prime Farmlands, Rangelands, Forestlands, and Parklands

No prime farmlands, rangelands, or parklands exist within the project area. Although prime forestland does exist in isolated pockets, no effects are expected to occur as a result of implementation of the MVUM because this project would not authorize the cutting of any trees. Therefore any prime forestland would be unaffected.

Wetlands and Floodplains

Riparian allocations under the amended Forest Plans contain both floodplains and wetlands. Floodplains are located within the riparian allocations, and vary from only a few feet, to the entire riparian allocation width plus a buffer. Wetlands are areas that regularly are saturated by surface or ground water and subsequently are characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. The effects of closing the Forest to cross-country motorized travel and designating corridors within riparian allocations are discussed in the Water, Soils, and Fish section of this chapter. Impacts to wetlands and floodplains are minimized by application of the aquatic conservation strategy (NWFP), riparian management objectives (PACFISH/INFISH) and those plans' respective riparian allocation standards and guidelines.

Section 504 of the Rehabilitation Act of 1973

The comment and response to the 2005 Travel Management Rule states, "Under section 504 of the Rehabilitation Act of 1973, no person with a disability can be denied participation in a Federal program that is available to all other people solely because of his or her disability. In conformance with section 504, wheelchairs are welcome on all National Forest System lands that are open to foot travel and are specifically exempted from the definition of motor vehicle in § 212.1 of the final rule, even if they are battery-powered. However, there is no legal requirement to allow people with disabilities to use OHVs or other motor vehicles on roads, trails, and areas closed to motor vehicle use because such an exemption could fundamentally alter the nature of the Forest Service's motorized travel management program (7 CFR 15e.103). Reasonable restrictions on motor vehicle use, applied consistently to everyone, are not discriminatory."

Clean Air Act

The action alternatives would either maintain or reduce emissions as a result of restrictions placed on motor vehicles because OHV users may either choose to go elsewhere find cross-country travel experiences or not use their OHVs at all. OHV users who use the designated system of trails on the MVUM may experience some temporary increase in localized air quality impairment from emissions or fugitive dues as a result of more vehicles on a finite system. Emissions may increase over time as the general population increases. Any increase would likely be linked to local, state, and national trends in population and OHV popularity rather than affected by the changes in this action.

Literature Cited

General

USDA Forest Service. 1989. Okanogan National Forest Land and Resource Management Plan. 194 pages.

USDA Forest Service 1990. Wenatchee National Forest Land and Resource Management Plan. 540 pages.

USDA Forest Service. 2004. Executive Summary Okanogan and Wenatchee National Forests Roads Analysis. 6 pages.

USDA Forest Service 2005. Final Rule Travel Management Designated Routes and Areas for Motor Vehicle Use. Federal Register 70 (216), page 68264-68291.

USDA Forest Service. 2006. Region 6 guidelines for implementation of the Travel Management Rule. 3 pages.

Recreation

Cordell, H.K. ed. 1999. Outdoor recreation in American life: a national assessment of demand and supply trends. Champaign, IL: Sagamore Publishing.

Cordell, H.K.; Betz, C.J.; Green, F.T.; Mou, S.; Leeworthy, V.R.; Wiley, P.C.; Barr, J.J.; Hellerstein, D. 2004. Outdoor recreation for 21st century America. A report to the Nation: the national survey on recreation and the environment. State College, PA Venture Publishing. 293 p.

Cordell, H. Ken,. Betz, Carter J., Green, Gary T, and Mou, Shela H. 2008. Outdoor Recreation Activity Trends: What's Growing, What's Slowing? Internet Research Information Series, September 2008.

Cordell, H. Ken,. Betz, Carter J., and Green, Gary T. 2009. Long-term National Trends in Outdoor Activity Recreation Activity Participation- 1980 to Now. Internet Research Information Series, May 2009.

Hall, T.; Heaton, H.; and Kruger, L. 2009. Outdoor recreation in the Pacific Northwest and Alaska: trends in activity participation. Gen. Tech. Rep. PNW-GTR-778. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 108 p.

Interagency Committee For Outdoor Recreation (IAC) 2002. As Assessment of Outdoor Recreation in Washington State. A State Comprehensive Outdoor Recreation Planning Document (SCPORP) 2002-2007. Retrieved from: http://www.rco.wa.gov/documents/rec_trends/SCORP_Oct_2002.pdf

Interagency Committee for Outdoor Recreation (IAC) 2003. Estimates of Future Recreation Participation in Outdoor Recreation in Washington State. State of Washington, March 2003.

Office of Financial Management 2010. April 1 Intercensal and Postcensal Population Estimates for the State, Counties, and Cities: 1968 to 2010. Retrieved from: http://www.ofm.wa.gov/pop/historical.asp

Office of Financial Management 2007. Final Projections of Total Resident Population for Growth Management; medium series: 2000 to 2030. Retrieved from: http://www.ofm.wa.gov/pop/gma/projections07.asp

U.S. Forest Service (USFS). 1989. Okanogan National Forest Land and Resource Management Plan. U.S. Department of Agriculture, Forest Service, Okanogan National Forest, Wenatchee, WA.

U.S. Forest Service (USFS). 1990. Wenatchee National Forest Land and Resource Management Plan. U.S. Department of Agriculture, Forest Service, Wenatchee National Forest, Wenatchee, WA.

U.S. Forest Service (USFS). 2005. Okanogan National Forest Travel Plan. U.S. Department of Agriculture, Forest Service, Okanogan National Forest, Wenatchee, WA.

U.S. Forest Service (USFS). 2010. National visitor use monitoring results for Okanogan and Wenatchee National Forests. Portland, OR: U.S. Department of Agriculture, Forest Service Region 6.

Washington State Recreation and Conservation Office (WA RCO) June 2008. Defining and Measuring Success: The Role of State Government in Outdoor Recreation. A State Comprehensive Outdoor Recreation Planning Document. Olympia, WA: Washington State Recreation and Conservation Office. Retrieved from: http://www.rco.wa.gov/documents/rec_trends/SCORP_2008.pdf

Hydrology, Fish, and Soil

Al-Chokhachy, R., B. Roper, and E. Archer. 2010. Evaluating the status and trends of physical stream habitat in headwater streams within the interior Columbia River and upper Missouri River basins using an index approach. Transactions of the American Fisheries Society 139:1041-1059.

Beamish, J. 1980. Adult biology of the river lamprey (Lampetra ayresi) and the Pacific lamprey (Lunipetru tridentata) from the Pacific coast of Canada. Can. J. Fish. Aquat. Sci. 37: 1906-1923.

Belt, G.H., J. O'Laughlin, and T. Merrill. 1992. Design of forest riparian buffer strips for the protection of water quality: Analysis of scientific literature. Policy Analysis Group Report No. 8. Moscow: University of Idaho, College of Forestry, Wildlife, and Range Sciences.

Behnke, R. 2002. Trout and salmon of North America. The Free Press. 359p

Bjornn, TC | Reiser, DW 1991. Habitat Requirements of Salmonids in Streams. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. pp. 83-138. American Fisheries Society Special Publication [Am. Fish. Soc. Special Pub.]. no. 19.

Bowling LC, Lettenmaier DP. 2001. The effects of forest roads and harvest on catchment hydrology in a mountainous maritime environment. In The Influence of Land Use on the Hydrologic–Geomorphic Responses of Watersheds, Wigmosta M, Burges SJ (eds). Water Resources Monograph Series, American Geophysical Union: Washington, DC; 145–164.

Brown, L.G., 1992. Draft management guide for bull trout Salvelinus confluentus (Suckley) on the Wenatchee National Forest. USDA Forest Service, Wenatchee National Forest, Wenatchee, WA.

Carie, D. 1996. Spring and summer Chinook salmon and sockeye salmon spawning ground surveys on the Entiat River, 1995. U.S. Fish and Wildlife Service Mid-Columbia River Fisheries Resource Office. Leavenworth, WA. February 20, 1996.18 p.

Chapman, D., C. Peven, T. Hillman, A. Giorgi and F. Utter. 1994. Status of summer steelhead in the mid-Columbia River. Don Chapman Consultants, Inc., Boise, Idaho. 235+pp.

Chapman, D.C., Peven, A. Giorgi, T. Hillman, and F. Utter. 1995. Status of spring Chinook salmon in the Mid-Columbia Region. Don Chapman Consultants, Inc. Report to Report to Chelan, Douglas, and Grant County Public Utility Districts, Wenatchee, WA.

Coe, D. 2006. Sediment production and delivery from forest roads in the Sierra Nevada, California. M.Sc. thesis, Colorado State Univ., Fort Collin, CO. 110 p. http://www.fire.ca.gov/cdfbofdb/pdfs/DrewCoe_FinalThesis.pdf

COSEWIC. 2010. COSEWIC Assessment and Status Report on the Umatilla Dace Rhinichthys Umatilla in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa

Craig, S.D. 1997. Habitat conditions affecting bull trout, Salvelinus confluentus, spawning areas within the Yakima River basin, Washington. Master's Thesis. Central Washington University, Ellensburg, WA. August 7, 1997.

Fast, D., J. Hubble, M. Kohn, and B. Watson. 1991. Yakima River spring chinook enhancement study. Bonneville Power Administration, Division of Fish and Wildlife. Portland, OR. 343 pgs.

Ford, M.J. (ed.). 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-113, 281 p.

Grace, J.M.; Clinton, B.D. 2007. Protecting soil and water in forest road management. Transcript of the American Society of Agricultural and Biological Engineers 50(5): 1579–1584.

Greig, S.M., D.A. Sear, and P.A. Carling. 2005 The impact of fine sediment accumulation on the survival of incubating salmon progeny: Implications for sediment management. Science of the Total Environment 344 (2005) 241–258

Gresswell, R.E. 1999. Fire and aquatic ecosystems in forested biomes of North America. Transactions of the American Fisheries Society 128: 193–221.

Hallock, M., and P.E. Mongillo. 1998. Washington state status report for the pygmy whitefish. Washington Department of Fish and Wildlife, Olympia. 20 pp.

Hillman, T.W., D.W. Chapman and J.S. Griffith. 1989. Seasonal habitat use and behavioral interaction of juvenile chinook salmon and steelhead. I. Daytime habitat selection. Summer and Winter Ecology of Juvenile Chinook Salmon and Steelhead Trout in the Wenatchee River, Washington. Final Report to Chelan County Public Utility District, Washington, June 1989. Don Chapman Consultants, Inc., p. 42-82.

Hillman, T.W. and M.D. Miller. 1994. Estimated abundance and total numbers of chinook salmon and trout in the Chiwawa River, Washington, 1993. Report to Chelan County Public Utility District, Wenatchee, WA. Don Chapman Consultants, Inc., Boise, ID. 48 pp.

Howell, P. and P. Spruell. 2003. Information regarding the origin and genetic characteristics of westslope cutthroat trout in Oregon and Central Washington. Preliminary Report. LaGrande, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

ICBTRT (Interior Columbia Basin Technical Recovery Team).2005. Interior Columbia Basin TRT: viability criteria for application to interior Columbia Basin salmonid ESUs. Draft, July 2005. National Marine Fisheries Service. [unpublished document] http://www.nwfsc.noaa.gov/trt/trt_documents/viability_update_memo05.pdf

ICBTRT. 2007. Viability Criteria for application to interior Columbia basin ESUs. Review Draft. Interior Columbia Basin Technical Recovery Team draft Report. 84 pp.

Latterell, J.J., R.J. Naiman, B.R. Fransen and P.A. Bisson. 2003. Physical constraints on trout (Oncorhynchus spp.) distribution in the Cascade Mountains: a comparison of logged and unlogged streams. Canadian Journal of Fisheries and Aquatic Sciences. 60:1007-1017.

Lee, D., J.R. Sedell, B. Rieman and others. 1996. Broadscale assessment of aquatic species and habitats . In: Quigley, T. M. and S. J. Arbelbide Tech Eds. An assessment of ecosystem components in the Interior Columbia Basin and Portions of the Klamath and Great Basins. General Technical Report. Portland Ore. USDA Forest Service, Pacific Northwest Research Station (2 volumes).

Lindhorst, K. and K. MacDonald. 2002. Biological assessment for bull trout, westslope cutthroat, and steelhead for the proposed actions in the American/Bumping watershed, May 2002. USDW Forest Service, Okanogan-Wenatchee National Forest, Naches Ranger District. Naches, WA

MacDonald, K., S. Noble and J. Haskins. 1996. An assessment of the status of aquatic resources within subbasins on the Wenatchee National Forest. USDA Forest Service, Wenatchee, Wa. 22pgs.

Madej MA. 2001. Erosion and sediment delivery following removal of forest roads. Earth Surf Proc Land 26: 175-90.

May, B. 2009. Westslope cutthroat trout status update summary 2009. Wild trout Enterprises, LLC. Bozeman, MT. 33 p.

Meehan W.R., and TC Bjornn. Salmonid Distributions and Life Histories. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society. Special Publication 19, 47-82, 1991.

Meyer, K.G. (2002). Managing degraded off-highway vehicle trails in wet, unstable, and sensitive environments. — USDA Forest Service Technology and Development Program, Missoula, MT.

McCullough, D. A.: 1999, A Review and Synthesis of Effects of Alterations to the Water Temperature Regime on Freshwater Life Stages of Salmonids, with Special Reference to Chinook Salmon,

Region 10 Water Resources Assessment Report No. 910-R-99-010, United States EPA, Seattle.
McMahon, T.E., A.V. Zale, F.T. Barrows, J.H. Selong and R.J. Daney. 2007. Temperature and competition between bull trout and brook trout: a test of the elevation refuge hypothesis. Transactions of the American Fisheries Society 136: 1313-1326.
Meredith, C., E.K. Archer, R. Scully, A. Van Wagenen, J.V. Ojala, R. Lokteff and B. Roper. 2012. PIBO effectiveness monitoring program for streams and riparian areas. USDA Forest Service 2012 Annual Summary report (available at: http://www.fs.fed.us/biology/resources/pubs/feu/pibo/2012_PIBOEM_AnnualReport9_12_2013update.pdf (March 20, 2014)
McPhail, J. D. and R. Carveth. 1992 A foundation for conservation: the nature and origin of the freshwater fish fauna of British Columbia. Fish Museum, Department of Zoology, University of British Columbia. Vancouver, B.C., Canada. 37 pps.
Mosey, T. R. and K. Truscott. 1999. Spring and summer chinook spawning ground surveys on the Wenatchee River Basin, 1998. Chelan County Public Utility District. Wenatchee, Wa. 32pgs plus appendices.
Muhlfield, C.C., T.E. McMahon, M.C. Boyer and R.E. Gresswell. 2009. Local habitat, watershed, and biotic factors influencing the spread of hybridization between native westslope cutthroat trout and introduced rainbow trout. Transactions of the American Fisheries Society 138: 1036-1051.
NMFS (National Marine Fisheries Service). 2006. Endangered and threatened species: final listing determinations for 10 distinct population segments of West Coast steelhead. Federal Register 71:3(5 January 2006):834–862.
NMFS (National Marine Fisheries Service). 2009. Middle Columbia River steelhead distinct population segment ESA recovery plan. National Marine Fisheries Service Northwest Region. November 30, 2009. 260 pgs. Accessed May 4, 2015 at: http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/interior_columbia/middle_columbia/mid-c-plan.pdf
NOAA (National Oceanographic and Atmospheric Administration). 2007. Endangered and Threatened Species; Recovery Plans, Notice of Availability (RIN 0648–XD02). Federal Register, 72:194(9 October 2007):57303-57307.
Ojutkangas, E., K. Aronen and E. Laukkanen. 1995. Distribution and abundance of river lamprey (Lampetra fluviatilis) ammocoetes in the regulated river Perhonjoki. In: Regulated Rivers: Research and Management. Volume 10, Issue 2-4, Pg 239-245
Ouren, D.S., C. Hass, C.P. Melcher, S.C. Stewart, P.D. Ponds, N.R. Sexton, L. Burris, T. Francher, and Z.H. Bowen. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources. U.S. Geological Survey Open-File Report 2007-1353
Pearsons, T.N., S.R. Phelps, S.W. Martin, E.L. Bartrand, and G.A. McMichael. 2007. Gene Flow between Resident and Anadromous Rainbow Trout in the Yakima Basin: Ecological and Genetic Evidence. Washington Department of Fish and Wildlife. American Fisheries Society Pub.
Platts, W. S., and R. L. Nelson. 1988. Fluctuations in trout populations and their implications for land-use evaluation. North American Journal of Fisheries Management 8:333–345
Rashin, E.B., C.J. Clishe, A.T. Loch, and J.M. Bell. 2006. Effectiveness of Timber Harvest Practices for Controlling Sediment Related Water Quality Impacts. Journal of the American Water Resources Association 42(5):1307-1427.
Reid, L. M. and T. Dunne, 1984. Sediment Production from Road Surfaces. Water Resources Research 20:1753-1761.

Reeves, G. H., F. H. Everest, and J. D. Hall. 1987. Interactions between the redside shiner (Richardsonius balteatus) and the steelhead trout (Salmo gairdneri) in western Oregon: the influence of water temperature. Canadian Journal of Fisheries and Aquatic Sciences 44:1602-1613.

Reiss, K.Y., K Gallo, P Dawson, D. Konnoff, and L. Croft. Process doe evaluating the contribution of national forest system lands to aquatic ecological sustainability. A Regional pilot process conducted on the Okanogan-wenatchee and Colville National Forests. USDA Forest Service, Region 6, Portland, Oregon. June 5, 2008. 176 pgs.

Rodtka, M.C. and J.P. Volpe. 2007. Effects of water temperature on interspecific competition between juvenile bull trout and brook trout in an artificial stream. Transactions of the American Fisheries Society 136: 1714-1727.

Scott, W.B. and E.J. Crossman. 1973. Freshwater Fishes of Canada. Fisheries Research Board of Canada, Bulletin pgs. 214-219.

Shaw E.A, and J. S. Richardson. 2001. Direct and indirect effects of sediment pulse duration on stream invertebrate assemblages and rainbow trout (Oncorhynchus mykiss) growth and survival. Can. J. Fish. Aquat. Sci. 58: 2213–2221.

Scholz, A.T. and H.J. McLellan. 2009. Field Guide to the Fishes of Eastern Washington. Eastern Washington University. Cheney, WA.

Sweeney, Bernard W. and J. Denis Newbold, 2014. Streamside Forest Buffer Width Needed to Protect Stream

Water Quality, Habitat, and Organisms: A Literature Review. Journal of the American Water Resources Association (JAWRA) 50(3): 560-584. DOI: 10.1111/jawr.12203

Swift, L.W., Jr.; Burns, R.G. 1999. The three R's of roads: redesign, reconstruction, and restoration. Journal of Forestry 97(8): 41–44.

Trombulak, S.T; Frissell, C.A. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1): 18–30.

USDA Natural Resources Conservation Service. 2013.Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed [2013].

UCSRB (Upper Columbia Salmon Recovery Board). 2007. Upper Columbia spring Chinook salmon and steelhead recovery plan. August 2007 352 pgs. Accesses May 4, 2015 at: http://www.ucsrb.org/Assets/Documents/Library/Plans/UCSRP/UCSRP%20Final%209-13-2007.pdf

USDA Forest Service. 1995. Inland native fish strategy environmental assessment decision notice and finding of no significant impact: interim strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana and portions of Nevada (INFISH). Intermountain, Northern and pacific Northwest Regions. 39 p. (Place of publication unknown)

USDA Forest Service and USDI Bureau of Land Management. 1994. Record of Decision for amendments to Forest Service and Bureau of Land Management planning documents in the range of the northern spotted owl and standards and guidelines for management of habitat for late-successional and old growth forest related species. 74. (plus Attachment A: standards and guides) (Place of publication unknown)

USDA Forest Service and USDI Bureau of Land Management. 1995. Decision notice/decision record, FONSI, environmental assessment, and appendices for the implementation of interim strategies for managing anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho, and portions of California (PACFISH). 305 p. (Place of publication unknown)

US Department of the Interior (BOR), 2007. Assessment of Sockeye Salmon Production Potential in the Cle Elum River Basin Storage Dam Fish Passage Study Yakima Project, Washington. Technical Series No. PN-YDFP-008. Boise, ID.

USBOR (US Bureau of Reclamation). 2011.Keechelus Reservoir fish entrainment 2010 monitoring report, Yakima Project. U.S. Bureau of Reclamation, Columbia-Cascades Area Office, Yakima, Washington. 34 pp.

USFWS (U.S. Fish and Wildlife Service) and NMFS (National Marine Fisheries Service) 1998. Consultation handbook. Procedures for conducting consultation and conference activities under section 7 of the Endangered Species Act. March 1988. Location of publication is unknown.

U.S. Fish and Wildlife Service. 2002. Chapters 21 and 22, Upper Columbia Recovery Unit, Washington. 113 p. In: U.S. Fish and Wildlife Service. Bull Trout (Salvelinus confluentus) Draft Recovery Plan. Portland, Oregon

USFWS (U.S. Fish and Wildlife Service). 2008. Bull trout (Salvelinus confluentus) 5 year review: summary and evaluation. U.S. Fish and Wildlife Service. Portland, Oregon. 55 p. Accesses May 3, 2008 at: http://www.fws.gov/pacific/bulltrout/pdf/Bull%20Trout%205YR%20final%20signed%20042508.pdf

USFWS (U.S. Fish and Wildlife Service). 2014. Revised draft recovery plan for the coterminous United States population of bull trout (Salvelinus confluentus). Portland, Oregon. xiii + 151 pp. Accessed May 3, 2015 at: http://www.fws.gov/pacific/bulltrout/pdf/Revised%20Draft%20Bull%20Trout%20Recovery%20Plan.pdf

USFWS (U.S. Fish and Wildlife Service). 2015. Draft Mid-Columbia Recovery Unit implementation plan for bull trout recovery. Oregon Fish and Wildlife Office, U.S. Fish and Wildlife Service. Portland, OR. June 2015. Accessed online March 24, 2016 at: http://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/Draft_Mid_Columbia_RUIP_060215.pdf

WDFW (Washington Department of Fish and Wildlife). 1997. Washington state salmonid stock inventory, bull trout/Dolly Varden. Washington Department of Fish and Wildlife, September 1997.

WDFW (Washington State Department of Fish and Wildlife). 2008. Priority Habitats and Species List, distribution map for river lamprey. Accessed: June 13, 2012. Available online: http://wdfw.wa.gov/conservation/phs/list/2008/2008-sept_lamprey.pdf

WDFW (Washington Department of Fish and Wildlife). 2011. Annual Sensitive Species Report.

WSDOT (Washington State Department of Transportation). 2008. I-90 Snoqualmie Pass East Biological Assessment. Washington State Department of Transportation, South Central Region.

Wemple, B.C., J.A. Jones, and G.E. Grant . 1996. Channel Network Extension by Logging Roads in Two Basins, Western Cascades, Oregon. Water Resource Bull.,Vol 32, No. 6, pp 1195-1207.

Wood, P.J., and P.D. Armitage. 1997. Biological Effects of Fine Sediment in the Lotic Environment. Environmental Management Vol. 21, No. 2, pp. 203–217

Wydoski, R.S. and R.R. Whitney. 1979. Inland Fishes of Washington. Seattle, Washington: University of Washington Press.

Wildlife

Acorn, J., and I. Sheldon. 2006. Butterflies of British Columbia. Lone Pine Publishing. Edmonton, Alberta. 360 p.

Adams, L. 1959. An analysis of a population of snowshoe hares in northwestern Montana. Ecological Monographs. 29:141-170.

Agee, James K. 1994. Fire and weather disturbances in terrestrial ecosystems of the eastern Cascades. Gen. Tech. Rep. PNW-GTR-320. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 52 p. (Everett, Richard L., assessment team leader; Eastside forest ecosystem health assessment; Hessburg, Paul F., science team leader and tech. ed., Volume III: assessment.)

Alexander, S.M, and Waters, N.M. 2000. The effects of highway transportation corridors on wildlife: a case study of Banff National Park. Transportation Res. Part C 8, 207-320.

Altman, Bob. 2000 (a). Conservation strategy for landbirds in the northern Rocky Mountains of eastern Oregon and Washington. Version 1.0. Prepared for Oregon-Washington Partners In Flight.

Altman, Bob. 2000 (b). Conservation strategy for landbirds of the east-slope of the Cascade Mountains in Oregon and Washington. Version 1.0. Prepared for Oregon-Washington Partners In Flight.

Altman, Bob and Aaron Holmes. 2000. Conservation strategy for landbirds in the Columbia Plateau of Oregon and Washington. Version 1.0. Prepared for Oregon-Washington Partners In Flight.

Altman, Bob and Rex Sallabanks. 2000. Olive-sided Flycatcher (Contopus cooperi), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/502 doi:10.2173/bna.502

AMEC Americas Limited. Mackenzie gas project effects of noise on wildlife. 2005.

Andruskiw, M.; Fryxell, J. M.; Thompson, I. D.; Baker, J. A. 2008. Habitat-mediated variation in predation risk by the American marten. Ecology 89:2273–2280.

Apps, C. D. 2000. Space-use, diet, demographics, and topographic associations of lynx in the southern Canadian Rocky Mountains: a study. Pages 351-371 in L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires, editors. Ecology and conservation of lynx in the United States. University of Colorado, Boulder, USA.

Archibald, W.R. Ellis, R., and Hamilton, A. N. 1986. Responses of Grizzly Bears to Logging Truck Traffic in the Kimsquit River Valley, British Columbia in Bears: Their Biology and Management, Vol. 7, A Selection of Papers from the Seventh International Conference on Bear Research and Management, Williamsburg, Virginia, USA, and Plitvice Lakes, Yugoslavia, February and March (1987), pp. 251-257.

Arens, Paul, Theo van der Sluis, Wendy P. C. van't Westende, Ben Vosman, Claire C. Vos, and Marinus J. M. Smulders. 2007. Genetic population differentiation and connectivity among fragmented Moor frog (Rana arvalis) populations in The Netherlands. Landscape Ecology 22(10): 1489-1500.

Aubry, K. B. and D. B. Houston. 1992. Distribution and status of the fisher (Martes pennanti) in Washington. Northwest Naturalist 73:69-79. .

Aubry, K. B. and J. C. Lewis. 2003. Extirpation and reintroduction of fishers (Martes pennanti) in Oregon: implications for their conservation in the Pacific states. Biological Conservation 114:79-90.

Aubry, K. B. and C. M. Raley. 2006. Ecological characteristics of fishers (Martes pennanti) in the southern Oregon Cascade Range. Update: July 2006. U.S.D.A. Forest Service, Pacific Northwest Research Station, Olympia, Washington.

Banci, 1994. Wolverine. Pages 99-127 in L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, editors. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. U.S. Forest Service General Technical Report RM-254.

Bangs Edward E. and Steven H. Fritts. 1996. Reintroducing the Gray Wolf to Central Idaho and Yellowstone National Park . Wildlife Society Bulletin, Vol. 24, No. 3, pp. 402-413.

Bartels, Peggy. 2000. Western gray squirrel nest survey, Chelan and Okanogan Counties, Washington. Washington Department of Fish and Wildlife.

BARTON, DANIEL C., and AARON L. HOLMES. 2007. Off-Highway Vehicle Trail Impacts on Breeding Songbirds in Northeastern California. JOURNAL OF WILDLIFE MANAGEMENT 71(5):1617–1620.

Bate, L.J.; Wisdom, M.J.; Wales, B.C. 2007. Snag densities in relation to human access and associated management factors in forests of Northeastern Oregon, USA. Landscape and Urban Planning 80: 278-291.

Beaudry, Frederic; Demaynadier, Phillip G.; Hunter, Malcolm L. 2010. Identifying Hot Moments in Road-Mortality Risk for Freshwater Turtles. Journal of Wildlife Management Volume 74 Issue 1 152-158.

Bee, M.A. and Swanson, E.M. 2007. Auditory masking of anuran advertisement calls by road traffic noise. Animal Behavior 74, 1765-1776.
Benitez-Lopez, A., Alkemade, R., Verweij, P.A. 2010. The impacts of roads and other infrastructure on mammal and bird populations: a meta-analysis. Biological Conservation 143 1307-1316.
Boyle, Stephan A. and Fred B. Samson. 1985. EFFECTS OF NONCONSUMPTIVE RECREATION ON WILDLIFE: A REVIEW. Wildl. Soc. Bull. 13:110-116.
Bigger, D.B., and S. Chinnici. 2003. Pacific Lumber Company Habitat Conservation Plan: exploring the use of radar as a monitoring tool in northern California. Arcata, CA,
U.S. Fish and Wildlife Service and California Department of Fish and Game, 21 pp.
BLM. No date. Species Fact Sheet: Grand Coulee Mountainsnail Oreohelix junii. Bureau of Land Management. Unpublished report. http://web.or.blm.gov/mollusks/images/Oreohelix_2sp.doc
BLM. No date B. Species Fact Sheet: Shiny Tightcoil Pristiloma wascoense. Bureau of Land Management. Unpublished report. http://web.or.blm.gov/mollusks/images/Pristiloma%20wascoense.pdf
Bolsinger, C. L., N. McKay, D. R. Gedney, and C. Alerich. 1997. Washington's public and private forests. U.S. Forest Service, Pacific Northwest Research Station, PNW-RB-218.
Bowman, Jeff; Justina C.Ray, Audrey J. Magoun, Devin S. Johnson, F. Neil Dawsone. 2010. Roads, logging, and the large-mammal community of an eastern Canadian boreal forest. Canadian Journal of Zoology, 2010, 88:(5) 454-467.
Boyce, Jr., D. A. 1982. Prairie Falcon fledgling productivity in the Mojave Desert, California. Master's Thesis. Humboldt State Univ. Arcata, CA.
Brattstrom, B. H., and M. C. Bondello. 1983. Effects of off-road vehicle noise on desert vertebrates. Pages 167–206 in R. H. Webb and H. G. Wilshire (eds.), Environmental effects of off-road vehicles: impacts and management in arid regions. Springer-Verlag, New York.
Brittell, J.D., Poelker, R.J., S.J. Sweeney and others. 1989. Native cats of Washington. Unpublished Report, Washington Dept. of Wildlif. Olympia, WA. 169 pp. in Ruediger,
B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada lynx conservation assessment and strategy. Second edition. U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, and U.S. National Park Service. U.S. Forest Service Publication #R1 -00-53, Missoula, Montana, USA. Hard copy.
Buckley, Ralf. 2003. Environmental impacts of motorized off-highway vehicles. Pp. 83-97 in: R. Buckley (editor), Environment impacts of ecotourism. CABI Publishing. http://books.google.com/books?hl=en&lr=&id=wueZG01A9YoC&oi=fnd&pg=PA83&dq=Environmental+impacts+of+motorized+off-highway+vehicles.+&ots=Pl37H0lvYe&sig=nXfPb5-qYA3Ei9TE4a5J91r-s7E#v=onepage&q=Environmental%20impacts%20of%20motorized%20off-highway%20vehicles.&f=false
BULL, EL, TW HEATER, AND JF SHEPHERD. 2005. Habitat selection by the American marten in northeastern Oregon. Northwest Science 79:37–43.
Bull, Evelyn L . and Barbara C .Wales. 2001. Effects of disturbance on birds of conservation concern in Eastern Oregon and Washington. Northwest Science Vol. 75.
Bull, Evelyn L. and Charles T. Collins. 2007. Vaux's Swift (Chaetura vauxi), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/077 doi:10.2173/bna.77
BULL, EVELYN L.; ANTHONY L. WRIGHT, MARK G. HENJUM. 1990. NESTING HABITAT OF FLAMMULATED OWLS IN OREGON. Journal of Raptor Research: 24(3): Fall 1990: 52-55.
Bull, Evelyn L. and James R. Duncan. 1993. Great Gray Owl (Strix nebulosa), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/041 doi:10.2173/bna.41

BUNNELL, KEVIN D. , JERRAN T. FLINDERS and MICHAEL L . WOLFE. 2006. Potential Impacts of Coyotes and Snowmobiles on Lynx Conservation in the Intermountain West. Wildlife Society Bulletin, Vol. 34, No. 3 pp. 828-838.

Burke, T. E. 1999. Conservation Assessment for Cryptomastix devia Puget Oregonian. Unpublished Report. Revised 2005 by N. Duncan. USDA Forest Service and USDI Bureau of Land Management. 27 p.

Burke, T. E. 1999b. Conservation Assessment for Prophysaon coeruleum Blue-Gray Taildropper. Unpublished Report. Revised 2005 by N. Duncan. USDA Forest Service and USDI Bureau of Land Management. 19 p.

Burke, T. E. 1999c. Conservation Assessment for Oreohelix n. sp. 1 Chelan Mountainsnail. Unpublished Report. Revised 2005 by N. Duncan. USDA Forest Service and USDI Bureau of Land Management. 27 p.

Bury, R.B. and D.J. Germano. 2008. Actinemys marmorata (Baird and Girard 1852) – western pond turtle, Pacific pond turtle. Chelonian Research Monographs (ISSN 1088-7105) No. 5. Chelonian Research Foundation. City/country unknown.

Buskirk, S. W., L. F. Ruggiero, and C. J. Krebs. 2000. Habitat fragmentation and interspecific competition: implications for lynx conservation. Pages 83- 100 in L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires, technical editors. Ecology and conservation of lynx in the United States. University of Colorado, Boulder, USA.

Buskirk, S. W., and L. F. Ruggiero. 1994. American marten. Pages 7-37 In L. F. Ruggiero, K. B. Aubrey, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski (editors), The

Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States. USDA Forest Service General Technical Report RM-254. Rocky Mountain Research Station, Fort Collins, Colorado.

Canfield, J. E., L. J. Lyon, J. M. Hillis, and M. J. Thompson. 1999. Ungulates. Pages 6.1-6.25 in G. Joslin and H. Youmans, coordinators. Effects of recreation on Rocky Mountain wildlife: A Review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society. 307pp.

Carroll, C., R.F. Noss, and P.C. Paquet. 2001. Carnivores as focal species for conservation planning in the Rocky Mountain region. Ecological Applications 11:243-262.

Cassirer, E.F.; Groves, C.R. 1991. Harlequin duck ecology in Idaho.1987-1990. Boise, ID: Idaho Department of Fish and Game.

Center for Biological Diversity. 2008. A Petition to list the Pacific fisher(Martes pennanti) as an Endangered or Threatened Species under the California Endangered Species Act.

Chapin, T.G.; Harrison, D.J.; Katnik, D.D. 1998. Influence of landscape pattern on habitat use by American marten in an industrial forest. Conservation Biology 12:1327-1337.

Chase, M.K. and B.A. Carlson. 2002. Sage Sparrow (Amphispiza belli). In The Coastal Scrub and Chaparral Bird Conservation Plan: a strategy for protecting and managing coastal scrub and chaparral habitats and associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/scrub.html

Chruszcz, B., Clevenger A. P., Gunson K. E., and M. L. Gibeau. 2003. Relationships among grizzly bears, highways, and habitat in the Banff-Bow Valley, Alberta, Canada. Can. J. Zool. 81: 1378–1391 (2003).

Ciarniello, Lana M., Boyce, Mark S., Heard, Douglas C., and Seip, D.R. Components of Grizzly Bear Habitat Selection: Density, Habitats, Roads, and Mortality Risk. Journal of Wildlife Management 71(5):1446-1457. 2007 doi: 10.2193/2006-229.

Conroy, M.J., L.W. Gysel, and G.R. Dudderar. 1979. Habitat components of clear-cut areas for snowshoe hares in Michigan. J. Wildlife Management. 43(3):680-690.

John G. Cook, Lonnie J. Quinlan, Larry L. Irwin, Larry D. Bryant, Robert A.Riggs, Jack Ward Thomas. 1996. Nutrition-Growth Relations of Elk Calves during Late Summer and Fall. The Journal of Wildlife Management, Vol. 60, No. 3 (Jul., 1996), pp. 528-541.

Cook, John G., Larry L. Irwin, Larry D. Bryant, Robert A. Riggs, Jack Ward Thomas. 1998. Relations of Forest Cover and Condition of Elk: A Test of the Thermal Cover Hypothesis in Summer and Winter. Wildlife Monographs, No. 141, Relations of Forest Cover and Condition of Elk: A Test of the Thermal Cover Hypothesis in Summer and Winter (Oct., 1998), pp. 3-61.

Copeland, J.; Harris, C. 1994. Wolverine ecology and habitat use in central Idaho: progress report. Idaho Department of Fish and Game, Boise, ID. 29p.

Copeland, Jeffrey P., James M. Peek, Craig R. Groves, Wayne E. Melquist, Kevin S. McKelvey, Gregory W. McDaniel, Clinton D. Long, Charles L. Harris. 2007. Seasonal Habitat Associations of the Wolverine in Central Idaho. JOURNAL OF WILDLIFE MANAGEMENT 71(7):2201–2212.

Corkran, C. C., and C. Thoms. 2006. Amphibians of Oregon, Washington, and British Columbia. Lone Pine Publishing. Edmonton, Alberta. 176 p.

Courtney, S. P., J. A. Blakesley, R. E. Bigley, M. L. Cody, J. P. Dumbacher, R. C. Fleisher, A. B. Franklin, J. F. Franklin, R. J. Gutierrez, J. M. Marzluff, and L. Sztukowski. 2004. Scientific evaluation of the status of the northern spotted owl. Sustainable Ecosystems Institute, Portland, Oregon, US

Courtney, S. and R. Gutiérrez. 2004. Chapter 11 in S. Courtney, editor. Scientific evaluation of the status of the northern spotted owl. Sustainable Ecosystems Institute, Portland, Oregon.

Crisafulli, C.M., D.R. Clayton, and D.H. Olson. 2008. Conservation assessment for the Larch Mountain salamander (Plethodon larselli). Version 1. USDA Forest Service Region 6, and USDI BLM, Interagency Special Status and Sensitive Species Program. 36 pp.

Crother, B. I., J. Boundy, J. A. Campbell, K. de Quieroz, D. Frost, D. M. Green, R. Highton, J. B. Iverson, R. W. McDiarmid, P. A. Meylan, T. W. Reeder, M. E. Seidel, J. W. Sites, Jr., S. G. Tilley, and D. B. Wake. 2003. Scientific and standard English names of amphibians and reptiles of North America north of Mexico: update. Herpetological Review 34:198-203.

Dale, Virginia, Daniel L. Druckenbrod, Latha Baskaran, Aldridge, Matthew, Michael Berry, Chuck Garten, Lisa Olsen, Rebecca Efroymson , Robert Washington-Allen 2005. Vehicle impacts on the environment at different spatial scales: observations in west central Georgia, USA Journal of Terramechanics 42 (2005) 383–402.

Damiani, C.; Lee, D.C. and Jacobson, S.L. 2007. Effects of noise disturbance on Northern spotted owl reproductive success.

Davis, Raymond J.; Dugger, Katie M.; Mohoric, Shawne; Evers, Louisa; Aney, William C. 2011. Northwest Forest Plan- the first 15 years (1994-2008): status and trends of northern spotted owl populations and habitats. Gen. Tech. Rep. PNW-GTR-850. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station. 147 p.

Delaney David K and Teryl G. Grubb. 2004. Sound Recordings of Road Maintenance Equipment on the Lincoln National Forest, New Mexico. A Report to San Dimas Technology and Development Center, November 2003. Rocky Mountain Research Station Research Paper RMRS-RP-49.

Dark, S.J. 1997. A landscape-scale analysis of mammalian carnivore distribution and habitat use by fisher. Thesis, Humboldt State University, Arcata, California, USA.

Delibes, M., Gaona, P., and Ferreras, P. 2001. Effects of an attractive sink leading into maladaptive habitat selection. Am. Nat. 2001. Vol. 158, pp. 277–285.

Dellinger, Rachel, Petra Bohall Wood, Peter W. Jones and Therese M. Donovan. 2012. Hermit Thrush (Catharus guttatus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/261 doi:10.2173/bna.261

deMaynadier PG, Hunter ML. 2000. Road effects on amphibian movements in a forested landscape. Nat Areas J 20:56–65.
deMaynadier PG, Hunter ML (1999) Forest canopy closure and juvenile emigration by pool-breeding amphibians in Maine. J Wildlife Manag 63:441–450.
De Vos, Antoon. 1964. Range Changes of Mammals in the Great Lakes Region. American Midland Naturalist , Vol. 71, No. 1 (Jan., 1964), pp. 210-231 Article Stable URL: http://www.jstor.org/stable/2422696
Dobkin, D. S. No Date. Neotropical Migrant Landbirds in the Northern Rockies and Great Plains: a Handbook for Conservation and Management. US Department of Agriculture, Forest Service, Northern Region.
Dunn, J. L., and J. Alderfer eds. 2006. National Geographic Field Guide to the Birds of North America. Fifth Edition. National Geographic Society. Washington, DC. 503 p.
Dunn, Robert R. and Danoff-Burg, James A. 2007. Road size and carrion beetle assemblages in a New York forest. J Insect Conserv (2007) 11:325–
Eder, T. 2002. Mammals of Washington and Oregon. Lone Pine Publishing. Edmonton, Alberta. 351 p.
Edge, W.D., and Marcum, C.L. 1985. Movements of elk in relation to logging disturbances. J. Wildl. Manage. 49(4): 926–930.
Epps, C.W. , Palsboll, P.J., Wehausen, J.D., Roderick, G.K., Ramey, R.R. II, McCullough, D.R. 2005. Ecology Letters (2005)8. 1029-1038.
Fahrig, L. 2003. Effects of habitat fragmentation on biodiversity. Annu. Rev.Ecol.Evol.Syst. 34:487-515.
Ferraras, P., Aldamas, J.J., Beltran, J.F., and Delibes, M. 1991. Rates and causes of mortality in a fragmented population of Iberian lynx Felis pardina. Biological Conservation 61:197-202.
Finch, D. M. 1991. Threatened, endangered, and vulnerable species of terrestrial vertebrates in the Rocky Mountain Region. Gen. Tech. Rep. RM-215. Fort Collins, CO: US Department of Agriculture, Forest Service. Rocky Mountain Forest and Range Experiment Station. 38 p.
Foltz, Randy B. 2006. Erosion from ATV Trails on National Forest lands. American Society of Agricultural and Biological Engineers 2006 Annual meeting.
Forman, R.T.T., Alexander, L.E., 1998. Roads and their major ecological e€ects. Annual Review of Ecological Systems 29, 207±231.
Forman R. T. T. 2000. Estimate of the Area Affected Ecologically by the Road System in the United States Conservation Biology, Vol. 14, No. 1 pp. 31-35.
Bryan, Terry and Forsman, Eric D..1987. Distribution, Abundance, and Habitat of Great Gray Owls in Southcentral Oregon.The Murrelet, Vol. 68, No. 2 (Summer, 1987), pp. 45-49.
Frame, Paul F., Cluff, H.Dean, and Hik, David S. 2005. Response of wolves to experimental disturbance at homesites. Journal of Wildlife Management 71(2). 316-320.
Frey, S.M. and Conover, M.R. 2006. Habitat use by meso-predators in a corridor environment. Journal of Wildlife Management 70(4):1111-1118; 2006.
Gaines, W.L., W.O. Noble, and R.H. Naney. 2001. Grizzly bear recovery in the North Cascades Ecosystem. Western Black Bear Workshop 7:57-62.
George, T. Luke. 2000. Varied Thrush (Ixoreus naevius), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/541 doi:10.2173/bna.541
Fleckenstein, J. 2006. Species Fact Sheet: Lycaena cupreus Lustrous Copper. Natural Heritage Program, WA Department of Natural Resources. Edited 2007 by R. Huff, FS/BLM Portland, OR. http://www.fs.fed.us/r6/sfpnw/issssp/planning-documents/species-guides.shtml
Fleckenstein, J. 2006b. Species Fact Sheet: Beloria bellona Meadow Fritillary. Natural Heritage Program, WA Department of Natural Resources. Edited 2007 by R. Huff, FS/BLM Portland, OR. http://www.fs.fed.us/r6/sfpnw/issssp/planning-documents/species-guides.shtml

Fleckenstein, J. 2006c. Species Fact Sheet: Oeneis Melissa Arctic Melissa. Natural Heritage Program, WA Department of Natural Resources. Edited 2007 by R. Huff, FS/BLM Portland, OR. http://www.fs.fed.us/r6/sfpnw/issssp/planning-documents/species-guides.shtml

Frest, T. J., and E. J. Johannes, 1995. Interior Columbia Basin mollusk species of special concern. Final report: Interior Columbia Basin Ecosystem Management Project, Walla Walla, WA. Contract #43-0E00-4-9112. 274 pp. plus appendices.

Frest, T. J., and E. J. Johannes. 1995. Interior Columbia Basin Mollusk Species of Special Concern. Final Report. Interior Columbia Basin Ecosystem Management Project. USDA Forest Service and USDI Bureau of Land Management. 286 p. http://www.icbemp.gov/science/frest_1.pdf

Gowan, D. and T. E. Burke. 1999. Conservation Assessment for Pristiloma arcticum crateris, Crater Lake Tightcoil. Originally issued as management recommendations; reconfigured September 2004 by N. Duncan. USDA Forest Service Region 6 and USDI Bureau of Land Management, Oregon and Washington. Available online at http://webcache.googleusercontent.com/search?q=cache:RL5zD-oJXFwJ:www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/20050713-moll-crater-lake-tightcoil.doc+pristiloma+idahoense&cd=2&hl=en&ct=clnk&gl=us (Last accessed 29 June 2010).

Gerlach, Gabriele and Musolf, Kerstin. 2000. Fragmentation of Landscape as a Cause for Genetic Subdivision in Bank Voles. Conservation Biology, Vol. 14, No. 4 (Aug., 2000), pp. 1066-1074. Stable URL: http://www.jstor.org/stable/2642004 Accessed: 21/04/2010 14:32.

Gibbs, James P. and W. Gregory Shriver. Can road mortality limit populations of pool-breeding amphibians? Wetlands Ecology and Management (2005) 13: 281–289

Gilbert, Barrie K. 2003. MOTORIZED ACCESS ON MONTANA'S ROCKY MOUNTAIN FRONT: A SYNTHESIS OF SCIENTIFIC LITERATURE AND RECOMMENDATIONS FOR USE IN REVISION OF THE TRAVEL PLAN FOR THE ROCKY MOUNTAIN DIVISION.

Gonzales, P., R.P. Neilson, K.S. McKelvey, J.M. Lenihan, and R.J. Drapek. 2007. Potential impacts of climate change on habitat and conservation priority areas for Lynx canadensis (Canada lynx). Report to the Forest Service, U.S. Department of Agriculture, Washington D.C., and NatureServe, Arlington, VA. 19 pages.

Godbout, G.; Ouellet, J. 2008. Habitat selection of American marten in a logged landscape at the southern fringe of the boreal forest. Ecoscience 15:332-342.

Goggans, R. 1986. Habitat use by flammulated owls in northeastern Oregon. Corvallis, OR: Oregon Stat University, 54 p. M.S. thesis.

Golightly, R. T., T. F. Penland, W. J. Zielinski, and J. M. Higley. 2006. Fisher diet in the Klamath/North Coast Bioregion. Unpublished report, Department of Wildlife, Humboldt State University, Arcata, California.

Goszczynski, J, Posluszny, M, Pilot, M., and Gralak, B. 2007. Patterns of winter locamotion and foraging in two sympatric marten species: martes martes and martes foina. Canadian Journal of Zoology 85:239-249.

Goudie, R. I. and Jones, I. L. 2004. Environmental Conservation 31 (4): 289–298. Dose-response relationships of harlequin duck behaviour to noise from low-level military jet over-flights in central Labrador.

Graves, T. 2002. Spatial and temporal response of grizzly bears to recreational use of trails. M.S. thesis University of Montana, Missoula.

Graves TA, Servheen C and Godtel D. 2004. Spatial and temporal response of grizzly bears to recreational use on trails. IN: Proceedings of the 2003 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: p. 411.

GREGORY, S, VANDER HAEGEN, W. M, CHANG, W.Y.,WEST, S.D. 2010. Nest Site Selection by Western Gray Squirrels at Their Northern Range Terminus. Journal of Wildlife Management 74(1):18–25; 2010; DOI: 10.2193/2009-021.

Hamer, T.E., and S.K. Nelson. 1995. Characteristics of marbled murrelet nest trees and nesting stands. In: Ecology and conservation of the marbled murrelet (C.J. Ralph, G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt, eds.). U.S. Forest Service, Gen. Tech. Rep. PSW-GTR-152, Pacific Southwest Research Station, Albany, California.

Hays, D.W., McAllister, K.R., Richardson, S.A., Stinson, D.W., 1999. Washington State Recovery Plan for the Western Pond Turtle. Washington Department of Fish and Wildlife, Olympia.

Hargis, C.D.; Bissonette, J.A.; Turner, D.L. 1999. The influence of forest fragmentation and landscape pattern on American martens. Journal of Applied Ecology 36:157-172.

Hayes, G. E., and J. C. Lewis. 2006. Washington State Recovery Plan for the Fisher. Washington Department of Fish and Wildlife, Olympia. 62+ viii pp.

Hayward, G.D and J. Verner, tech. editors. 1994. Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins, CO: U.S. Departmetn of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 214 p. 3 Maps.

Hejl, S. J., K. R. Newlon, M. E. Mcfadzen, J. S. Young and C. K. Ghalambor. 2002. Brown Creeper (Certhia americana), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/669

Hickman, S. 1990. Evidence of edge species attraction to nature trails within deciduous forest. Natural Areas Journal 10:3-5.

Hodgman, Thomas P., Daniel J. Harrison, Donald D. Katnik, Kenneth D. Elowe. 1994. Survival in an Intensively Trapped Marten Population in Maine. The Journal of Wildlife Management, Vol. 58, No. 4 pp. 593-600.

Holland. D.C. 1994. The western pond turtle: habitat and history. Final report. U.S. Department of Energy, Bonneville Power Administration. Portland, OR.

Holmes, A. H., and G. R. Geupel. 2005. Effects of trail width on the densities of four species of breeding birds in chaparral. In C. J. Ralph, J. R. Sauer, and S. Droege, technical editors. Proceedings of the Third International Partners in Flight Conference. U.S. Forest Service General Technical Report PSW-GTR-191. Albany, California, USA.

Hornocker, M.G. and Hash, H.S. 1981. Ecology of the wolverine in northwestern Montana. Canadian Journal of Zoology. 59:1286-1301.

Hoving, Christopher L; Daniel J. Harrison, William B. Krohn, Ronald A. Joseph, Mike O'Brien. 2005. Broad-Scale Predictors of Canada Lynx Occurrence in Eastern North America. The Journal of Wildlife Management, Vol. 69, No. 2. pp. 739-751.

Interagency Grizzly Bear Committee. 2007. 2007 Briefing on the Interagency Grizzly Bear Recovery Program. 6 pp.

Johnson, Bruce K., John W. Kern, Michael J. Wisdom, Scott L. Findholt, John G. Kie. 2000. Resource Selection and Spatial Separation of Mule Deer and Elk during Spring. The Journal of Wildlife Management, Vol. 64, No, pp. 685-697 Stable URL: http://www.jstor.org/stable/3802738 . Accessed: 04/10/2011 18:35

Johnsgard, P.A. 1988. North American owls. Smithsonian Institution Press, Washington, D.C. USA.

Jones, Peter W. and Therese M. Donovan. 1996. Hermit Thrush (Catharus guttatus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/261doi:10.2173/bna.261

Kaczensky, P.; F. Knauer, B. Krze, M. Jonozovic, M. Adamic, H. Gossow. 2003. The impact of high speed, high volume traffic axes on brown bears in Slovenia. Biological Conservation 111 (2003) 191–204.

Kaseloo PA. 2006. Synthesis of noise effects on wildlife populations. IN: Proceedings of the 2005 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 33-35.

Kasworm Wayne F. and Timothy L. Manley. 1989. Road and Trail Influences on Grizzly Bears and Black Bears in Northwest Montana Bears: Their Biology and Management, Vol. 8, A Selection of Papers from the Eighth International Conference on Bear Research and Management, Victoria, British Columbia, Canada, February 1989 (1990), pp. 79-84.

Keller, Irene and Carlo R. Largiader. 2003. Recent Habitat Fragmentation Caused by Major Roads Leads to Reduction of Gene Flow and Loss of Genetic Variability in Ground Beetles. Proceedings: Biological Sciences, Vol. 270, No. 1513 (Feb. 22, 2003), pp. 417-423. Published by: The Royal Society. Stable URL: http://www.jstor.org/stable/3558663.

Kertha, Gerald and Melber, Markus. 2009. Species-specific barrier effects of a motorway on the habitat use of two threatened forest-living bat species. Biological Conservation 142 (2009) 270-279.

Kerwin, Anthony E2011. Conservation Assessment for the Mardon Skipper (Polites mardon), version 2.0. USDA and USDI.

Kerwin, Anthony E. and Huff, Rob. 2007. Conservation Assessment for the Mardon Skipper (Polites mardon), version 1.0. USDA and USDI.

Kingery, Hugh E. and Cameron K. Ghalambor. 2001. Pygmy Nuthatch (Sitta pygmaea), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/567

Kirk, T. A.; Zielinski, W.J. 2009. Developing and testing a landscape habitat suitability model for the American marten (Martes americana) in the Cascades mountains of California. Landscape Ecology 24:759-773.

Knight, R. R., Blanchard B. M., Eberhardt L. L. 1988. Mortality Patterns and Population Sinks for Yellowstone Grizzly Bears, 1973-1985 Wildlife Society Bulletin, Vol. 16, No. 2 , pp. 121-125.

Knutson, K.L. and V.L. Naef. 1997. Management recommendations for Washington's priority habitats-riparian. WDFW. Olympia, Wa.

KOEHLER GARY M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology 68:845-851.

Koehler, G. M., and K. B. Aubrey. 1994. Pages 74-98 in L. F. Ruggiero, K. B. Aubrey,S . W. Buskirik,L . J. Lyon, and W. J. Zielinski, editors. The scientific basis for conserving forest camivores: American marten, fisher, lynx, and wolverine in the western United States. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-254, Washington, D.C., USA.

Koehler, G. M., and J.D. Brittell. 1990. Managing spruce-fir habitat for lynx and snowshoe hares. Journal of Forestry 88:10-14.

KOEHLER, GARY M., BENJAMIN T. MALETZKE, JEFF A. VON KIENAST, KEITH B. AUBRY, ROBERT B. WIELGUS, ROBERT H. NANEY. 2007. Habitat Fragmentation and the Persistence of Lynx Populations in Washington State. Journal of Wildlife Management _ 72(7) pp.1518-1524.

Kolbe et al, 2007. The effect of snowmobile trails on coyote movements within lynx home ranges.

Kramer-Schadt, S., Revilla, E., Wiegand, T. and Breitenmoser, U. 2004. Fragmented landscapes, road mortality and patch connectivity: modelling influences on the dispersal of Eurasian lynx. Journal of Applied Ecology 41, 711–723. Bwell Publishing, Ltd.

Krapu, Gary L.; Facey, Douglas E.; Fritzell, Erik K.; Johnson, Douglas H. 1984. Habitat use by migrant sandhill cranes in Nebraska. Journal of Wildlife Management. 48(2): 407-417.

John Krebs, Eric C. Lofroth, Ian Parfitt. 2007. Multiscale Habitat Use by Wolverines in British Columbia, Canada. The Journal of Wildlife Management, Vol. 71, No. 7 (Sep., 2007), pp. 2180-2192 URL: http://www.jstor.org/stable/4496328 .Accessed: 28/09/2011 16:12

Jones, Peter W. and Therese M. Donovan. 1996. Hermit Thrush (Catharus guttatus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/261

Krebs, John, Eric Lofroth, Jeffrey Copeland, Vivian Banci, Dorothy Cooley,Howard Golden, Audrey Magoun, Robert Mulders, Brad Shults. 2004. Synthesis of Survival Rates and Causes of Mortality in North American Wolverines. The Journal of Wildlife Management, Vol. 68, No. 3 pp. 493-502

LALIBERTE, ANDREA S. and WILLIAM J. RIPPLE. 2004. Range Contractions of North American Carnivores and Ungulates. BioScience, 54(2):123-138.

Lamberson, Roland H., Robert McKelvey, Barry R. Noon and Curtis Voss. 1992. A Dynamic Analysis of Northern Spotted Owl Viability in a Fragmented Forest Landscape. Conservation Biology Vol. 6, No. 4 (Dec., 1992), pp. 505-512

Lawson, E. J. G., and A. R. Rodgers. 1997. Differences in home range size computed in commonly used software programs. Wildlife Society Bulletin 25:721-729.

Lewis, Jeffrey C., Happe, Patti J., Jenkins, Kurt J. and David J Manson. 2011. Olympic Fisher Reintroduction Project: 2010 Progress Report. Washington Department of Fish and Wildlife, Olympia, and Olympic National Park. 24 p.

Lewis, J. C, and D. W. Stinson. 1998. Washington State status report for the fisher. Wash. Dept. Fish and Wildl., Olympia. 64 pp.

Lewis, J. C. and G. E. Hayes. 2004. Feasibility assessment for reintroducing fishers to Washington. Washington Department Fish and Wildlife, Olympia. 70 pp.

Lewis, J. C. and D. Kraege. 2004. Harlequin duck. Pages 5-1 to 5-4 in E. Larsen, J. M. Azerrad, N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia, WA.

Linders, Mary J. and Derek W. Stinson. 2007. State of Washington Western gray squirrel recovery plan. Washington Department of Fish and Wildlife. Olympia, Wa.

Litvaitis, J.A., J.A. Sherbourne, and J.A. Bissonette. 1985. Influence of understory characteristics on snowshoe hare habitat use and density. Journal of Wildlife Management. 49:866-873.

Lofroth, E. 2001: Wolverine ecology in plateau and foothill landscapes, 1996-2001. 2000/01 Year end report, northern wolverine project. - Forest Renewal Activity No. 712260, Ministry of Environment, Lands and Parks, Victoria, B.C., 98 pp.

Lofroth, E.C., C.M. Raley, J.M. Higley, R.L. Truex, J.S. Yaeger, J.C. Lewis, P.J. Happe, L.L. Finly, R.H. Naney, L.J. Hale, A.L. Krause, S.A. Livingston, A.M. Myers, and R.N. Brown. 2010. Conservation of Fishers (Martes pennanti) in South-Central British Columbia, Western Washington, Western Oregon, and California- Volume 1: Conservation Assessment. USDI Bureau of Land Management, Denver, Colorado, USA.

Lovich, J. E., and D. Bainbridge. 1999. Anthropogenic degradation of the southern California desert ecosystem and prospects for natural recovery and restoration. Environmental Management 24:309–326.

Lowther, P. E., C. Celada, N. K. Klein, C. C. Rimmer and D. A. Spector. 1999. Yellow Warbler (Setophaga petechia), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/454 doi:10.2173/bna.454

Luckenbach, R. A., and R. B. Bury. 1983. Effects of off-road vehicles on the biota of the Algodones Dunes, Imperial County, California. Journal of Applied Ecology 20:265–286.

Macdougall-Shackleton, Scott A., Richard E. Johnson and Thomas P. Hahn. 2000. Gray-crowned Rosy-Finch (Leucosticte tephrocotis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/559 doi:10.2173/bna.559

Mace, R.D., Waller, J.S., Manley, T.L., Lyon, J. and Zuuring, H. 1996. Relationships among grizzly bears, roads and habitat in the Swan Mountains, Montana. Journal of Applied Ecology 33:1395-1404.

Mace, R. D., and J. S. Waller. 1996. Grizzly Bear Distribution and Human Conflicts in Jewel Basin Hiking Area, Swan Mountains, Montana. Wildlife Society Bulletin. Vol.25, No. 3. pp 461-467.

Mace, R. D., and J. S. Waller. 1998. Demography and trend of grizzly bears in the Swan Mountains, Montana. Conserv. Bio. 12:1005-1016.

Mace, R.D., Waller, J.S., Manley, T.L., Ake, K., and Wittinger, W.T. 1999. Landscape evaluation of grizzly bear habitat in western Montana. Conservation Biology Volume 13, No. 2, Pages 367–377.

Magoun, Audrey J. and Jeffrey P. Copeland. 1998. Characteristics of Wolverine Reproductive Den Sites. The Journal of Wildlife Management , Vol. 62, No. 4 (Oct., 1998), pp. 1313-1320

Marsh, D.M. 2007. Edge effects of gated and ungated roads on terrestrial salamanders. Journal of Wildlife Management 71(2):389-394.

Martin, S.K. and R.H. Barrett. Resting Site Selection by Marten at Sagehen Creek, California Author(s): Northwestern Naturalist, Vol. 72, No. 2 (Autumn, 1991), pp. 37-42 Published by: Society for Northwestern Vertebrate BiologyStable URL: http://www.jstor.org/stable/3536799 .Accessed: 08/11/2011 13:18

Mattson, D.J., Knight, R.R., Blanchard, B.M., 1987. The effects of development and primary roads on grizzly bear habitat use in Yellowstone National Park, Wyoming. Ursus 7, 259-273.

May, R., Landa, A., van Dijk, J., Linnell, J.D.C. & Andersen, R. 2006: Impact of infrastructure on habitat selection of wolverines Gulo gulo. - Wildl. Biol. 12: 285-295.

Mazur, K. M., and P. C. James. 2000. Barred owl (Strix varia). Account 508 in A. Poole and F. Gill, editors. Birds of North America. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington D.C., USA.

McKelvey, K. S., K. B. Aubrey, and Y. K. Ortega. 2000. History and distribution of lynx in the contiguous United States. Pages 207-264 in L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. Mckelvey, and J. R. Squires, technical editors. Ecology and conservation of lynx in the United States. University of Colorado, Boulder, USA.

McKelvey, K. S., Y. K. Ortega, G. M. Koehler, K. B. Aubry, and J. D.

Brittell. 2000b. Canada lynx habitat and topographic use patterns in north central Washington: a reanalysis. Pages 307–336 in L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires, editors. Ecology and conservation of lynx in the United States. University of Colorado Press, Boulder, USA.

McLellan, B.N., F.W. Hovey, R.D. Mace, J.G. Woods, D.W. Carney, M.L. Gibeau, W.L. Wakkinen, and W.F. Kasworm. 1999. Rates and causes of grizzly bear mortality in the interior mountains of British Columbia, Alberta, Montana, Washington, and Idaho. Journal of Wildlife Management 63: 911-920.

McLellan, B.N. and Shackleton, D.M. 1988. Grizzly bears and resource extration industries: effects of roads on behaviour, habitat use and demography. Journal of Applied Ecology, 25:451-460.

McShane, C., T. Hamer, H. Carter, G. Swartzman, V. Friesen, D. Ainley, R. Tressler, K. Nelson, A. Burger, L. Spear, T. Mohagen, R. Martin, L. Henkel, K. Prindle, C. Strong, and J. Keany. 2004. Evaluation report for the 5-year status review of the marbled murrelet in Washington, Oregon, and California. Unpublished report. EDAW, Inc. Seattle, Washington. Prepared for the U.S. Fish and Wildlife Service, Region 1. Portland, Oregon.

Mellen-McLean, Kim, Bruce G. Marcot, Janet L. Ohmann, Karen Waddell, Susan A. Livingston, Elizabeth A. Willhite, Bruce B. Hostetler, Catherine Ogden, and Tina Dreisbach. 2012. DecAID, the decayed

wood advisor for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon. Version 2.20. USDA Forest Service, Pacific Northwest Region and Pacific Northwest Research Station; USDI Fish and Wildlife Service, Oregon State Office; Portland, Oregon. http://www.fs.fed.us/r6/nr/wildlife/decaid/index.shtml

Mellen-McLean, Kim ISSSSP Fact sheets 2011.MIS Information Sheet. Pileated Woodpecker (Dryocopus pileatus).

Merkle, W. W. 2002. Recreational trail-use effects on American robin (Turdus migratorius) and yellow warbler (Dendroica petechia) nesting ecology and behavior. Dissertation, University of Colorado, Boulder, USA.

Middleton, Alex L. 1998. Chipping Sparrow (Spizella passerina), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/334

Mowat, G., K.G. Poole, and M.O'Donoghue. 2000. Ecology of lynx in northern Canada and Alaska. Pg. 265-306 in L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, L.S. McKelvey, and J.R. Squires, editors. Ecology and conservation of lynx in the United States. University of Colorado Press, Boulder, USA.

Miller, J. R., and N. T. Hobbs. 1998. Recreational trails, human activity, and nest predation in lowland riparian areas. Landscape and Urban Planning 50:227–236.

Mladenoff , DJ, Sickley, TA, Haight, RG, Wydeven, AP. A regional landscape analysis of favorable gray wolf habitat in the northern Great Lakes region. Conserv Biol 1995; 9:279–94.

Munger, J.C., Barnett, B.R., and Novak, S.J. 2003. IMPACTS OF OFF-HIGHWAY MOTORIZED VEHICLE TRAILS ON THE REPTILES AND

VEGETATION OF THE OWYHEE FRONT. TECHNICAL BULLETIN NO. 03-3 IDAHO BUREAU OF LAND MANAGEMENT FEBRUARY 2003.

Munzing, D. and Gaines, W.L. 2008. MONITORING AMERICAN MARTEN ON THE EAST-SIDE OF THE NORTH CASCADES OF WASHINGTON. NORTHWESTERN NATURALIST 89:67–75.

Nagorsen, D.W. and R.M. Brigham. 1993. Bats of British Columbia. Royal British Columbia Museum Handbook. UBC Press. Vancouver.

NatureServe. 2008. NatureServe Explorer: the Online Encyclopedia of Life.

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: February 2, 2010).

NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 2, 2012).

NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: May 1, 2012).

Naylor, Leslie M., Wisdom, Michael J., Anthony, Robert G. 2009. Behavioral Responses of North American Elk to Recreational Activity. JOURNAL OF WILDLIFE MANAGEMENT 73(3):328–338; 2009). DOI: 10.2193/2008-102

Nelson, S.K., and T.E. Hamer. 1995. Nest success and the effects of predation on marbled murrelets. Pp. 89-97. In: Ecology and conservation of the marbled murrelet (C.J. Ralph, G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt, eds). U.S. Forest Service, Gen.Tech. Rep. PSW-GTR-152, Albany, California.

Nordstrom, N. and M. Whalen. 1997. Striped whipsnake. Pages 9-1 to 9-7 in E. M. Larsen, ed. Management Recommendations for Washington's Priority Species, Volume III: Amphibians and Reptiles. Wash. Dept. Fish and Wildl., Olympia, WA.

Nordstrom, N. and R. Milner. 1997. Larch mountain salamander. Pages 3-1 to 3-8 in E. M. Larsen, ed. Management Recommendations for Washington's Priority Species, Volume III: Amphibians and Reptiles. Wash. Dept. Fish and Wildl., Olympia, WA.

Nordstrom, N., and K. Riener. 1997. California mountain kingsnake. Pages 7-1 to 7-5 in E. M. Larsen, ed. Management Recommendations for Washington's Priority Species, Volume III: Amphibians and Reptiles. Wash. Dept. Fish and Wildl., Olympia, WA.

Nordstrom, N. and M. Whalen. 1997. Striped whipsnake. Pages 9-1 to 9-7 in E. M. Larsen, ed. Management Recommendations for Washington's Priority Species, Volume III: Amphibians and Reptiles. Wash. Dept. Fish and Wildl., Olympia, WA.

Norling, Bradley S.; Anderson, Stanley H.; Hubert, Wayne A. 1992. Roost sites used by sandhill crane staging along the Platte River, Nebraska. The Great Basin Naturalist. 52(3): 253-261. [20102]

North Cascades Grizzly Bear Management Subcommittee. 1998. Access management in the North Cascades Grizzly Bear Ecosystem. Hard copy.

Noss, Reed, F., Howard B. Quigley, Maurice G. Hornocker, Troy Merrill, Paul C. Paquet . 1996. Conservation Biology and Carnivore Conservation in the Rocky Mountains. Conservation Biology, Vol. 10, No. 4, pp. 949-963.

Okanogan Wenatchee National Forest. 2011. Status of Management Indicator Species on the Okanogan and Wenatchee National Forests.

Ortega, Y.K., and Capen, D.E. 2002. Roads as edges: effects on birds in forested landscapes. For. Sci. 48(2): 381–396.

Pease, J.L., R.H. Vowles, and L.B. Keith. 1979. Interaction of snowshoe hares and woody vegetation. Journal of Wildlife Management. 43:43-60.

Persson, Jens. 2005. Female wolverine (Gulo gulo) reproduction: reproductive costs and winter food availability. Canadian Journal of Zoology, 2005, 83:(11) 1453-1459.

Persson, Jens, Arild Landa, Roy Andersen, Peter Segerström. 2006. Reproductive Characteristics of Female Wolverines (Gulo gulo) in Scandinavia.Journal of Mammalogy, Vol. 87, No. 1 (Feb., 2006), pp. 75-79.

Person, D., Russell, A. 2009. Reproduction and den site selection by wolves in a disturbed landscape. Northwest Science 83:211-224.

Poole, K.G., L.A. Wakelyn and P.N. Nicklen. 1996. Habitat selection by lynx in the Northwest Territories. Can.J.Zool 74:845-850.

Potter A., Fleckenstein J., Richardson S., and D. Hays. 1999. Washington State Status Report for the Mardon Skipper. Washington Department of Fish and Wildlife, Olympia. 39pp.

Powell, R. A. and W. J. Zielinski. 1994. Fisher. Pages 38-73 in L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L.J. Lyon, and W. J. Zielinski, editors. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-254. Powell, S. M., E. C. York, J. J. Scanlon, T. K. Fuller.

Potvin, F.; Belanger, L.; Lowell, K. 2000. Marten habitat selection in a clearcut boreal landscape. Conservation Biology 14:844-857.

Preisler, Haiganoush K., Ager, Alan A., and Michael J. Wisdom. 2006. Statistical methods for analyzing responses of wildlife to human disturbance. Journal of Applied Ecology 43, 164-172.

PROCTOR, M., B. N. MCLELLAN, AND C . STROBECK. 2002. Population fragmentation of grizzly bears in south-eastern British Columbia, Canada. Ursus 13:153-160.

Puchlerz, T. and Servheen, C. 1994. Interagency Grizzly Bear Committee (IGBC) Taskforce Report on Grizzly Bear/Motorized Access Management. Hard copy.

Pyle, R. M. 1992. The Audubon Society: Field Guide to North American Butterflies. Alfred A. Knopf, New York. Seventh printing. 924 p.

Pyle, Robert M. 2002. The butterflies of Cascadia. Seattle Audbon Society. 420 pp
Reed, R.A., Johnson-Barnard, J. and Baker, B.L. 1996. Contribution of Roads to Forest Fragmentation in the Rocky Mountains. Conservation Biology, Vol. 10, No. 4 pp. 1098-1106.
Reed, Sarah E. And Adina M. Merenlender. 2008. Quiet, nonconsumptive recreation reduces protected area effectiveness. Conservation Letters 1 (2008) 146-154. Wiley Periodicals, Inc.
REYNOLDS-HOGLAND, MELISSA J. AND MITCHELL, MICHAEL S. 2007. EFFECTS OF ROADS ON HABITAT QUALITY FOR BEARS IN THE SOUTHERN APPALACHIANS: A LONG-TERM STUDY. Journal of Mammalogy, 88(4):1050–1061.
Rice, C.G. and D. Gay. 2010. Effects of mountain goat harvest on historic and contemporary populations. Northwest Naturalist. 91:40–57.
Rice, C.G. 2008. Status of Mountain Goats in Washington. Unpublished report. Washington Department of Fish and Wildlife.
Rich, A. C., D. S. Dobkin, and L. J. Niles. 1994. Defining forest fragmentation by corridor width: the influence of narrow forest-dividing corridors on forest-nesting birds in southern New Jersey. Conservation Biology 8:1109–1121.
Robertson, Gregory J. and R. Ian Goudie. 1999. Harlequin Duck (Histrionicus histrionicus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/466 doi:10.2173/bna.466
Robitaille, J. F., and K. Aubry. 2000. Occurrence and activity of American martens (Martes americana) in relation to roads and other routes. Acta Theriologica 45:137–143.
Roever, C.L., Boyce, M.S., and Stenhouse, G.B. 2008. Grizzly bears and forestry II. Grizzly bear habitat selection and conflicts with road placement. Forest Ecology and Management 256 (2008) 1262-1269.
Roever, C.L., Boyce, M.S., and Stenhouse, G.B. 2008. Grizzly bears and forestry I. Road vegetation and placement as an attractant to grizzly bears. Forest Ecology and Management 256 (2008) 1253-1261.
Mary M. Rowland, Michael J. Wisdom, Douglas H. Johnson, Barbara C. Wales, Jeffrey P. Copeland and Frank B. Edelmann. 2003. Evaluation of Landscape Models for Wolverines in the Interior Northwest, United States of America. Journal of Mammalogy Vol. 84, No. 1 (Feb., 2003), pp. 92-105. Published by: American Society of Mammalogists Article Stable URL: http://www.jstor.org/stable/1383637
Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada lynx conservation assessment and strategy. Second edition. U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, and U.S. National Park Service. U.S. Forest Service Publication #R1 - 00-53, Missoula, Montana, USA.
Ruggiero, Leonard F.; Aubry, Keith B.; Buskirk, Steven W.; Koehler, Gary M.; Krebs, Charles J.; McKelvey, Kevin S.; Squires, John R. Ecology and conservation of lynx in the United States. General Technical Report RMRS-GTR-30WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Available at: http://www.fs.fed.us/rm/pubs/rmrs_gtr030.html
Ruggiero, Leonard F.; Aubry, Keith B.; Buskirk, Steve W.; Lyon, L. Jack; Zielinski, William J. tech. eds. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx and Wolverine in the Western United States. Gen Tech. Rep. RM-254. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky mountain Forest and Range Experiment Station. 184 p.
Rusch, Donald H., Stephen Destefano, Michael C. Reynolds and David Lauten. 2000. Ruffed Grouse (Bonasa umbellus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/515 doi:10.2173/bna.515

SELANDER, R.K., AND D.W. KAUFMAN. 1975. Genetic structure of populations of the brown snail Helix aspera. I. Microgeographic variation. Evolution 29:385–401.
Servhee, C. and M. Cross. 2010. Climate change impacts on grizzly bears and wolverines in the Northern U.S. and Transboundary Rockies:Strategies for Conservation. Report on a workshop held Sept. 13-15, 2010 in Fernie, British Columbia. 23 pp.
Shine, R., M. Lemaster, M. Wall, T. Langkilde, and R. Mason. 2004. Why did the snake cross the road? Effects of roads on movement and location of mates by garter snakes (Thamnophis sirtalis parietalis). Ecology and Society 9(1): 9. [online] URL: http://www.ecologyandsociety.org/vol9/iss1/art9
Sibley, D. A. 2000. National Audubon Society: The Sibley Guide to Birds. National Audubon Society. Chanticleer Press Edition. Alfred A. Knopf, New York. 543 p.
Singleton, P.H, Gaines, W.and Lehmkuhl, J.F. 2002. Landscape permeability for large carnivores in Washington: a geographic information system weighted-distance and least-cost corridor assessment. USDA Forest Service. Pacific Northwest Research Station. PNW-RP-549.
Slauson, K. M.; Zielinski, W.J.; Hayes, J.P. 2007. Habitat selection by American martens in coastal California. Journal of Wildlife Management 71:458–468.
Slauson, K. M.; Zielinski, W.J. 2009. Characteristics of summer and fall diurnal resting habitat used by American martens in coastal northwestern California. Northwest Science 83:35-45.
Snyder, J.E.; Bissonette, J.A. 1987. Marten use of clear-cuttings and residual forest stands in western Newfoundland. Canadian Journal of Zoology 65:169-174.
Soutiere, E.C. 1979. Effects of timber harvesting on marten in Maine. Journal of Wildlife Management 43:850-860.
Spahr, R., L. Armstrong, D. Atwood, and M. Rath. 1991. Threatened, endangered, and sensitive species of the Intermountain Region. U.S. Forest Service, Ogden, Utah.
SPINKS, PHILLIP Q. and H. BRADLEY SHAFFER. 2005. Range-wide molecular analysis of the western pond turtle (Emys marmorata): cryptic variation, isolation by distance, and their conservation implications. Molecular Ecology (2005) 14, 2047–2064.
JOHN R. SQUIRES, NICHOLAS J. DECESARE, JAY A. KOLBE, LEONARD F. RUGGIERO, 2010. Lynx in Managed Forests of the Northern Rocky Mountains. Journal of Wildlife Management 74(8):1648–1660; 2010; DOI: 10.2193/2009-184
SQUIRES, JOHN R., NICHOLAS J. DECESARE, JAY A. KOLBE, LEONARD F. RUGGIERO. 2008. Hierarchical Den Selection of Canada Lynx in Western Montana. JOURNAL OF WILDLIFE MANAGEMENT 72(7):1497–1506.
Staples, W.R. 1995. Lynx and coyote diet and habitat relationships during a low hare population on the Kenai Peninsula, Alaska. M.S. Thesis, Univ. of Alaska, Fairbanks.
Stinson, D. W. and J. C. Lewis. 1998. Draft Washington state status report for the fisher. Unpublished Report. Washington Dept. of Fish & Wildlife, Olympia. 64pp.
St. John, A. 2002. Reptiles of the Northwest. Lone Pine Publishing. Edmonton, Alberta. 272 p.
Steenhof, Karen. 1998. Prairie Falcon (Falco mexicanus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/346 doi:10.2173/bna.346
Sterling, John C. 1999. Gray Flycatcher (Empidonax wrightii), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/458 doi:10.2173/bna.458
Stinson, D. W. 2001. Washington state recovery plan for the lynx. Washington Department of Fish and Wildlife, Olympia, Washington. 78 pp. + 5 maps.
Swihart RK, Slade N. 1984. Road crossing in Sigmodon hispidus and Microtus ochrogaster. J Mammal 65:357–360.

Taylor, Richard B. THE EFFECTS OF OFF-ROAD VEHICLES ON ECOSYSTEMS. Texas Parks and Wildlife. Unpublished.

The Wilderness Society. 2006. Addressing the ecological effects of off-road vehicles (ORV's). Science and Policy Brief 3: 1-16.

Thomas, J.W.; Raphael, M.G.; Anthony, R.G.; Forsman, E.D.; Gunderson, A.G.; Holthausen, R.S.; Marcot, B.G.; Reeves, G.H.; Sedell, J.R.; Solis, D.M. 1993. Viability assessments and management considerations for species associated with late-successional and oldgrowth forests of the Pacific Northwest. Washington, DC: U.S. Department of Agriculture, Forest Service, U.S. Government Printing Office. 530 p.

Thompson, I.D. 1994. Marten populations in uncut and logged boreal forests in Ontario. Journal of Wildlife Management 58:272–280.

THOMPSON, I.D. AND Colgan, P.W. Numerical responses of martens to a food shortage in Northcentral Ontario. 1987 J. WILDL. MANAGE. 51(4):824-835

Trombulak, Stephen C. and Christopher A. Frissell. 2000 Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology, Vol. 14, No. 1 . pp. 18-30.

Tomback, Diana F. 1998. Clark's Nutcracker (Nucifraga columbiana), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/331 doi:10.2173/bna.331

TULL, JOHN C and PETER F. BRUSSARD. 2006. Fluctuating Asymmetry as an Indicator of Environmental Stress From Off-Highway Vehicles. The Journal of Wildlife Management 71(6).

U.S. Department of Agriculture.1994. Flammulated, boreal, and great gray owls in the United States: a technical conservation assessment. GTR RM-253. Rocky Mountain Forest and Range Experiment Station and Rocky Mountain Region.

U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management [USDA and USDI]. 1994a. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. Standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl.

USDA and USDI. 1994b. Final Supplemental Environmental Impact Statement on management of habitat for late-successional and old-growth related species within the range of the northern spotted owl (Northwest Forest Plan). USDA Forest Service and USDI Bureau of Land Management. Portland, OR. February 1994.

USDA Forest Service. 2007. Butterflies and moths of Pacific Northwest forests and woodlands: Rare, Endangered, and Management-Sensitive species. Jeffery C. Miller, Paul C. Hammond. Forest Health Technology Enterprise Team. Technology Transfer Species Identification. FHTET-2006-07. 234 pp.

U.S. Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, MT 181 pp.

U.S. Fish and Wildlife Service. 1997. Grizzly bear recovery plan. Supplement: North Cascades Ecosystem Recovery Plan Chapter. Missoula, MT 24 pp.

U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Threatened Marbled Murrelet (Brachyramphus marmoraturs) in Washington, Oregon, and California. Portland, Oregon. 203 pp.

U.S. Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; 12-month Finding for a Petition to List the West Coast Distinct Population Segment of the Fisher. 50 CFR Part 17. Federal Register / Vol. 69, No. 68 / Thursday, April 8, 2004

U.S. Fish and Wildlife Service. 2010. Draft revised recovery plan for the northern spotted owl, Strix occidentalis caurina. U.S. Fish and Wildlife Service, Portland, Oregon. xii + 163 pp

U.S. Fish and Wildlife Service. 2011. Revised Recovery Plan for the Northern Spotted Owl (Strix occidentalis caurina). U.S. Fish and Wildlife Service, Portland, Oregon. xvi + 258 pp.

U.S. Forest Service and U.S. Fish and Wildlife Service. 2000. Canada lynx conservation agreement. U.S. Forest Service Agreement #00-MU- 11015600-013, Washington, D.C., USA.
U.S. Forest Service. Snoqualmie Pass AMA.
Found at O:\NFS\OkanoganWenatchee\Project\CLE\AMA1997\Planning\FinalDocument
U.S. Fish and Wildlife Service. 2000. Determination of threatened status for the contiguous U.S. distinct population segment of the Canada lynx and related rule; final rule. Federal Register 65:16051–16086.
USFWS (U.S. Fish and Wildlife Service). 2008a. Endangered and threatened wildlife and plants; final rule designating the Northern Rocky Mountain population of gray wolf as a distinct population segment and removing this distinct population segment from the federal list of endangered and threatened wildlife. Federal Register 73(39):10514-10560.
U.S. Fish and Wildlife Service. 2008. Final recovery plan for the northern spotted owl, Strix occidentalis caurina. U.S. Department of Interior, Portland, Oregon, USA.
U.S.Fish and Wildlife Service web page. Grizzly bear recovery home page: North Cascades. http://www.fws.gov/mountain%2Dprairie/species/mammals/grizzly/cascades.htm
Accessed December 10, 2009.
VAN ZYLL DE JONG, C. G. 1975. The distribution and abundance of the wolverine (Gulo gulo) in Canada. Can. Field-Nat. 89: 431-437.
VASHON, JENNIFER H., AMY L. MEEHAN, JOHN F. ORGAN, WALTER J. JAKUBAS, CRAIG R. MCLAUGHLIN, ADAM D. VASHON, SHANNON M. CROWLEY, 2007. Diurnal Habitat Relationships of Canada Lynx in an Intensively Managed Private Forest Landscape in Northern Maine The Journal of Wildlife Management _ 72(7):1488-1496.
Walker, Carly Jane. 2005. Influences of landscape structure on snowshoe hare populations in fragmented forests. MS thesis. The University of Montana.
Waller J. S. and C. Servheen. 2005. Effects of transportation infrastructure on grizzly bears in Northwestern Montana. Journal of Wildlife Management 69:985-1000.
Washington Department of Fish and Wildlife (WDFW). 2006. Washington State Elk Herd Plan: Colockum Elk Herd. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA. Available online at: http://wdfw.wa.gov/publications/00770/wdfw00770.pdf
Washington Department of Fish and Wildlife (WDFW). 2008. 2009-2015 Game Management Plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA. Available online at: http://wdfw.wa.gov/publications/00433/wdfw00433.pdf
WDFW. 2011 Annual Report. (larch mtn salamander).
WDFW. 2011 Annual Report. (striped whipsnake)
WDFW (Washington Department of Fish and Wildlife). 2009. DRAFT Environmental Impact Statement (DEIS) for the Wolf Conservation and Management Plan for Washington. Washington Department of Fish and Wildlife, Olympia, Washington. 259 pp.
Washington Department of Fish and Wildlife. 2010. 2010 Game status and trend report. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA.
Washington Department of Fish & Wildlife. Web. 28 Feb. 2012. "Mountain Goat Ecology: Population Models | Washington Department of Fish & Wildlife." <http://wdfw.wa.gov/conservation/research/projects/mtn_goat/population_models/
Washington Wildlife Habitat Connectivity Working Group. 2010. Washington Connected Landscapes Project: Statewide Analysis. Washington Departments of Fish and Wildlife, and Transportation, Olympia, WA.
Webb, Shevenell M, and Boyce Mark S. 2009. Marten Fur Harvests and Landscape Change in West-Central Alberta. JOURNAL OF WILDLIFE MANAGEMENT 73(6):894–903.

Wiens, J. A., J. T. Rotenberry, and B. Van Horne. 1986. A lesson in the limitation of field experiments: shrubsteppe birds and habitat alteration. Ecology 67:365-376.
Richard D. Weir and Fraser B. Corbould. 2006. Density of Fishers in the Sub-Boreal Spruce Biogeoclimatic Zone of British Columbia. Northwestern Naturalist, Vol. 87, No. 2 (Autumn, 2006), pp. 118-127.
Richard D. Weir and Fraser B. Corbould. 2007. Factors Affecting Diurnal Activity of Fishers in North-central British Columbia. Journal of Mammalogy: December 2007, Vol. 88, No. 6, pp. 1508-1514.
Weir, R.W., and F.B. Corbould. 2008.Ecology of fishers in the Sub-boreal forests of north-central British Columbia, Final Report. Peace/Williston Fish and Wildlife Compensation Program Report No. 315. 178 pp plus appendices.
Weir, R., F. Corbould, and A. Harestad. 2004. Chapter 9?effect of ambient temperature on the selection of rest structures by fishers. Pp. 187-197 in Martens and fishers (Martes) in human-altered environments: an international perspective (D. J. Harrison, A. K. Fuller, and G. Proulx, eds.). Springer Science-f-Business Media, New York.
Weir, R.D., A. S. Harestad, and R. C. Wright. 2005. Winter diet of fishers in British Columbia. Northwestern Naturalist 86:12-19.
Whittington, J., C.C. St.Clair and G. Mercer. 2004. Path tortuosity and the permeability of roads and trails to wolf movement. Ecology and Society 9(1):4.
Michael J. Wisdom, Lisa J. Bate. 2008. Snag density varies with intensity of timber harvest and human access, Forest Ecology and Management, Volume 255, Issue 7, 20 April 2008, Pages 2085-2093, ISSN 0378-1127, 10.1016/j.foreco.2007.12.027. (http://www.sciencedirect.com/science/article/pii/S0378112707009292)
Wisdom, Michael J., Alan A. Ager, Haiganoush K. Preisler, Norman J. Cimon, and Bruce K. Johnson. 2004. Effects of off-road recreation on mule deer and elk. Pp. 531-550 in, Transactions of the 69th North American Wildlife and Natural Resources Conference.
Wisdom, M.J.; Holthausen, R.S.; Wales, B.C. [et al.]. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. Gen. Tech. Rep. PNW-GTR-485. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; U.S. Department of the Interior, Bureau of Land Management. 3 vol. (Quigley, T.M., tech. ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).
Wolff, J.O. 1980. The role of habitat patchiness in the population dynamics of snowshoe hares. Ecological Monographs 50:111-130.
K.Woodruff, pers.comm. 2/14/12. Williamson's sapsucker in birds and burning project.
Woodruff, Kent, pers. Comm. 7/3/12. Meadow frittilary.
Wright, A. L., G. D. Hayward, S. M. Matsuoka and P. H. Hayward. 1998. Townsend's Warbler (Setophaga townsendi), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/333doi:10.2173/bna.333
Yost, A.C. and R.G. Wright. 2001. Moose, caribou, and grizzly bear distribution in relation to road traffic in Denali National Park, Alaska. Arctic. Vol. 54. No. 1. P. 41-48.
Youkey, Don. 2011. Status of Management Indicator Species On the Okanogan and Wenatchee National Forests. April 2011
Zharikov, Y., David B. Lank., Falk Huettmann, Russell W. Bradley, Nadine
Parker, Peggy P.-W. Yen, Laura A. Mcfarlane-Tranquilla. and Fred Cooke. 2006. Habitat selection and breeding success in a forest-nesting Alcid, the marbled murrelet, in two landscapes with different degrees of forest fragmentation. Landscape Ecology (2006) 21:107–120.
Zielinski, W. J., N. P. Duncan, E. C. Farmer, R. L. Truex, A. P. Clevenger, and R. H. Barrett. 1999. Diet of fishers (Martes pennanti) at the southernmost extent of their range. J. Mammalogy 80:961-971.

Zielinski, W. J.; Slauson, K.M.; Carroll, C.; Kent, C.; Kudrna, D. 2001. Status of American martens in coastal forests of the Pacific states. Journal of Mammalogy 82:478–490.

Zielinski, William J.; Richard L. Truex, Gregory A. Schmidt, Fredrick V. Schlexer, Kristin N. Schmidt and Reginald H. Barrett. Home Range Characteristics of Fishers in California Journal of Mammalogy , Vol. 85, No. 4 (Aug., 2004), pp. 649-657.

Zielinski, William J., Slauson, Keith M., and Bowles, Ann E. 2008. Effects of off-highway vehicle use on the American Marten Journal of Wildlife Management. Volume 72, issue 7. p 1558-1571.

Zwickel, Fred C. and James F. Bendell. 2005. Blue Grouse (Dendragapus obscurus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/015 doi:10.2173/bna.15

Botany

USDA Forest Service. 2011. Region 6 Regional Forester's Special Status Species list. FSM 2670-1950.

USDA Forest Service. 2001. Record of Decision and Standards for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines and December 2003 Species List.

Memorandum May 2014: Direction Regarding the Survey and Manage Standards and Guidelines. FSM 2670-1950.U.S. Fish and Wildlife Service. 2004. Recovery plan for Sidalcea oregana var. calva (Wenatchee Mountains Checker-mallow). U.S. Fish and Wildlife Service, Portland, Oregon. x + 52 pp.

The Effects of Off Road Vehicles on Ecosystems; Taylor, Richard B. Retrieved March 27, 2010, from the Texas Parks and Wildlife Department Web site: http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_rp_t3200_1081.pdf

Ouren, D.S., Haas, Christopher, Melcher, C.P., Stewart, S.C., Ponds, P.D., Sexton, N.R., Burris, Lucy, Fancher, Tammy, and Bowen, Z.H., 2007, Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey, Open-File Report 2007-1353, 225 p.

Farmer, Andrew M., 1991. The Effects of Dust on Vegetation – A Review. Environmental Pollution 79 (1993) 63-75.

USDA Respect the River; http://www.fs.fed.us/rtr/; USDA Forest Service; April 2012.

Spellerburg, I.F., and Morrison, T., 1998. The ecological effects of new roads—A literature review: Wellington, New Zealand, New Zealand Department of Conservation, Technical Report, 55 p.

Norton, David A., Janice M. Lord, David R. Given and Peter J. De Lange. 1994. Over-Collecting: An Overlooked Factor in the Decline of Plant Taxa. Taxon, Vol. 43, No. 2, pp. 181-185

Wagner, Dr. David H. *1995.* A Rule of Thumb for Botanists: The 1 in 20 Rule. Oregon Flora On-Line Newsletter, Volume 1, Number 3. Oregon State University

Invasive Species

Christen, Douglas and Glenn Matlack., 2006, The Role of Roadsides in Plant Invasions: a Demographic Approach. Environmental and Plant Biology, Porter Hall, Ohio University, Athens, OH 45701, U.S.A.

Taylor, Kimberley, Jane Mangold, Lisa J. Rew., 2011, Weed Seed Dispersal by Vehicles, Montana State University Extension.

Ouren, D.S., Haas, Christopher, Melcher, C.P., Stewart, S.C., Ponds, P.D., Sexton, N.R., Burris, Lucy, Fancher, Tammy, and Bowen, Z.H., 2007, Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey, Open-File Report 2007-1353, 225 p.

D.N. Kimberling, C.G. Parks, B.J. Shanafelt, D.E. Knecht, E.J. DePuit. 2005. Appendix D PNW Causal Paper Potential; Potential Influences of Forest Service Land Management on Invasive Plant

Species in Pacific Northwest Forests and Rangelands: A Review; Preventing and Managing Invasive Plants Final Environmental Impact Statement April 2005; USDA. 32 p.
USDA, USFS, Region 6 Invasive Plant EIS. Retrieved from http://www.fs.fed.us/r6/invasiveplant-eis/plantinfo.htm.
Hulbert, L.C. 1988. Causes of fire effects in tallgrass prairie. Ecology 69:46-58.
Sans, F.X. and R.M. Masalles. 1995. Phenological patterns in an arable land weed community related to disturbance. Weed Research 35:312-332.
Milberg, G.P. and B.B. Lamont. 1995. Fire enhances weed invasion of roadside vegetation in southwestern Australia. Biological Conservation 73:45-49
Washington State Noxious Weed Control Board (WSNWCB). Retrieved from http://www.nwcb.wa.gov/ab_weedlaws.htm. 2012.

Economics and Environmental Justice

Bureau of Labor Statistics Consumer Price Index Inflation Calculator (http://data.bls.gov/cgi-bin/cpicalc.pl) (23 May).
Bureau of Labor Statistics Local Area Unemployment (http://data.bls.gov/cgi-bin/dsrv?la) (23 May).
Cordell, H. Ken. 1999. Framework for assessment. In H. Ken Cordell, comp., ed. Outdoor recreation in American life: a national assessment of demand and supply trends, Champaign, Illinois: Sagamore Publishing: II.
Hewings, Geoffrey J.D. 1989. Regional Input-Output Analysis. Beverly Hills: Sage Scientific Geography Series.
Stynes, D.J.; White, E. M. 2005. Spending profiles for national forest visitors. NVUM Four year Report. USDA Forest Service Pacific Northwest Inventory and Monitoring Institute and Michigan State University. Joint Venture Agreement # 10-JV-11130149-203.
Stynes, D.J.; White, E. M. 2010. Updated Spending profiles for national forest recreation visitors by activity. USDA forest service Pacific Northwest research station and Oregon state university. Joint Venture Agreement # 10-JV-11261955-018.
US Census Bureau, Census 2010, Fact Finder 2 (http://factfinder2.census.gov) (23 May).
US Census Bureau State and County Quick Facts (http://quickfacts.census.gov) (23 May).
White, E.M.; Stynes, D.J. 2008. National forest visitor spending averages and the influence of trip-type and recreation activity. Journal of Forestry 116(1): 17 – 24.

APPENDIX A
Present, Ongoing, and Reasonably Foreseeable Future Actions

Present and Ongoing Actions on National Forest System Land

Present and ongoing actions were considered in the cumulative effects analysis. There are many actions occurring at any given time on National Forest System land. Those that have a cumulative effect with the alternatives are discussed in the individual resource sections.

The main routine present and ongoing actions are listed below. Those that have a cumulative effect with the alternatives are discussed in the individual resource sections.

- Road Maintenance, including hazard tree removal
- Trail Maintenance
- Developed Campground Maintenance
- Respect the River (Improved Site) Maintenance
- Firewood and other Special Forest Products Gathering
- Livestock Grazing on Grazing Allotments
- Noxious Weed/Invasive Species Control
- Mining Operations
- Recreation and Non-Recreation Special Use Permits
- Fire Suppression

The following table includes information about specific ongoing projects on the Forest. While this includes the major ongoing projects, it is not meant to be an exhaustive list of current projects, but rather those that could have cumulative effects with the Travel Management alternatives.

Table A-1. Ongoing Actions on Okanogan Wenatchee National Forest

Restoration Projects	*Projects will improve forest health, and reduce fuel loading. Projects will comply with all Forest Plan standards and guidelines, and all laws, including the Endangered Species Act. Transportation System Management will be part of each project and will reduce open road density by closing some roads (maintenance level 1) and decommissioning others. Overall result will be a decrease in open road mileage in each project area.*	
Project Name	**Location**	**Project Details**
Teanaway Project	Cle Elum Ranger District	3,176 acres of silvicultural treatments, including 975 commercial thinning, 67 acres of precommercial thinning, 2,111 unburning, close 1.3 miles of road
Walter Springs	Cle Elum Ranger District	1,654 acres of silvicultural treatments, including 619 acres of commercial thinning, 17 acres precommercial thinning, 1,017 acres of unburning, closing 0.9 miles of unauthorized roads, and 1.7 miles of system road.

Table Mountain Fire Reforestation	Cle Elum Ranger District	Replant a portion of the Table Mountain Fire area, within Late Successional Reserve
Iron Thin	Cle Elum Ranger District	2,282 acres of silvicultural treatments, including 1,703 acres of commercial thinning, 439 acres of underburning, 140 acres of precommercial thinning
Moe Forest Restoration	Entiat Ranger District	1,414 acres of thinning, piling, pile burning, and underburning
Preston Fox	Entiat Ranger District	5,217 acres of prescribed burning, 1,137 acres of thinning.
Buck Forest and Fuels	Methow Valley Ranger District	Reduce surface and ladder fuels on 8,181 acres through commercial thinning, precommercial thinning, and prescribed burning, decommissioning or closing 40.7 miles of road
Glass Angel Restoration	Naches Ranger District	783 acres of commercial and precommercial thinning, 4,392 acres of fuels treatments
Baily Restoration	Tonasket Ranger District	2,938 acres of commercial treatments; 4,602 acres of non-commercial treatments; up to 6,002 acres of underburning, and 3.86 miles of roads would be decommissioned
Crawfish Restoration	Tonasket Ranger District	2,222 acres of commercial treatments and fuels reduction; 2,814 acres of non-commercial treatments including pre-commercial thinning, pruning, hand or machine piling, and underburning; add 17.7 miles of unauthorized road to the system, and decommission or close 25.8 miles of road, and improve approximately 39 stream crossings
Transportation System Management	*Project will reduce open road density by closing some roads (maintenance level 1) and decommissioning others. Overall result will be a decrease in open road mileage in the project area.*	
Project Name	**Location**	**Project Details**
Gold Creek Bridge Replacement	Cle Elum Ranger District	Replace the Gold Creek Bridge and repair Forest Road 4832.
Jack Creek Culvert Removal	Cle Elum Ranger District	Remove culvert on Forest Road 9738114 to restore fish passage. Relocate 855 feet of road away from occupied MCR steelhead habitat.
Forest Road 3300 Flood Repair	Cle Elum Ranger District	Restore road damaged by flood, and reconnect the floodplain.
Peshastin Chumstick Road Decommissioning	Wenatchee River Ranger District	Decommission 51.7 miles of road. Convert 11.7 miles of road to ATV trail.
Fuels Reduction/Management	*Projects will reduce fuel loading, improving forest health and reducing the risk of wildfire.*	
Project Name	**Location**	**Project Details**
Falls Coyote Fuels Reduction	Chelan Ranger District	5,394 acres of underburning, 850 acres of precommercial thinning, 483 acres of mechanical fuel treatment
Bear Mountain Fuels Reduction	Chelan Ranger District	1,000 acres of piling and burning
Forest Mountain Fuels Reduction	Chelan Ranger District	200 acres of thinning, piling and burning, and underburning; 1,798 acres of under burning, and 125 acres of commercial salvage logging
East Pine Zone Fuel Reduction	Entiat Ranger District	Complete prescribed burning on 6,820 acres.

East Pine Zone Non-Commercial thinning and Prescribed fire	Entiat Ranger District	Thin and prescribed burn 17,000 acres
Bannon Precommercial Thinning	Tonasket Ranger District	2013 – 205 acres; 2014 – 138 acres; 2015 – 291 acres; and 2016 – proposed 207 acres. 2015 to 2016- 26 acres treated
Recreation/Trails		
Project Name	**Location**	**Project Details**
Ken Wilcox Hazard Tree	Cle Elum Ranger District	Hazard trees will be felled in the 17-acre Ken Wilcox Horsecamp
Aquatic Habitat Restoration	*Projects will improve aquatic habitat in project area, and will comply with all forest plan standards and guidelines and applicable laws.*	
Project Name	**Location**	**Project Details**
Upper Cle Elum Floodplain Restoration	Cle Elum Ranger District	A combination of projects will improve fish habitat in the Cle Elum River. Engineered log jams and other habitat improvement structures will be installed. A 150-foot setback will be established for dispersed camping. Dispersed campsites in the floodplain will be decommissioned, others will have boundaries delineated. Dispersed campsites along another 18 mile stretch will be modified to protect riparian and late successional habitat. New parking and camping opportunities will be created on terraces elevated about the flood plain. Campsites within the floodplain will be decommissioned.
Chewuch River Restoration RM13-15	Methow Valley Ranger District	A series of fish habitat improvement projects in River Mile 13 to 15 of the Chewuch River. Improvements include engineered log jams, backwater channel enhancement, and cover habitat.
Mining Activities	*Plans of Operations submitted by claimants modified by mitigation to reduce environmental impacts*.	
Project Name	**Location**	**Project Details**
Holden Mine Remediation	Chelan Ranger District	Remediation actions at the Holden Mine.
Bossart Core Hole Drilling	Cle Elum Ranger District	Exploratory core drilling
Merry Widow, Golden Promise, McCoy and Southern Star	Cle Elum Ranger District	Approved individual mining plans of operation
Carlsen Blue Mining Project	Cle Elum Ranger District	6 contiguous mining claims totaling 120 acres, excavations and surface mining.

Reasonably Foreseeable Future Actions on National Forest System Land

The list of reasonably foreseeable future actions was compiled by consulting the Schedule of Proposed Actions for the Okanogan-Wenatchee National Forest, and by contacting neighboring Federal, State, and Local governments to obtain lists of future projects. Reasonable attempts were made to compile a complete list, but it is likely that some projects are not included because agencies did not respond, new projects have surfaced since publication of the Travel Management EA, or projects that were on hold were reactivated.

The following table includes the reasonably foreseeable future actions planned for the Okanogan-Wenatchee National Forest.

Table A-2. Reasonably Foreseeable Future Forest Service Projects on Okanogan-Wenatchee National Forest

Restoration Projects	*Projects will improve forest health, and reduce fuel loading. Projects will comply with all Forest Plan standards and guidelines, and all laws, including the Endangered Species Act. Transportation System Management will be part of each project and will reduce open road density by closing some roads (maintenance level 1) and decommissioning others. Overall result will be a decrease in open road mileage in each project area.*	
Project Name	**Location**	**Project Details**
Swauk Pine Restoration	Cle Elum Ranger District	Proposed action would treat 5,244 acres: harvest and underburn approximately 2300 acres, and underburn an additional 2,062 acres; thin 60 acres; protect legacy trees on 510 acres; riparian large wood enhancement 240 acres; and aspen regen/meadow enhancement w/prescribed fire 71 acres. Approximately 4.8 miles of maintenance level 1 road would be decommissioned; decommission 2.7 miles of currently open road; relocate 0.5 miles of a system jeep trail; change 1.1 miles from mixed use to jeep only; restore hill-climb area.
Upper Yakima Restoration	Cle Elum Ranger District	Watershed restoration project. Forest commercial and pre-commercial thinning designed to accelerate old growth forest structure, watershed restoration, road obliteration, and road to trail conversion.
South Summit Forest and Fuels II	Methow Valley Ranger District	Proposed action would manage vegetation on 11,635 acres, with a combination of commercial and precommercial thinning, regeneration harvest, and tree planting. Fuels would be treated on 9,900 acres, with a combination of piling and burning and underburning. 20 miles of road would be closed, and 68 miles of unauthorized road would be decommissioned.
Little Crow Restoration	Naches Ranger District	Proposed action would harvest approximately 6,500 acres, non-commercially thin 14,500 acres; prescribed burn up to 24,800 acres; plant 204 acres; supplement 5 miles of stream with large woody debris; improve 10 acres of streambank habitat; close or decommission 35 miles of system road; complete structural upgrades on 119 miles of road; treat invasive species on 2,500 acres; remove hazard trees from Little Naches Recreation Residence tract; improve Raven Roost trailhead; construct up to 3.4 miles of beginner level learner loops at Crow Creek Campground, Long Meadow, and/or Ponderosa Camp dispersed sites.
Microwave Project	Naches Ranger District	Project will restore 2900 acres of NFS land with commercial and non-commercial thinning, piling, and burning (850 acres)
Annie Restoration Project	Tonasket Ranger District	Proposed action would commercially treat 1,713 acres with a combination of restoration, thinning, sanitation, and shelterwood harvest, and non-commercially treat approximately 1,710 acres with a combination of underburning, ladder fuel reduction, prescribed burning in riparian areas, and precommercial thinning. Approximately

		1.3 miles of system road would be decommissioned, in addition to 7 miles of unauthorized road. Approximately 5.4 miles of road would be closed (maintenance level 1), and 1.7 miles of unauthorized road would be added to the official road system.
Light Restoration Project	Tonasket Ranger District	Proposal is to thin 3,243 acres, precommercial thin 5,091 acres, prescribed burn 5,711 acres, add 5.5 miles of unauthorized roads to the road system, and decommission 3.3 miles of unauthorized road.
Transportation System Management	*Project will reduce open road density by closing some roads (maintenance level 1) and decommissioning others. Overall result will be a decrease in open road mileage in the project area.*	
Project Name	**Location**	**Project Details**
Chewuch Transportation Plan	Methow Valley Ranger District	Proposed action would close or decommission approximately 118 miles of road in the Chewuch Watershed.
Fuels Reduction/Management	*Projects will reduce fuel loading, improving forest health and reducing the risk of wildfire.*	
Project Name	**Location**	**Project Details**
Crum Canyon	Entiat Ranger District	Proposed action is to thin and prescribed burn 1,427 acres in the Crum Canyon area.
Lost Driveway	Methow Valley Ranger District	Project would thin and do prescribed burning on approximately 2,860 acres in the Upper Methow Valley.
Mission Area Prescribed Maintenance Burning Project	Wenatchee River Ranger District	Hazardous fuel project with noncommercial thinning, prescribed burning, piling and burning, and jackpot burning (approx. 4500ac)
Aquatic Habitat Restoration	*Projects will improve aquatic habitat in project area, and will comply with all forest plan standards and guidelines and applicable laws.*	
Project Name	**Location**	**Project Details**
Chewuch River Restoration RM 13-15.5	Methow Valley Ranger District	Project would install engineered fish habitat structures in the Chewuch River to improve fish habitat.
Peshastin Creek Culvert Replacement Project	Wenatchee River Ranger District	Provide road/stream crossing that allows for fish passage and flood flows by replacing current undersized culvert with bridge
Nason Creek: Upper White Pine Reach Aquatic Habitat Restoration Project	Wenatchee River Ranger District	Project would implement aquatic habitat improvement in Upper White Pine, including restoring some meanders and removing a power line out from the riparian area.
Road Maintenance/Management	*Projects will improve condition of road and improve fish passage. Will comply with all forest plan standards and guidelines and applicable laws.*	
Project Name	**Location**	**Project Details**
Deadhorse River Road Culvert Replacement CE	Wenatchee River Ranger District	Project would replace the Deadhorse River culvert with a fish passage culvert.
Invasive Species	*Project will help control or eradicate invasive species, helping to restore native plant species and communities.*	
Project Name	**Location**	**Project Details**
Forest-wide Invasive Species EIS	Forest-Wide	Project will allow expanded control of invasive species, including the use of targeted, reduced impact herbicides.

Special Use Permits	*Projects will comply with all forest plan standards and guidelines, and applicable laws.*	
Project Name	**Location**	**Project Details**
Sno-tel Sites	Forest-wide	Project would issue a special use permit to install and operate snotel sites across the forest.
Geologic Monitoring Station	Cle Elum Ranger District	Project would issue a special use permit for a geologic monitoring station.
Powerline Tree Disposal	Cle Elum Ranger District	Project would remove hazard trees along a permitted power corridor.
Explosives magazine for avalanche control on I90.	Cle Elum Ranger District	Modify an existing long-term special use permit issued to the Washington State Department of Transportation, to allow installation and use of a second explosives magazine adjacent to one already in place.
Spencer Canyon Fault Investigation	Entiat Ranger District	Issue a permit to excavate two hand dug trenches across the Spencer Canyon scarp to assess potential earthquake activity.
Skyline Ditch Permit Renewal	Methow Valley Ranger District	Project would renew the special use permit for the Skyline Ditch.
Eightmile Ranch Coho Acclimation Site	Methow Valley Ranger District	Project would issue a special use permit for construction and operation/maintenance of coho acclimation ponds at the Eightmile Ranch.
Pack and Saddle Stock Special Use Permits	Methow Valley Ranger District	Project would issue 10-year outfitter-guide permits to pack and saddle stock outfitter-guides operating on the Methow, Tonasket, and Chelan Ranger Districts.
Permit Renewal for Preexisting Permits Summer 2013	Naches Ranger District	Proposal would issue a special use permits for all areas associated with Bear Cove Cabins, Inc. on Rimrock Lake.
PacifiCorp Gold Hill Repeater	Naches Ranger District	Project would issue a SUP for Pacific Power to take over the use and maint. of Gold Hill repeater.
Benton REA Hazard Tree Removal project 3	Naches Ranger District	Project will issue 20-year permit for BREA to remove hazard trees along power line.
Ski Area SUP	Naches Ranger District	Special use permit for the operation of White Pass Ski Area on US Forest Service
White Pass Projects	Naches Ranger District	Project would issue a SUP for additional x-country ski trails operated by White Pass Ski Area
Livestock Area SUP	Naches Ranger District	SUP for livestock grazing on the District.
Corral Resort SUP	Naches Ranger District	SUP for horseback riding and outfitter guiding services
Boat Club SUP	Naches Ranger District	Re-issue of SUP for parking and dock use on Rimrock Lake.
Pacific Northwest Navy Range Special Use Permit	Tonasket Ranger District	Special use permit for US Navy to park trunks on existing roads on the district to conduct training exercises.
Wagon Trips Special Use Permit	Tonasket Ranger District	Special use permit for horse-drawn wagon trips.
Yakama Nation Hatchery Utility Line CE	Wenatchee River Ranger District	Special Use permit for utility line beneath/adjacent to Forest Service road to new Yakama fish hatchery
McKenzie-Beverly 115Kv Electric Transmission Line Permit	Wenatchee River Ranger District	Re-issue of special use permit to Chelan County PUD for power transmission line

Recreation Residences SUP	Wenatchee River Ranger District	Re-issue of isolated rec residence SUP
Various Water Transmission Lines and Storage Tank Re-Issuance Permits CE	Wenatchee River Ranger District	Re-issuance of new term permits for existing water transmission lines and water storage tanks across the district
Trout Unlimited Icicle Creek Fish Passage Study CE	Wenatchee River Ranger District	Issuance of permit to remove 4-5 boulders from Icicle Creek, transport to new location on NFS lands to break apart using explosives and return to creek
Mission Ridge Ski and Board Resort Improvements	Wenatchee River Ranger District	Issuance of a permit for night lights along a ski run and a sun deck along another run
Ski Hill Improvements EA	Wenatchee River Ranger District	EA to determine effects of issuing a permit for construction of a deck, septic fields, new restrooms and other minor improvements to Ski Hill lodge
Special Use Permit Issuance – Wenatchee River Isolated Residence	Wenatchee River Ranger District	Re-issue of isolated rec residence SUP
Minerals	*Projects will disclose environmental impacts and include mitigation for submitted plans of operation from claimants.*	
Project Name	**Location**	**Project Details**
Ferris Hard Rock Mining	Cle Elum Ranger District	Project would disclose impacts and specify mitigation measures for underground exploration work in a re-existing tunnel. Cross country travel would be authorized to reach site.
Southern Star	Cle Elum Ranger District	Project would disclose impacts and specify mitigation measures for road use and maintenance, underground mining, and processing of some ore on site.
Flagg Mountain Mineral Exploration	Methow Valley Ranger District	Project would disclose impacts and specify mitigation measures for an exploratory drilling project in the Flagg Mountain area. Approximately 15 drill sites would be used, all along existing roads.
Buckhorn Outfall	Tonasket Ranger District	Project currently on hold. Proposing some locations for outfall of treated water from the Bunkhorn Mine.
Recreation	*Projects will improve recreation sites and experience. All projects will comply with all forest plan standards and guidelines, and applicable laws.*	
Project Name	**Location**	**Project Details**
WATV Routes	Forest-wide	350 miles of road will be designated open for WATVs.
Meadow Creek Re-Route	Chelan Ranger District	Reconstruct and construct approximately 2500 feet of trail, install a footlog (bridge) across Meadow Creek on the Lakeshore Trail #1247 to repair flash flood damage.
Lake Chelan Campground Prince Creek Dock Replacement	Chelan Ranger District	Project would replace the dock at Prince Creek.
Box Canyon Trail	Chelan Ranger District	Proposal is to construct a non-motorized trail along the south shore of Lake Chelan.
Silver Falls Interpretive Trail Hazard Tree Removal	Entiat Ranger District check	Hazard trees in the Silver Falls recreation area would be removed.
2014 West Side Recreation Projects	Tonasket Ranger District	Establishing ATV trailheads, improving a wilderness trailhead.
Bonaparte Lake and Lost Lake Recreation Projects	Tonasket Ranger District	Proposed to establish a group site, install a swimming dock at Bonaparte Lake. Install a gazebo at the existing group site at Lost Lake.

Fishing Dock Replacement	Tonasket Ranger District	Install new fishing docks at Beth, Beaver, Lost, and Little Beaver Lake. Repair the fishing dock at Bonaparte Lake.
Ski Hills Trails CE	Wenatchee River Ranger District	Project to provide needed trail construction for trail connections for the Ski Hill-Freund Trail system.
Number Two Canyon Trail System EA	Wenatchee River Ranger District	Project would authorize construction of approximately 25 miles of mountain bike trails in the Number 2 Canyon area near Wenatchee.
Facilities	*Project will dispose of excess facilities*	
Project Name	**Location**	**Project Details**
Conconully Compound Disposal	Tonasket Ranger District	Project would authorize disposal of Forest Service buildings in Conconully Washington.
Communication Site	*Projects will improve facilities at existing communication sites.*	
Project Name	**Location**	**Project Details**
Round Mountain AT&T Communications Site Additions CE	Wenatchee River Ranger District	Permit to excavate for additional storage area next to existing facility and construct retaining wall
Blag Mountain Communication Site EA	Wenatchee River Ranger District	Permit to replace existing site building with larger one, excavate for new concrete pad for new building and additional propane tanks, add 250 feet of road
Diamondhead Communication Site Additions CE	Wenatchee River Ranger District	Issuance of a permit for additional propane tanks at an existing communication site
Boundary Butte Communication Site Additions CE	Wenatchee River Ranger District	Issuance of a permit for additional propane tanks at an existing communication site

Ongoing and Reasonably Foreseeable Future Action on Non-National Forest System Land

The following actions were identified for adjacent, non-National Forest System lands. A reasonable effort was made to search websites and to make personal contacts for a variety of federal, state, and country and non-profit agencies; however this table of actions likely does not include all possible actions on adjacent lands due to unanticipated projects being added, projects being dropped, lack of response from other agencies, or other reasons. The list does provide an adequate representation of non-Forest Service actions to determine the cumulative effects of the alternatives considered in the EA. Detailed information about each project can be obtained by contacting the responsible agency.

The Yakima Basin Integrated Water Resource Management Plan is described following the table.

Table A3. Ongoing and Reasonably Foreseeable Future Actions on non-National Forest System Lands

Road Maintenance and Management		
Project Name	**Location**	**Project Details**
WATV Routes	Okanogan, Chelan, Douglas, and Kittitas Counties	Most county roads with speed limits less than 35 miles per hour are open to WATVs, providing hundreds of miles of riding opportunities.
WADNR C-1200-3A Fish Passage	Ahtanum State Forest	Installation of bottomless arch structure for improved fish passage
WADNR T-5000-9 Fish Passage	Teanaway Community Forest	Installation of bottomless arch structure for improved fish passage
WADNR T-5000-17 Fish Passage	Teanaway Community Forest	Installation of bottomless arch structure for improved fish passage
WADNR Carlson Bridge	Teanaway Community Forest	Replacement of Bridge structure due to damage
WADNR N-1000 Road	Naneum Ridge State Forest	Relocation of stream adjacent parallel road to reduce potential for sediment delivery.
WA DOT I-90 Project	I-90	Entails clearing forest adjacent to 1-90, blasting rock, storing trees and rock, selling timber decks, etc.
Forest Improvement Treatments		
Project Name	**Location**	**Project Details**
WADNR Stirrup	Ahtanum State Forest	Treatment to reduce stocking of stands within Forest Health Hazard Warning Area.
Fuels Reduction		
Project Name	**Location**	**Project Details**
BLM Brisky Canyon Fuels Reduction	Brisky Canyon	Thin and remove commercial sized trees, thin, pile and burn small trees and brush.
BLM West Pine Zone Fuels Reduction		Hand/mechanical non-commercial thinning and prescribed fire.
Recreation Plan Implementation		
Project Name	**Location**	**Project Details**
WADNR Naneum to Columbia River Recreation Plan	Naneum Ridge State Forest	Implement projects identified in plan related to motorized/non-motorized developed recreation, dispersed recreation, and Green Dot cooperative road management for public access
WADNR Ahtanum State Forest Recreation Plan	Ahtanum State Forest	Implement projects identified in plan related to motorized/non-motorized developed recreation, dispersed recreation, and Green Dot cooperative road management for public access
Recreation Plan Development		
Project Name	**Location**	**Project Details**
WADNR Teanaway Community Forest Recreation Plan	Teanaway Community Forest	Plan will be developed to provide strategic guidance on restoration, maintenance, and development of recreation activities
Aquatic Restoration		
Project Name	**Location**	**Project Details**
WADNR Indian Creek	Teanaway Community Forest	In stream log placement to increase pool habitat, cool water temperatures, stabilize stream bank erosion, and reconnect the floodplains

North Yakima Conservation District	Nile Creek and Naches River	Removal of unscreened gravity irrigation diversion in Nile Creek, moving point of diversion to Naches River, installing pump and fish screen
WDRN/Kittitas County Conservation District	Teanaway River at Red Bridge and Seaton Diversion	Fish Passage and irrigation maintenance in Teanaway River at Red Bridge and Seaton Diversion
Yakama Nation Amphibian project		Survey of amphibs (including tailed frog, western toads, northwestern salamander, cascade frog, etc.) in the forest of the Yakama Reservation
Cascadia Conservation District		Various projects on private lands, including instream structures, irrigation structures and systems, well drilling and wildfire fuels reduction. Entiat River enhanced stream flow monitoring, watershed planning for the Entiat, Chelan, Wenatchee and Stemilt Squilchuck Watershed Plannign Units. Wildfire preparedness.
Upper Columbia Salmon Recovery Board		Various salmon habitat implementation projects in the Entiat, Methow, Okanogan, and Wenatchee Subbasins.
Timber Sales	*Projects will generate timber volume, and comply with all State Forestry Practices Act requirements to minimize environmental effects. Projects will comply with all Federal and State laws.*	
Project Name	**Location**	**Project Details**
WADNR Plumback	Taneum ownership block	Timber sale to promote proper stocking, long term value to the trusts, and provide for habitat
WADNR Wild Plum	Taneum ownership block	Timber sale to promote proper stocking, long term value to the trusts, and provide for habitat
WADNR Hog Ranch	Wenas ownership block	Timber sale to promote proper stocking, long term value to the trusts, and provide for habitat
Confederated Tribes of the Colville Reservation West Fork Timber Sale	Adjacent to Tonasket Ranger District	
Confederated Tribes of the Colville Reservation Strawberry Timber Sale	Adjacent to Tonasket Ranger District	
Confederated Tribes of the Colville Reservation Crawfish Area lodgepole pine management	Adjacent to Tonasket Ranger District	
WDNR Crawdad Timber Sale		Tree removal, pre-haul road maintenance, small amount of road construction. Eight miles southwest of Conconully.
Mining Projects		
Project Name	**Location**	**Project Details**
WDNR/FS Crown Resources Gold Mine	Bukhorn Mine	Crown Resources Gold Mine on Buckhorn Mountain on private land and haul of ore to Republic.
Forest Management Plan		
Project Name	**Location**	**Project Details**
WADNR Teanaway Community Forest Management Plan	Teanaway Community Forest	Provides guidance on the implementation of five restoration goals for the forest: Water quality, working lands, recreation, wildlife habitat, and community partnerships
Noxious Weed/Invasive Species Control		
Project Name	**Location**	**Project Details**
WDNR	Tunk Grade Fire	Post-fire noxious weed herbicide treatment

Tunk Grade Fire Noxious Weed Stablization		
WDNR Star Thistle Treatment	Bear Mountain	Yearly treatment of star thistle populations
Chelan Country Noxious Weed Control	County Roads	Boom spraying of paved county roads that access Forest Service land
Yakama Nation		Various vegetation and invasive plant management projects: Status Creek/Yakima River Scotch thistle project, Naches River Japanese knotweek project, Yakima River purple loosestrife project, Yamkima Reservation forest tree planting/spraying project, Russian Olive status Wildlife Area project.
Wildlife and Fish Projects		
Project Name	**Location**	**Project Details**
Yakama Nation		Various non-game avian monitoring and banding projects
Yakama Nation		Various habitat projects: shrub-steppe floodplain terrace restoration, shrub-steppe restoration for sage-grouse habitat, forest riparian and meadow projects, and old growth mapping
Yakama Nation		Various big gam projects: California bighorn sheep reintroduction, mountain goat research, pronghorn antelope habitat analysis, mule deer study, and elk research
Yakama Nation		Various sage grouse reintroduction projects: habitat assessments and restoration, reintroduction of sage grouse on Yakama reservation.
Yakama Nation Spotted Owl Project		Survey of habitat in vicinity of upcoming timber sales and monitoring at known sites
Colville Tribe Various Fish and Wildlife Projects		Salmon and steelhead ESA projects, resident fish and wildlife projects
USFWS	Wildlife Refuges	Various projects: wetland construction, migrating and wintering waterfowl habitat enhancement projects, invasive species projects, prescribed and wildland fire projects, fisheries management.
WDFW	Wildlife Areas	Various Species recovery and management projects, habitat restoration and projection projects, aquatic invasive species projects, and wildlife health related projects.
USFWS	Entiat National Fish Hatchery	Habitat improvement for fish I the Entiat River. Off-channel habitat for fish, wetland ponds.
Yakama Nation Mid-Cloumbia coho reintroduction feasibility project.		To reintroduce coho salmon into the mid-Columbia River basin tributaries – Methow and Wenatchee River basins in Chelan and Okanogan counties.
USFWS	Winthrop National Fish Hatchery	Beaver relocation project from places where they conflict with landowners and release them in unoccupied habitat higher in the watershed in the Methow Valley.
Range and Livestock Management		
Project Name	**Location**	**Project Details**
Yakama Nation		Various Range and livestock management projects.
Private Landowners: Various vegetation	*Landowners submit projects to the Department of Natural Resources on a regular basis. The DNR reviews the project to ensure they comply with the Forest Practices*	

management, timber harvest, road construction and other projects.	*Act, which ensures that all projects will meet environmental requirements, including complying with all federal and state laws, such as the Clean Water Act, Endangered Species Act, and Clean Air Act, to name a few.*

Yakima Basin Integrated Water Resource Management Plan[1]

The Bureau of Reclamation and Washington Department of Ecology are currently developing and planning projects as part of the *Yakima Basin Integrated Water Resource Management Plan*. The planning and decision process for many of these projects could take many years to complete, and the funding has not been secured for every project. While these are considered reasonably foreseeable by the definition used by the Forest Service, it must be understood that final decisions have not been made, and funding has not been secured. It could easily take up to 20 years for some of the more complicated, expensive, and controversial projects to be implemented. The Integrated Plan identifies a comprehensive approach to water resources and ecosystem restoration improvements in the Yakima River basin. The Integrated Plan includes seven elements: reservoir fish passage, structural and operational changes to existing facilities, surface water storage, groundwater storage, habitat/watershed protection and enhancement, enhanced water conservation, and market reallocation. The Integrated Plan was developed to address a variety of water resource and ecosystem problems affecting fish passage and habitat and agricultural, municipal, and domestic water supplies.

The specific projects included in the Integrated Plan include:

- Reservoir Fish Passage Element (Habitat Component);
    - Provide fish passage at the five major Yakima River basin dams – Cle Elum, Bumping Lake, Tieton, Keechelus, and Kachess – as well as Clear Lake Dam.
- Structural and Operational Changes Element (Systems Modification Component);
    - Cle Elum Pool Raise,
    - Kittitas Reclamation District Canal Modifications,
    - Keechelus-to-Kachess Pipeline,
    - Subordinate Power at Roza Dam and Chandler Powerplants, and
    - Wapatox Canal Improvements.
- Surface Water Storage Element (Water Supply Component);
    - Wymer Dam and Pump Station,
    - Kachess Reservoir Inactive Storage,
    - Bumping Lake Reservoir Enlargement, and
    - Study of Columbia River Pump Exchange with Yakima Storage.
- Groundwater Storage Element (Water Supply Component);
    - Shallow Aquifer Recharge, and
    - Aquifer Storage and Recovery.
- Habitat/Watershed Protection and Enhancement Element (Habitat Component);
    - Targeted Watershed Protections and Enhancements, and
    - Mainstem Floodplain and Tributary Enhancement Program.
- Enhanced Water Conservation Element (Water Supply Component);
    - Agricultural Conservation, and

[1] Information from the Bureau of Reclamation *Executive Summary of the Yakima Basin Integrated Water Resource Management Plan*, 2002.

    - Municipal and Domestic Conservation Program.
- Market Reallocation Element (Water Supply Component).

Resource Analysis

Following is a narrative summary of the environmental elements most likely to be impacted based on current evaluations. Table 1 presents a summary of impacts on all resources evaluated.

Soil

Short-term impacts to soil would be related to construction activities that may result in erosion and sedimentation. Long-term impacts would include a combination of effects, including loss of earth-related resources, permanent landscape modifications, new roads, and changes in stream channel and floodplain conditions. Implementation of the Surface Water Storage Element of the Integrated Plan would result in increased disruption of the natural sedimentation process downstream of new storage facilities, as the reservoirs trap and hold sediments. Implementation of the Integrated Plan would also likely result in a decrease in erosion potential as floodplains are reconnected, channel scouring is reduced, and as the Targeted Watershed Protection and Enhancement program is implemented and lands are protected to benefit the watershed as a whole.

Surface Water Resources

The Integrated Plan Alternative would benefit instream flows and improve the reliability of water supply for agriculture and municipal and domestic uses. Construction activities could cause temporary disruptions in water deliveries to water users, alter the timing and quantity of streamflows , or TWSA. These disruptions would be coordinated to minimize impacts to water users and streamflows. Surface water bodies could be temporarily diverted from their typical locations. Long-term improvements in water supply would be reflected in increases in TWSA, end-of-season reservoir storage, and improved streamflows for fish. The reliability of water supply for irrigators would be improved to minimize economic losses during drought years. Water supply improvements would provide flexibility to adapt to climate change.

Groundwater

Short-term impacts of groundwater are limited to potential reduced usability of wells in the immediate vicinity of construction sites caused by dewatering during construction. Impacts would be temporary and are likely to be minor. Long-term groundwater levels and quantity are expected to increase through additional recharge from irrigation deliveries made from storage facilities, groundwater recharge enhancement, and riparian and floodplain enhancements. The increased groundwater levels would benefit well users and improve riparian habitat. Decreases in recharge are expected from enhanced conservation (improving conveyance facilities and increasing application efficiencies). These declines are expected to be minor, but could cause localized declines in water levels in wells. No impacts to groundwater quality are anticipated.

Water Quality

The Integrated Plan is designed to provide an overall net benefit to water quality conditions by improving streamflow conditions, riparian areas, and floodplain habitat in the basin. Existing reservoir releases would continue to provide cool water to downstream surface waters. New reservoirs may have the potential to increase temperatures of water released from the dams to downstream surface waters at certain times of the year (late summer/early fall); however, the reservoirs will be operated to minimize and mitigate temperature impacts. There is potential for

existing contamination of soils in some locations to affect water quality if floodplain restoration projects are carried out in those areas, but contaminated soils would be identified and removed to prevent contamination. Preserving watersheds through land acquisition, public land designations, and river corridor designations would protect water quality, contribute to cooler water temperatures, and reduce sedimentation.

Fish

Overall the Integrated Plan is expected to provide benefits to resident and anadromous fish by improving habitat conditions throughout the basin. Streamflow conditions would be improved through water storage projects which will allow alterations to reservoir operations. Fish passage facilities would remove barriers allowing fish access to historic headwater habitat. Fish passage at major dams would also allow the reintroduction of sockeye salmon which were extirpated from the basin by blocked passage. Water conservation, groundwater storage, and market reallocation would provide localized improvements in streamflow and reduce high water temperatures. Targeted watershed protections and habitat enhancement projects (including land acquisition, public land and river corridor designations and floodplain restoration) would preserve watersheds and help maintain aquatic habitat complexity. All of these Integrated Plan elements will provide improved habitat conditions that will benefit fish and help meet fish production and survival targets. These improvements may help fish withstand the impacts of climate change.

The expansion of Bumping Lake Reservoir would inundate areas of bull trout habitat and spawning grounds. The proposed reservoir has been designed to minimize those impacts; however, impacts to bull trout could be substantial. Overall the Integrated Plan is expected to provide improved conditions for bull trout in the Yakima basin.

Vegetation

Under the Surface Storage Element of the Integrated Plan, large areas of shrub-steppe habitat and old-growth forest would be inundated at Wymer Dam and the Bumping Lake Reservoir expansion, respectively. Mitigation for the loss of these vegetation types is difficult or impossible. Reclamation and Ecology recognize the significant impacts of these projects.

Overall the Integrated Plan is expected to have positive impacts for native vegetation communities. Degraded habitat would be restored under the Habitat/Watershed Protection and Enhancement Element and intact vegetation communities would be protected. Protected areas would include acquisition of threatened shrub-steppe habitat and mature forests. The integrated implementation of watershed protection and enhancement activities along with streamflow improvements provided by structural and operational changes, increased surface water storage, and new groundwater storage would provide greater benefits to riparian and wetland vegetation in comparison to a program that implements the elements separately. The integrated approach is more likely to achieve systemwide benefits for vegetation.

Wildlife

The overall impact of the Integrated Plan is expected to be positive for wildlife. There would be negative impacts to wildlife habitat caused by the inundation of shrub-steppe and old-growth forest at Wymer Dam and the Bumping Lake Reservoir expansion respectively. These projects would cause substantial impacts to wildlife, including some threatened and endangered species as discussed below. The combined effects of the proposed elements in the Integrated Plan are expected to result in improved fish and wildlife habitat over time. Many of the proposed

structural and operational changes would not impact habitat because they would be located in previously disturbed areas and would provide flow benefits to fish and other aquatic species. Fish passage facilities would reopen historic territory for anadromous fish and help restore ecosystems upstream of the dams. The Habitat/Watershed Protection and Enhancement Element would improve degraded habitat and protect large areas of intact habitat, including declining shrub-steppe habitat surrounding the Wymer Reservoir site and mature forests threatened with development.

Threatened and Endangered Species

Construction associated with structural and operational changes to existing facilities and water conservation projects is not expected to result in impacts because it would occur in previously disturbed areas or built environments with minimal habitat for listed species. In addition, the projects would provide flow benefits to Middle Columbia River (MCR) steelhead, bull trout and other aquatic species. Fish passage facilities would reopen historic territory for MCR steelhead, help restore ecosystem help upstream of the dams, allow reintroduction of extirpated species, and allow isolated bull trout populations to be connected. The Habitat/Watershed Protection and Enhancement Element of the Integrated Plan would result in a net improvement in conditions for greater sage-grouse, northern spotted owl, MCR steelhead, bull trout, and other wildlife species by protecting and enhancing existing high value habitat areas within the Yakima basin. Further, additional surface storage in the basin would provide positive impacts through increased flows for anadromous and resident fish passage and survival during drought years. The integrated implementation of fish habitat enhancement projects and the streamflow improvements provided by structural and operational changes, increased surface water storage, new groundwater storage, and watershed protection and enhancement activities would provide greater benefits to listed fish and wildlife species in comparison to a program that implements the elements separately.

Wymer Dam and the expansion of Bumping Lake Reservoir would negatively impact listed fish and wildlife. Wymer Dam would inundated a large area of shrub-steppe habitat used by the greater sage-grouse, a Federal candidate species. The Bumping Lake Reservoir expansion would inundate spawning areas used by bull trout, especially on Deep Creek and large areas of old-growth forest used by the northern spotted owl.
Reclamation and Ecology acknowledge the potential significant impacts to these species and will coordinate with NMFS, the Service, and WDFW to minimize those impacts and develop mitigation strategies.

Climate Change

As an integrated package, this alternative would provide multiple benefits to water supply, agriculture, and fish while improving the ability of water managers to adapt to future climate changes. Approaching management on a basinwide level could provide additional consistency in water management across agencies and jurisdictions.

Additional water storage and improved irrigation operations would provide a more reliable water supply for agriculture during dry periods. Improved streamflows and fish habitat, along with access to upper river tributaries, would produce enhanced fish populations that would be better able to withstand habitat changes caused by climate change. As climate change places new stresses on water resources and aquatic habitats in the future, the Yakima River basin's upper watersheds will become even more vital to ecosystem health and water supply. Reopening

historic fish habitat through fish passage facilities will improve conditions for anadromous fish. Acquisition of a 46,000-acre tract in the middle and lower Teanaway River basin including ponderosa pine forest would be particularly significant due the limited range and vulnerability to climate change of this forest type.

Recreation

Implementation of most of the projects and elements of the Integrated Plan would result in short-term disruptions to facilities due to access limitations during construction; however, most of these impacts would be temporary and disruptions would cease following completion of construction. Long-term impacts to recreational resources could occur associated with land acquisition, which could limit some recreational uses and improve others. Designation of areas as Wilderness could limit some recreational uses such as motorized vehicles or mountain biking. Proposed National Recreation Areas, Wild and Scenic Rivers, and other watershed protection actions would enhance recreation opportunities. Acquisition of private lands could allow increased recreational activities on lands currently closed by private ownership.

Recreational facilities at Bumping Lake Reservoir would be significantly impacted by eliminating shoreline recreational facilities and access to trails. It is anticipated that some of the recreational facilities that would be eliminated could be replaced over time.
However, it may not be possible to replace all impacted facilities at or near Bumping Lake Reservoir. Reclamation would coordinate with the USFS to determine appropriate mitigation for displaced recreational facilities. Many of the proposed projects in the Integrated Plan would improve riparian and fish habitat. This would have a beneficial impact on recreation by improving fishing and wildlife viewing opportunities.

Land and Shoreline Use

The Cle Elum Dam pool raise, Keechelus-to-Kachess pipeline, Bumping Lake enlargement, and Kachess Reservoir inactive storage projects would require acquisition of land or easements, but are not anticipated to have a significant impact on land use.
Approximately 4,000 acres of private land would need to be purchased for the Wymer Dam project and changed from forest and rangeland uses to water storage, which would be a significant change in land use. Habitat enhancement projects could require acquisition of property or easements, but they would be located on property owned by willing participants and would be compatible with existing land uses.

Watershed protection and enhancement activities are likely to cause land use impacts when properties or conservation easements are acquired for protection; however, all properties would be acquired from willing sellers. Logging or other relatively high intensity activities would likely be curtailed on these acquired properties, although the intent is to maintain historic uses to the extent that they are compatible with habitat protection goals. The types and intensities of recreation on the acquired properties could change depending on how the land is managed. Wilderness or Wild and Scenic River designations could also place restrictions on existing land uses. The Market Reallocation Element could result in changes in land use as water rights are transferred from one area and land use to another.

Cultural Resources

Projects undertaken as part of the Integrated Plan have the potential to cause long-term impacts to cultural resources located within the footprint of any new ground-disturbing construction

activities. Construction impacts would include access and staging areas as well as any off-site mitigation areas. The main non-construction long-term impact for most elements would be erosion of cultural resources. Potential impacts to cultural resources would be evaluated through site-specific studies and consultation with the Washington State Department of Archaeology and Historic Preservation and affected Tribes to develop appropriate mitigation measures.

Table A-4. Comparison of Impacts for Yakima Basin Alternatives

Resource	Preferred Alternative
Earth	Short-term: Construction-related erosion and sedimentation. Long-term: Loss of some earth-related resources, permanent landscape modifications, and changes in stream channel and floodplain conditions. Disruption of sedimentation downstream of storage facilities. Decrease in erosion potential in conservation areas.
Surface Water Resources	Short-term: Potential disruption during construction. Long-term: Increased TWSA, end-of- season reservoir storage, annual diversions, and improved streamflow.
Groundwater	Short-term: Temporary reduction of usability of wells in the immediate vicinity of construction sites. Long-term: Groundwater levels and quantities would increase with potential decreases near canal lining sites.
Water Quality	Short-term: Risk of erosion and contaminants from construction. Long-term: Net benefit to water quality by improving streamflow conditions, riparian areas, and floodplain habitat. New reservoirs have potential to increase temperatures of water released from the dams in downstream surface waters at certain times of the year (late summer/early fall); however, the reservoirs will be operated to minimize and mitigate temperature impacts. Preserving watersheds through land acquisition, public land designations, and river corridor designations would protect water quality, contribute to cooler water temperatures, and reduce sedimentation.
Hydropower	Short-term: No impact. Long-term: Reduction of hydroelectric generation at Roza and Chandler Powerplants and the Drop 2 and Drop 3 powerplants in the Wapato Irrigation Project.
Fish	Short-term: Temporary habitat disturbance, construction-related impacts. Long-term: Overall benefits from fish passage facilities, improved streamflows and habitat/watershed protection and enhancement projects. Combined elements would contribute to flow conditions resembling natural flows and improve fish passage and habitat throughout historic ranges.
Vegetation	Short-term: Temporary disruption of vegetation, including shrub-steppe and mature forest vegetation Long-term: Negative impacts, including habitat loss, from expanded reservoirs, but an overall positive impact due to habitat/watershed protection and enhancement. Permanent removal of some areas of shrub-steppe and mature forest vegetation.
Wildlife	Short-term: Temporary disruption of habitat during construction. Substantial habitat impact could occur if replacement habitat is unavailable. Short term impacts for some species could be substantial at Wymer Dam and expansion of Bumping Lake Reservoir. Long-term: Negative impacts to habitat from new or expanded reservoirs.

Resource	Preferred Alternative
	Overall positive impact for wildlife from habitat/watershed protection and enhancement. Permanent impact on shrub-steppe and mature forest vegetation.
Threatened and Endangered Species	Short-term: Temporary disruption of habitat during construction. Removal of some areas of shrub-steppe and mature forest habitat. Long-term: Negative impacts to species that may be displaced from the area of a new or expanded reservoir. Overall positive impacts from fish passage facilities, improved streamflows, and habitat/watershed protection and enhancement projects. Permanent impact on shrub-steppe and mature forest vegetation; however, land acquisition and habitat enhancement components are intended to result in a net improvement in conditions for listed fish and wildlife species
Visual Resources	Short-term: Presence of construction equipment and activities during construction would generally create an unattractive visual setting during the construction period. Long-term: Visual impacts would be primarily of local scale and are not expected to be significant with the potential exception of new and expanded reservoirs.
Air Quality	Short-term: Minor dust and emissions associated with construction and traffic. Long-term: Some projects may cause long term impacts from emissions associated with stationary pollutant sources, although impacts are not expected to be significant.
Climate Change	Short-term: Increases in greenhouse gas emissions associated with construction of individual projects. Long-term: Multiple benefits to water supply, agriculture, and fish, improving the ability of water and fisheries managers to adapt to future climate change.
Noise	Short-term: Increased noise from construction equipment and activities, including blasting associated with certain individual projects. Long-term: Some equipment or vehicles may be audible in the vicinity of projects.
Recreation	Short-term: Temporary access restrictions or nuisance dust and noise. Long-term: Some recreational facilities and resources at Bumping Lake Reservoir would be eliminated and it may not be possible to relocate. Many projects would improve fishing and wildlife viewing opportunities. Motorized vehicle use would be restricted in designated Wilderness. Proposed National Recreation Areas and other watershed protection actions would enhance recreational opportunities.
Land and Shoreline Use	Short-term: Temporary access restrictions caused by construction. Property or conservation easement acquisitions of private property. Long-term: Property and easement acquisitions, shift from forest and rangeland to water storage in Wymer Reservoir area, potential land use changes due to market reallocation. Potential decreased tax base with the conversion of private lands to public ownership.
Utilities	Short-term: Potential temporary disruption during construction. Long-term: Reduced supply of electricity due to power subordination and increased demand from new equipment.
Transportation	Short-term: Temporary traffic delays and possible detours, in some cases for up to 3 to 5 years for major projects. Long-term: Bumping Lake Enlargement would eliminate some Forest Roads and reduce access to some National Forest areas.

Resource	Preferred Alternative
Cultural Resources	Short-term: Potential impacts on historic structures, traditional cultural properties, or sacred sites from increased dust, vibration, noise, or construction activity. Construction could cause permanent impacts to cultural resources. Long-term: Projects have the potential to cause long-term impacts on cultural resources located within the footprint of any new ground-disturbing construction activities. These impacts could be substantial where habitat improvements projects are located in areas with a high likelihood for significant Native American cultural resources. The potential impacts on cultural resources would likely be higher than under the No Action Alternative because of the large-scale projects that are likely to be constructed. Ground disturbance, erosion, and increased vandalism of cultural resources. Potential impacts to historic structures.
Socioeconomics	Short-term: Project-related funding would likely have short-term positive impacts on jobs and incomes and reduced uncertainty and risk. Long-term: Potential increase in the value of goods and services derived from the basin's water and related resources in the long term. Reduction in uncertainty and risk.
Environmental Justice	Most projects are not expected to cause disproportionate impacts to environmental justice communities. Additional environmental justice analysis would be required during project-level analysis.