Wildlife Resources Report

The Summit at Snoqualmie Master Development Plan

Prepared for:

U.S. Forest Service
Mt. Baker Snoqualmie National Forest

and

Booth Creek Resorts

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- Tailed frog (*Ascaphus truei*) - a USFWS Species of Concern; and
- Western toad (*Bufo boreas*) - a USFWS Species of Concern.

1. Executive Summary

This report is one of several natural resource reports prepared by Jones & Stokes for the U.S. Forest Service (USFS) as part of the inventory of natural resources associated with The Summit-at-Snoqualmie Master Development Plan (MDP). The MDP is a long-range management and development plan proposing additional ski lifts, ski trails, and facilities for The Summit-at-Snoqualmie ski area. The Summit-at-Snoqualmie is located at the crest of the Cascade Mountains at Snoqualmie Pass, approximately 50 miles southeast of Seattle and 60 miles northwest of Ellensburg (see Figure 1, Vicinity Map). The Summit-at-Snoqualmie is located partially on National Forest System Lands (NFSL) on both the Mt. Baker-Snoqualmie National Forest (MBSNF) and the Okanogan-Wenatchee National Forest (OWNF), and partially on private land owned by Ski Lifts, Inc. The portion of the ski area located on NFSL is operated under a Special use permit administered by the MBSNF.

The purpose of this report is to document the special species occurring or potentially occurring in Summit at Snoqualmie and surrounding areas. The report presents the study methods and results of literature review and field investigations. The report will be used as a wildlife discipline report to be referenced in the NEPA document prepared for the MDP and for the subsequent Biological Assessment to be prepared for the preferred alternative.

Literature reviews were conducted for and surveys were conducted in The Summit-at-Snoqualmie Study Area. Additional information was derived for portions of the adjoining upper South Fork Snoqualmie and upper Yakima River watersheds. Reconnaissance and protocol surveys were conducted between 1997 and 2002.

No threatened or endangered species are known to regularly occur within the Study Area. The following special status species were observed or are known to occur in the Study Area:

- Northern goshawk (*Accipiter gentilis*) – a (USFS) Sensitive species;
- Pileated woodpecker (*Dryocopus pileatus*) – a Management Indicator Species;
- Elk (*Cervus elaphus*) - a Management Indicator Species;
- Mule deer (*Odocoileus hemionus*) - a Management Indicator Species;
- Mountain goat (*Oreamnos americanus*) - a Management Indicator Species;
- American marten (*Martes Americana*) - a Management Indicator Species;
- Olive-sided flycatcher (*Contopus borealis*) – a U.S. Fish and Wildlife Service (USFWS) Species of Concern;
- Cascades frog (*Rana cascadae*) - a USFWS Species of Concern;

2. Introduction

2.1. Purpose of Report

Ski Lifts, Inc. has presented a MDP to the MBSNF and the OWNF, which describes long range (10 years) management, and development plans for The Summit-at-Snoqualmie ski areas (Sno.engineering 1998). The ski area operates partially on federally owned land under a Special Use Permit (SUP) administered by the MBSNF. Implementation of the MDP cannot occur until a NEPA review of the proposed actions is complete. As part of that process, the MDP is reviewed to ensure consistency with several guidance documents including the Record of Decision (ROD) for the Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (Northwest Forest Plan) (USDA and USDI 1994); as amended (USDA and USDI 2000, 2001, 2002, 2003, and 2004), the MBSNF Forest Plan (USDA 1990a), the OWNF Forest Plan (USDA 1990b) and the Snoqualmie Pass Adaptive Management Area (SPAMA) Plan EIS (USFS and USFWS 1997). All of these documents have identified standards and guidelines for management of habitat for certain wildlife species.

The purpose of this report is to document wildlife resources within the Study Area, which is defined as the SUP area and adjoining private lands in the Snoqualmie Pass area owned and managed by Ski Lifts, Inc. for recreational use. The report presents the study methods and results of literature review and field investigations. The report is intended to be a wildlife discipline report referenced in the NEPA document prepared for the MDP. This wildlife resources report contains the biological evaluation used to determine the effects of the range of alternatives on threatened and endangered species, USFS sensitive species, rare and uncommon species identified under the Northwest Forest Plan ROD, and USFWS species of concern.

2.2. Summary of Project Description

The proposed MDP for Alpental includes the replacement and addition of chair lifts and surface lifts, development of approximately 11 acres of new ski trails, construction of an aerial tram from the base area to the top of Alpental, construction of additional parking areas, construction of new base area facilities, construction of additional restaurant facilities on the mountain-top area of Alpental, and utilities to support new ski and other recreational opportunities.

The proposed MDP for The Summit includes replacement or realignment of the majority of existing ski lifts, and the addition of two new lifts, development of approximately 61 acres of new ski trails, construction of new parking, maintenance and base area facilities including utilities to support these facilities, and reforestation of selected areas in the lower slopes of Summit West and Summit Central.

3. Study Methods

3.1. General Approach

For purposes of this report, wildlife resources were evaluated for the Study Area and for a broader analysis area (an area which encompasses portions of the adaptive management area [AMA], the Snoqualmie pass area, and the upper Yakima River and South Fork Snoqualmie River watersheds adjacent to the Study Area). Wildlife information was derived from sources including existing resource data from the MBSNF Geographic Information System (GIS) database, watershed analyses (USFS 1995, USFS 1997); the Final EIS for the SPAMA Plan (USFS and USFWS 1997); Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) database (2002); and wildlife data from the I-90 Wildlife Linkage Assessment (Singleton and Lehmkuhl, 2000). Additional wildlife habitat information was derived from incidental observation data from the MBSNF Snoqualmie Ranger District, reconnaissance survey data collected during 1994 through 2000, and personal observations by Jones & Stokes field biologists. Incidental sighting data from the OWNF Cle Elum Ranger District is provided annually to the WDFW and so is included in the PHS data.

3.2. Surveys

Surveys specifically for this report and the associated EIS were conducted for the presence of northern spotted owl, great gray owl, marbled murrelet, gray wolf, and northern goshawk, and for suitable habitat for peregrine falcon and Townsend's big-eared bat. These surveys encompassed both USFS and private land in order to accurately characterize the status of these wide-ranging species in the Snoqualmie Pass area. In addition, surveys were conducted for terrestrial mollusk and salamander species formerly included under the Survey and Manage Standards and Guidelines of the Northwest Forest Plan (USDA and USDI 1994), and although these Standards and Guidelines have since been removed from Land and Resource Management Plans of National Forests within the range of the northern spotted owl (USDA and USDI 2004) discussion of these species is retained to document compliance with Standards and Guidelines in effect at the time the survey efforts were undertaken. Only NFSL were surveyed for former Survey and Manage species, however, because the Survey and Manage requirements applied only on federal land.

3.3. Definitions

Some animal species and their habitats are considered unique based on their limited occurrence. The USFWS and USFS have classified these species into several categories to assist with their management and protection.

- Threatened, endangered, and proposed species include those that are officially "listed" under the Endangered Species Act or are proposed for listing. Endangered species are those species or

subspecies judged to be in imminent danger of extinction, while threatened species are those judged to be at risk of becoming endangered. Proposed species are those for which, in the opinion of the USFWS, enough information exists to warrant listing them as endangered or threatened (16 U.S.C. 1531-1544, 87 Stat. 884).

- Forest Service sensitive species are those recognized by the Regional Forester as species for which population viability is a concern (WAC 232-12-297).
- Management indicator species (MIS) are species selected by National Forests to help determine the effects of management activities on wildlife and are assumed to be representative of other species reliant upon the same habitat types (USDA 1990a, USDA 1990b).
- Species of special concern are those identified by the USFWS as being of concern, some of which are former Category 1 and Category 2 candidates (those species whose conservation standing is of concern to the USFWS, but for which status information is still needed). These are species whose conservation standing is of concern to the USFWS but for which further status information is needed.

In addition, there are several species included in this analysis that are former Survey and Manage species, which are those species that were identified in the Northwest Forest Plan, as amended (USDA and USDI 1994a, USDA and USDI 2001) as being closely associated with late successional or old-growth forest and whose long-term persistence is a concern. In 2004, the USFS and USBLM issued an EIS and associated ROD, which removed the Survey and Management provisions for these species (USDA and USDI 2004). Survey and Manage species with the potential to occur in the Study Area have been reclassified as Forest Service Sensitive and/or other rare and uncommon species, and others no longer have any special status within the Study Area (USFS 2007a). This is described in greater detail in Section 9.2 – Sensitive and Other Rare and Uncommon Species.

Also included under former Survey and Manage are species identified in appendix J2 of the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth forest Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994b), which are species for which the Survey and Manage provisions were not expected to provide adequate protection.

4. Project Setting and Land Designations

4.1. Setting

The Summit-at-Snoqualmie consists of four separate ski areas: Alpental, Summit West, Summit Central, and Summit East. They are aligned along I-90 at the crest of the Cascade Mountains at Snoqualmie Pass, approximately 50 miles southeast of Seattle and 60 miles northwest of Ellensburg, as shown on Figure 1, Vicinity Map. Alpental is the western- and northern-most of the areas, and lies completely in the watershed of the South Fork Snoqualmie River, just below the origin of the river at Source Lake. It has elevations from 3,200 to 5,400 feet, and sits in a steep sided valley enclosed by dramatic peaks and cliffs. The other three areas, which after a long history as separate facilities have been consolidated into The Summit-at-Snoqualmie by Ski Lifts, Inc., lie on the southwest side of I-90 as it winds through the pass. The Summit consists of several long ridges with multiple knolls, with gentle slopes at lower elevations and steeper terrain at higher elevations. A small part of The Summit lies within the South Fork Snoqualmie River watershed, but most is within the Yakima River watershed. The combined size of the ski areas is 2,899.36 acres, of which 1,752.68 acres are on NFSL and 1,146.68 acres are privately owned.

4.2. Land Designations

A mosaic of fragmented ownership and government jurisdiction characterizes the Snoqualmie Pass area and The Summit-at-Snoqualmie. The crest of the Cascade Mountains passes through the area, with Alpental and part of Summit West on the west side and the remainder of The Summit on the east side. Since the crest serves as both a County and National Forest boundary, jurisdiction is split between King County and the MBSNF to the west and Kittitas County and the OWNF to the east. The Snoqualmie Ranger District of the MBSNF administers the NFSL in the Snoqualmie Pass area for both National Forests, however.

Most of The Summit-at-Snoqualmie ski area facilities located on NFSL, with the exception of Alpental, area also included in the SPAMA. This area is one of 10 specified by the Northwest Forest Plan ROD for the development and testing of new techniques for achieving the ecological, social and economic goals of federal forestland. The Northwest Forest Plan directs land management agencies to develop AMA plans that meet the intent of AMAs and also emphasize the attributes of each AMA that were instrumental in their selection. The emphasis for the SPAMA management plan was to manage for late-successional forest on checkerboard lands within the SPAMA, recognizing that this area provides a “critical connective link in north-south movement of organisms in the Cascade Range”. The SPAMA Plan Final Environmental Impact Statement (FEIS) (USFS and USFWS 1997) documents the methods by which the SPAMA is managed and generally adopts the Standards and Guidelines for Late Successional Reserves (LSR) from the Northwest Forest Plan (USDA and USDI 1994); identifies Connectivity Emphasis Areas; and places management emphasis on maintaining or enhancing late-successional habitat, rehabilitating

riparian habitat, and maintaining or enhancing wildlife habitat connectivity. Within the Study Area, late successional habitat (LSH) within Section 16 of Township 22N Range 11E, which lies between the developed portions of Summit Central and Summit East, is managed by the USFS as LSH and has been identified as a critical area for landscape connectivity in the Snoqualmie Pass area.

Land grants made in 1864 to railroad companies to encourage them to build through to Puget Sound created a complex land management situation. These grants were made in the form of alternating 1-mile square sections, with the remaining land mostly in federal ownership. This history has resulted in a mosaic of landowners and managers, including Ski Lifts, Inc., MBSNF, OWNF, private residential and commercial, and the Mountaineers. In the Snoqualmie Pass area most of the sections granted to the railroads eventually came to be owned by timber companies, principally Plum Creek, and the USFS manages the federal land. The checkerboard ownership pattern has resulted in fragmented habitat in the Snoqualmie Pass area because of contrasting management goals and actions of the USFS and the private landowners and the necessity for roads to access each section. In the FEIS for the SPAMA Plan (USFS and USFWS 1997) the Forest Service announced a policy to reduce this inconvenient pattern through land exchanges such as the I-90 land exchange between the USFS and Plum Creek Timber Company, completed in December 1999. These exchanges are designed to create larger blocks of land to manage as LSH (USDA 1998) to increase connectivity and simplify land management.

Within the Study Area, the regulation of private land is also divided between Kittitas County and King County. Each county includes the private land in the Snoqualmie Pass Area in its state mandated Comprehensive Plan. In addition, the Snoqualmie Pass Sub-Area Comprehensive Plan, including the land in both counties, was made part of the Kittitas County Comprehensive Plan. The goal of this plan for the Snoqualmie Pass Area is “to preserve the natural features and recreational amenities which contribute to its alpine environment and enhance the fabric and character of the community while planning for growth and development” (Kittitas County 1996). This plan envisions substantial growth of residential, commercial and recreational development on both private and NFSL.

5. Wildlife Resources

5.1. Overview

There are 290 terrestrial vertebrate species with the potential to occur in or near the Snoqualmie Pass area, according to the Yakima River Watershed Analysis (USFS 1997), the South Fork Snoqualmie River Watershed Analysis (USFS 1995), and the SPAMA Plan FEIS (USFS and USFWS 1997). Table 1 lists the species with special status on the MBSNF and/or the OWNF and summarizes their habitat needs and potential for presence in the Study Area. Wide ranging, mobile species were evaluated for their potential to use the general Snoqualmie Pass area around the Study Area, while low mobility species were evaluated for their potential use of the actual Study Area.

The forests of the Snoqualmie Pass area have been greatly modified by human activity, largely because the pass also serves as an important corridor for human transportation. Past railroad building, timber harvesting and fires, followed by ski area development, have resulted in the conversion of mature Pacific silver fir and mountain hemlock forests into open grass and shrub-covered slopes. This combination of open slopes and forested stands provides good habitat for black-tailed deer/mule deer, elk, red-tailed hawk and other species that use open areas or edge habitats. Species associated with interior forest habitat, such as marten, fisher, Townsend's warbler, woodpeckers, and northern spotted owl, have lost habitat and declined in the area (USFS 1995). The cliffs and peaks surrounding Alpental provide habitat for mountain goats and pika, potential nest sites for peregrine falcons, and caves that may be used by bats.

Wildlife use of the area decreases during the winter as many species, such as deer and elk, migrate to lower elevations to avoid harsh weather and deep snow. However winter wildlife use includes hibernating mammals (e.g., black bear, hoary marmot, golden-mantled ground squirrel), and non-hibernating species such as mountain goats, occasional elk and deer, snowshoe hares, and resident avian species.

Table 1:
Special Status species potentially occurring in the Study Area.

Species Name and Status	Habitat Association	Probability of Occurrence
Threatened and Endangered Species		
Northern spotted owl *(Strix occidentalis caurina*) FT	Requires mature and old growth forest, with multiple canopy layers and large amounts of dead and down woody material (FEMAT 1993).	Potential habitat available in areas of mature forest habitat within the Study Area and the Analysis Area. One spotted owl response to surveys conducted in 1994 and 1995; no spotted owls found during surveys conducted in 2001 and 2002 (barred owls found in vicinity of previous spotted owl response). Has been documented in the greater Snoqualmie Pass area (WDFW 2002, Sovern 2003 pers. com.).
Marbled murrelet (*Brachyramphus marmoratus*) FT	Mature and old-growth forest with trees having large-diameter branches for nesting (Hamer and Cummins 1991).	Potential habitat available in areas of mature forest habitat within the Study Area and the Analysis Area. No murrelets detected during surveys conducted in 1994, 1995, 2001, and 2002. Has been documented within the Analysis Area (WDFW 2002).
Grizzly bear (*Ursus arctos horribilis*) FT	Vast areas of remote, undisturbed habitat; a variety of habitats including meadows, wet areas, open slopes with huckleberries (USFWS 1993)	Known to occur in the Analysis Area (WDFW 2002), not expected to regularly occur in the Study Area.
Gray wolf (*Canis lupus*) FE	Remote, undisturbed habitat; isolation from human disturbance for denning (Paradiso and Nowak 1982).	Known to occur in the Analysis Area (WDFW 2002), not expected to regularly occur in the Study Area.
Other Rare and Uncommon Species		
Silver-haired bat (*Lasionycteris noctivagans*) RU, J2	Prefer older Douglas-fir/western hemlock forest to younger forests. Choose trees larger and taller than average, dead or damaged trees that contain refuge (Christy and West 1993). Forage primarily in clearcuts (Erickson and West 1996)	Potential habitat in the Study Area, may occur.

Species Name and Status	Habitat Association	Probability of Occurrence
Hoary bat (*Lasiurus cinereus*) RU, J2	Roost almost exclusively in trees, preferring older conifer forests, and forage in open areas. Thought to be only a summer resident or spring and fall migrant of Washington. (Johnson and Cassidy 1997, Nagorsen and Brigham 1993)	Potential habitat in the Study Area, may occur.
Terrestrial mollusks (5 species) RU	A variety of habitats including mature forest (BLM 1999).	Potential habitat available in Study Area in areas containing forested cover and coarse woody debris (CWD). No rare and uncommon terrestrial mollusks were found during surveys conducted for them between 1998 and 2001.
Forest Service Sensitive		
Bald eagle *(Haliaeetus leucocephalus*) FSS	Almost always found near large bodies of water where primary prey items of fish and waterfowl can be found (USFWS 1986).	May occur in the Analysis Area, not expected to regularly occur in the Study Area.
Pacific western (Townsend's) big-eared bat (*Corynorhinus townsendii*) FSS	Utilize caves, old mines, and buildings for summer day roosts; nursery colonies, and hibernaculum; migrate short distances between summer and winter use areas (Nagorsen and Brigham 1993).	Potential habitat in the Study Area, may occur.
Fisher (*Martes pennanti*) FSS	Dense mature forest; second growth with adequate cover; require snags and down logs; low to mid elevational forest (Johnson and Cassidy 1997).	Potential habitat in the Study Area, may occur.
Wolverine (*Gulo gulo*) FSS	Utilizes a variety of habitats including tundra, taiga, boreal forest, high-elevation mixed conifer in alpine and sub-alpine zones. Distribution dependent on availability of large ungulates (Banci 1994, Johnson and Cassidy 1997).	Known to occur in the Analysis Area (WDFW 2002), not expected to regularly occur in the Study Area.

Species Name and Status	Habitat Association	Probability of Occurrence
Northern goshawk (*Accipiter gentilis*) FSS	Large stands of multi-layered old growth forest containing small openings (Johnsgard 1990).	Known to occur in the Study Area (WDFW 2002).
Great gray owl (*Strix nebulosa*) FSS	Mature forest stands (80+ years) with greater than 60 percent canopy cover within 1,000 feet of a natural opening or meadows larger than 10 acres (USFS et al 1995).	Potential habitat for this species exists within the Study Area. No great gray owls were detected during surveys conducted in 1999 and 2000.
Van Dyke's salamander (*Plethodon vandykei*) FSS	Usually among large, woody debris within the wetted edge of streams and seeps. Near the northernmost edge of known range. (Leonard et al. 1993).	Potential habitat occurs within the Study Area in forested riparian areas. No Van dyke's salamanders were found during surveys conducted from 1997 through 1999.
Larch Mountain salamander (*Plethodon larselli*) FSS	Steep, moist talus slopes, usually moss-covered and under a forest canopy (Leonard et. al. 1993). Species has been found as far north as Cle Elum, WA.	May occur within forested habitats within the Study Area in areas of talus or coarse down woody debris habitat. No Larch Mountain salamanders were found during surveys conducted from 1997 through 1999. Known to occur in the Analysis Area (WDFW 2002).
Management Indicator Species		
Pileated woodpecker (*Dryocopus pileatus*) MIS	Mature and old growth forest; second growth with abundant snag and down wood component (Rodrick and Milner 1991).	Known to occur in the Study Area (Jones & Stokes 1995).
Primary cavity excavators MIS	A variety of forested habitat types.	One species is known to occur in the Study Area. Potential habitat occurs in the Study Area for the remainder of these species and they may occur in the Study Area.
Elk (*Cervus elaphus*) MIS	Combination of forest and open habitats. Seclusion from human disturbance important for calving (Thomas and Toweill 1982)	Known to occur within the Study Area (MBSNF sighting data, observed during field work for this analysis).

Species Name and Status	Habitat Association	Probability of Occurrence
Mule deer (*Odocoileus hemionus*) MIS	Typically inhabit higher elevations in the summer and lower elevations in the winter. Benefit from interspersion of vegetative communities. Riparian zones are important for fawning. (USFS 1998a)	Known to occur in the Study Area (MBSNF sighting data, observed during field work for this analysis).
Mountain Goat (*Oreamnos americanus*) MIS	Closely associated with steep, rocky cliffs, pinnacles, ledges, and talus slopes. Dense conifer stands, including mature and old growth, may be important in providing winter forage and thermal cover (USFS 1990a, WDFW 1999).	Known to occur in the Study Area (DeRosier 2003 pers comm.) and in the Analysis Area (MBSNF sighting data, WDFW 2002).
American marten (*Martes americana*) MIS	Prefer mature, mesic forests with complex physical structure near the ground (CWD, large talus, low hanging branches). Generally avoid cleared or open areas. (Buskirk and Ruggiero 1994)	Known to occur in the Study Area (MBSNF sighting database, WDFW 2002).
USFWS Species of Concern		
Peregrine falcon (*Falco peregrinus*) FC	Cliffs for nesting; concentrations of waterfowl and/or flocking birds for foraging (Johnsgard 1990).	May occur in the Analysis Area, not expected to regularly occur in the Study Area.
Olive-sided flycatcher (*Contopus borealis*) FC	Northern and mountainous coniferous forests; perches on high dead branches (Stokes & Stokes 1995) or dead tops of trees (Ehrlich et al 1988).	Known to occur in the Study Area (Jones & Stokes 1995).

Species Name and Status	Habitat Association	Probability of Occurrence
Harlequin duck (*Histrionicus histrionicus*) FC	Summer habitat is fast flowing streams with nearby loafing sites; cobble to boulder substrate; vegetated banks. Usually found in areas of mature and old growth forest cover (Lewis and Kraege 1999; Cassirer and Groves 1994 in Lewis and Kraege 1999).	Potential habitat in the Study Area, may occur.
Long-eared myotis (*Myotis evotis*) FC	Forested habitat below the subalpine/parkland zone; roosts in trees, buildings, and caves and occurs in areas of low-density development (Johnson and Cassidy 1997).	Potential habitat in the Study Area, may occur.
Long-legged myotis (*Myotis volans*) FC	A variety of habitats including arid range lands, and humid coastal and montane forests. Summer day roosts are in buildings, rock crevices, fissures in the ground, and tree bark. Maternity colonies occur in attics, fissures in the ground, and under tree bark. Caves and mines are used for night roosts and hibernacula (Nagorsen and Brigham 1993).	Potential habitat in the Study Area, may occur.
Yuma myotis (*Myotis yumanensis*) FC	Forages primarily over open, still water. May prefer old growth to mature or young stands (Thomas and West 1991).	Potential habitat in the Study Area, may occur.
Cascades frog (*Rana cascadae*) FC	Highly aquatic; closely associated with edges of seeps and other wetlands (Leonard et al 1993).	Known to occur in the Study Area.

Species Name and Status	Habitat Association	Probability of Occurrence
Red-legged frog (*Rana aurora*) FC	Breeds in ponds or slow-moving water containing aquatic vegetation; adults highly terrestrial, occurring in forested areas or disturbed sites with a residual down wood component (Dvornich et al. 1997). Rarely found at elevations above 3,000 feet (Corkran and Thoms 1996).	May occur in the Analysis Area, not expected to regularly occur in the Study Area.
Tailed frog (*Ascaphus truei*) FC	Turbulent mountain streams; has been found as high as 7,000 feet elevation (Leonard et al 1993).	Known to occur in the Study Area (Jones & Stokes 1995, WDFW 2002).
Western toad (*Bufo boreas*) FC	Breed in lakes, ponds, and wetlands; adults utilize a variety of habitats including forest, brushy areas, and meadows (Corkran and Thoms 1996).	Known to occur in the Study Area (Jones & Stokes 1995).

FT = federal threatened, FE = federal endangered, FC = federal (USFWS) species of concern, RU = other rare and uncommon species, J2 = identified as of concern in appendix J2 of the ROD, FSS = Forest Service Sensitive, and MIS = Management indicator species

5.2. Wildlife Habitat Associations

5.2.1. Vegetation Communities

The vegetation at Alpental and The Summit primarily fits within the “wet series” classification developed for the SPAMA Plan FEIS (USFS and USFWS 1997). High levels of precipitation and cool temperatures have created mixed conifer forests with fire return intervals of 300-600 years, deep snow cover most of the year, and generally slow growth. According to the classification scheme of Franklin and Dryness (1973) the Pacific silver fir zone covers most of the area, with the western hemlock zone at the very lowest elevations (2500 to 3000 feet) and the mountain hemlock zone at the very highest elevations. Although most of the Study Area lies east of the actual crest of the Cascades mountains, the forests of the area are more representative of the wetter high elevation forests of the west side.

Specific vegetation types within the Study Area have been mapped for use in the analysis of The Summit-at-Snoqualmie MDP Proposal. This was done through interpretation of aerial photos and field verification of vegetation types. The vegetation types identified and the amount of each available within the Study Area are shown in Table 2. General vegetation types are also shown on Figure 2, Habitat Map – The Summit and Figure 3, Habitat Map - Alpental.

Table 2:
Vegetation types and the amount available in the Study Area.

Vegetation Type	Definition	Acres in Study Area
Forested Habitats		
Western hemlock, mature	Forested habitat dominated by western hemlock ranging in size from 20 to 30 inches dbh; occurs at lower elevations within the Study Area up to approximately 2,500 to 3,000 feet.	47.71
Western hemlock, immature	Immature stands containing predominantly western hemlock and occurring at elevations up to 2,500 to 3.000 feet.	96.18
Mountain hemlock, mature	Forested habitat dominated by mountain hemlock ranging in size from 24 to 30 inches dbh; occurs at elevations above 3,400 feet.	224.61
Pacific silver fir, mature	Forested habitats dominated by Pacific silver fir ranging in size 24 to 36 inches dbh, generally occurring between 2,800 and 4,100 feet elevation.	780.80
Pacific silver fir, immature and sapling	Immature stands containing predominantly Pacific silver fir and occurring between 2,800 and 4,100 feet in elevation.	519.90
Riparian habitats		
Western hemlock, mature	As described under forested habitat, within Riparian Reserves/Buffers (RR/Bs).	22.48
Western hemlock, immature	As described under forested habitat, within RR/Bs.	16.36
Mountain hemlock, mature	As described under forested habitat, within RR/Bs.	23.87
Pacific silver fir, mature	As described under forested habitat, within RR/Bs.	273.22
Pacific silver fir, immature and sapling	As described under forested habitat, within RR/Bs.	99.92
Shrub, natural	As described under herbaceous and shrub habitat, within RR/Bs.	43.16
Shrub, modified	As described under herbaceous and shrub habitat, within RR/Bs.	116.56
Herbaceous, natural	As described under herbaceous and shrub habitat, within RR/Bs.	13.77
Herbaceous, modified	As described under herbaceous and shrub habitat, within RR/Bs.	146.29
Cliff and talus	As described under cliff and talus habitat, within RR/Bs.	13.48
Developed	Developed parking lot, road, building etc	30.38
Aquatic habitats		

Open water, lakes	Ponds and lakes containing open water.	1.34
Wetlands	Wetlands as described in Section 8.3 – Forest Service Sensitive Species.	72.29
Streams1 (miles)	Miles of streams within the Study Area.	29.47
Cliff and talus habitat		
Rock/talus	Cliffs, rock and outcrops, and talus areas.	235.26
Herbaceous and shrub habitats2		
Shrub, natural	Undisturbed riparian and wetland areas, avalanche chutes, and natural forest openings containing shrubs.	107.99
Shrub, modified	Areas that have been modified and are maintained in a shrub habitat condition.	341.87
Herbaceous, natural	Areas associated with emergent wetlands and wet meadows.	14.77
Herbaceous, modified	Areas that have been modified and are maintained in a herbaceous condition.	433.97

[1]Includes jurisdictional streams.

[2]Includes wetland and lake cover types.

Most of the vegetation, even the areas of forest cover, has been modified by ski trail or road development, timber harvest, commercial development, construction of the railroad, and fire. The older trees in most areas are Pacific silver fir, about 100-180 years old and 15-30 inches DBH, and mountain hemlock over 300 years old and of 40-60 inches DBH. Section 16 of Summit East, owned by the Forest Service, has the most area of relatively undisturbed, continuous forest.

The shrub and understory layer is dense in most forested areas, with shrubs such as huckleberries (*Vaccinium spp*.), white rhododendron (*Rhododendron albiflorum*) and stink current (*Ribes bracteosum*) and locally dense patches of small, suppressed Pacific silver fir trees of 1 to 3-inch diameter. Ski runs generally consist of patches of dense shrub and herbaceous, grassy vegetation.

5.2.2. Terrestrial Vertebrate Habitat Conditions Model

The Terrestrial Vertebrate Habitat Conditions (TVHC) model (Vandemoer 1995) describes terrestrial vertebrate habitat conditions for a variety of landscape scales. The model provides information on species occurrence, habitat availability, fragmentation, biotic diversity, human disturbance potential and other habitat attributes. The TVHC model uses the GIS to analyze, in combination, vegetation; roads and trails; and lakes and streams.

The TVHC model analyzes wildlife habitat using guilds grouped by habitat use and responses to changes in landscape condition. The guilds identified in the Snoqualmie Pass area are divided into large groups, such as generalist, open or old growth/large tree guilds, and then further divided based upon more specific criteria. A total of 53 individual guilds are identified by the MBSNF and the OWNF (USFS and USFWS 1997).

The guild habitats vary between Alpental and the Summit. In general, Alpental is dominated by open habitat with large tree habitat in small patches or narrow strips. Much of the open habitat is steep talus or bedrock. The large tree habitat provides little area of forest interior conditions but does potentially serve as travel corridors and cover. The Summit lacks steep, talus covered open habitat but does contain significant areas of grass and brush field maintained as ski trails, interspersed with patches of mature forest. The forest patches are large enough in some areas to provide forest interior habitat, especially in Section 16. This combination of open slopes and closed forest provides good habitat for deer and elk but may constrain the movement of species that avoid large openings, such as fisher, marten and lynx.

The SPAMA Plan FEIS (USFS and USFWS 1997) details the terrestrial vertebrate habitat availability; trends in habitat condition; guild habitat for early, mid- and late-seral, and ecotone and unique habitat dependent species; biotic diversity (species diversity and species richness); and species-specific habitat (acres) within the SPAMA, which includes all the Summit ski areas except Alpental. The South Fork Snoqualmie River Watershed Analysis (USFS 1995) and Yakima River Watershed Analysis (USFS 1997) include similar information for these watersheds, which combined include the entire Summit at Snoqualmie Study Area. The acreages of suitable habitat described in the following accounts of

threatened and endangered (listed and proposed) species, MIS, former Survey and Manage species, and Forest Service sensitive species are derived from these analyses, primarily the SPAMA Plan FEIS (USFS and USFWS 1997).

6. Habitat Connectivity and Fragmentation

Habitat connectivity and fragmentation refer to the size, quality, and spatial arrangement of patches of a species' habitat across the landscape, particularly the number and arrangement of these patches as they relate to the dispersal of organisms. Fragmentation and connectivity of LSH is one of the focus points in the Northwest Forest Plan (USDA and USDI 1994) and the SPAMA Plan FEIS (USFS and USFWS 1997).

The Snoqualmie Pass area has unique importance because it is the narrowest point of federally owned middle and high elevation habitat between the North and South Cascades, and the lowest elevation corridor between western and eastern Washington. The Snoqualmie Pass area provides a corridor between the following areas:

- The Alpine Lakes Wilderness to the immediate north of Alpental;
- The LSR in the Teanaway River watershed to the east:
- The LSR in the Snoqualmie River watersheds to the west: and
- The White River watershed LSR, the Norse Peaks Wilderness and Mount Rainier National Park to the south.

Because of this, the suitability of the area for movement and dispersal of wildlife is critical to sustaining populations of rare or sensitive species with naturally low densities and large ranges, such as the wolverine, grizzly bear, fisher, spotted owl and wolf. A common feature of these species, except for the spotted owl, is that their primary remaining range is in Canada and the only likely path for their movement into the southern Washington or Oregon Cascades is through the Snoqualmie Pass area. The Puget Sound region to the west has become too urbanized for these species, and the region east of the pass contains drier forest types which quickly descends to a shrub/steppe habitat unsuitable for these forest-dwelling species (USFS and USFWS 1997).

A comprehensive analysis of habitat connectivity and fragmentation was conducted as a part of the SPAMA FEIS (USFS and USFWS 1997) focusing on LSH and associated wildlife. The I-90 Land Exchange EIS (USFS 1998a) continued this analysis and the I-90 Wildlife Linkage Habitat Assessment (Singleton and Lehmkuhl 2000) combined further modeling studies with field studies of wildlife travel patterns in the I-90 area of Snoqualmie Pass. All three modeling analyses were based upon landscape level GIS modeling. Separate ratings were calculated for four to six different species or groups representing different levels of mobility and habitat specificity.

The connectivity analysis performed for the SPAMA EIS used the spotted owl to represent species linked to LSH but not sensitive to road density, and the fisher for species also dependent upon LSH but sensitive

to roads and barriers. The wolverine and the Cascades red fox were chosen as mobile species linked to high elevation, with the wolverine also sensitive to road densities. Low mobility late-successional dependent species such as small mammals, mollusks and amphibians were considered as a group. At the SPAMA scale, the modeling concluded that the Snoqualmie Pass area has moderate dispersal potential for all modeled species or species groups despite the presence of significant road density. At a site-specific scale, much of the portion of the Study Area that was modeled in the SPAMA has a low potential for dispersal for all modeled species or species groups, particularly areas of existing modified vegetation, although the LSH in Section 16 of the Study Area has a high potential for all modeled species or species groups. The Cabin Creek/Lake Keechelus area to the east was less suitable dispersal habitat for all modeled species or species groups because of the lack of LSH (USFS and USFWS 1997).

The I-90 Snoqualmie Pass Wildlife Habitat Linkage Assessment (Singleton and Lehmkuhl 2000) used a least-cost grid path model to estimate movement corridors across the I-90 area. It was determined from the model that the Snoqualmie Pass area was “most permeable for high mobility dispersal habitat generalists and least permeable for low mobility late successional riparian associates” (Singleton and Lehmkuhl 2000). High and moderate mobility species faced significant barriers near the Study Area and would encounter the best opportunity for habitat connectivity between Kachess and Cle Elum Lakes and across I-90 south of Kachess Lake. Connectivity for low mobility riparian or LSH associated species, such as salamanders, mollusks shrews and voles, was good or moderate along I-90 at the ski areas (Singleton and Lehmkuhl 2000).

The I-90 Wildlife Habitat Linkage Assessment (Singleton and Lehmkuhl 2000) also included several phases that evaluated actual wildlife movement and use in the I-90 corridor, from milepost 52 just west of The Summit to milepost 81 on the outskirts of Cle Elum. The evaluation was based on:

- Analysis of deer and elk road kills on I-90 from 1990 to 1998;
- Automated camera stations, mostly within 1 mile of the Interstate;
- Snow tracking surveys along both sides of the Interstate; and
- Monitoring of Interstate crossing structures such as bridges and culverts using traps, cameras and track plates.

The analysis for the report did not include consideration of the land west of the Denny Creek drainage.

The overall conclusion of the report, after consideration of both the modeling studies and the results of the studies of actual animal movements near the Interstate, was that seven areas along I-90 have existing or potential connectivity value for wildlife. Four of these areas occur east of The Summit. The three areas near The Summit are discussed below.

6.1. Airplane Curve, from Milepost 51 to 51.5.

This narrow zone has nearby late successional forest and the elevated roadbed of the westbound lanes of I-90 to provide wildlife passage. The eastbound lanes, however, are cut into a steep hill supported by retaining walls, which likely block direct animal passage to the habitat 'behind' (west of) The Summit ski areas. There is only one large culvert under the highway under the eastbound lanes in this area, but there are 19 small culverts. These small culverts were found to be used by numerous small mammals such as mice, chipmunks, Douglas squirrel and striped skunk.

6.2. The Corner of Sections 10 and 16.

These sections of Township 22N, Range 11E meet near milepost 54 of the highway. They are both located on National Forest land and retain considerable late-successional habitat. Section 16, which is discussed further in the section on late-successional habitat, makes up the majority of Summit East and is mostly covered by mature forest, despite the presence of several ski runs, roads and the cleared right-of-way for electrical transmission lines. Section 10 is largely undeveloped. The shape of the forested habitat in these sections may serve to funnel wildlife movement into the area of milepost 54, where two marten were detected using the large box culverts which carry Coal Creek under the highway. Bear, coyote and bobcat were also detected in the area of this corridor. The surface crossing potential at this point would appear to be poor however, because the highway is 6 to 8 lanes wide with a 6-foot high jersey barrier between the east and west bound lanes.

6.3. Gold Creek Valley and Underpasses.

The I-90 wildlife report considers the Gold Creek valley, and the north end and west shore of Keechelus Lake to be the prime wildlife movement corridor in the Snoqualmie Pass area. A high density of deer and elk road kill, and bobcat, coyote and other carnivores were observed in this zone. Gold Creek crosses under I-90 and a parallel secondary access road through three bridges, which may provide passage for larger animals when the lake water level is low. In seasons of high runoff in the creek or high water in the lake the design of these bridges leaves little opportunity for wildlife passage. Enhancement of the passageway potential of these bridges is one goal of the proposed rebuilding of I-90 between the Hyak interchange at milepost 55 and the south end of Keechelus Lake. This project has become necessary because of continued avalanche and structural problems on the highway and the inefficiency of this section in handling the traffic load (WSDOT 2004). The Gold Creek valley on the north side of the highway is mostly forested but is currently being developed into low-density residential use. A substantial natural vegetation reserve along the creek is planned to preserve the wildlife value of the valley (Snoqualmie Pass Advisory Council).

There has been no formal analysis of habitat connectivity to the west of the Denny Creek area or a survey of culverts. In reviewing GIS/vegetation data for the area 5 miles to the west of Snoqualmie Pass and along Interstate 90, the data shows large areas of mature forest on both sides of the Interstate from Denny

Creek to the Asahel Curtis picnic area, with closed immature and hardwood stands occurring on the north side of the interstate from this area down to Talapus Creek and areas of second growth forest containing large residual trees, open mature forest, and LSH occurring south of the Interstate in this area. Based on vegetation type, it appears that there would be habitat connectivity across this area.

In the area near The Summit, however, movement of animals other than birds would likely be limited by steep topography in the area between Snoqualmie Pass and Rockdale Creek. Topography to the north of the interstate suggests a natural path of travel following the Denny Creek drainage. Animals utilizing this area could travel under the elevated westbound lanes of I-90, and travel along the SFS River to cross I-90 in the area between Rockdale Creek and the Asahel Curtis picnic area. The greatest barrier to movement through any of the areas discussed is crossing the interstate. As part of an ongoing analysis on modifications to I-90 to the southeast of the Study Area, the Washington Department of Transportation is working with the USFS to identify crossing structures that could be constructed in the future (Garvey-Darda 2003 pers. com.) however this is not certain to occur.

Within the Study Area, LSH habitat within Section 16 has been identified as an important area of habitat connectivity for both wide-ranging and low mobility wildlife species. This area extends from SR 906 up to the ridge top above Hyak Lake and provides nearly continuous forest cover, with only the existing cross over trail between Summit Central and Summit East bisecting it from north to south and a transmission line corridor bisecting it from east to west. Within this area, three different surveys have been conducted to assess canopy cover and forest stand characteristics.

The first survey, conducted by Jones & Stokes in 1998, collected data on canopy cover from ten plots. Jones & Stokes conducted the second survey in 2000 and data was collected from 12 plots in the mature forest in Section 16. Data collected included canopy cover, tree species, DBH of trees, number, size and condition of both snags and pieces of coarse woody debris (CWD), and understory cover. Tree age was also determined for representative trees in some plots. SE Group conducted the third survey in 2003 and data for canopy cover, tree species, and DBH was collected from three plots located within the mature forest in Section 16. Data from these three surveys was combined and used to describe canopy cover within the mature forest in Section 16, where canopy cover was found to range from 45 to 96 percent in the plots with an average canopy cover of 79 percent and 88 percent of the plots (22 plots) having canopy cover greater than 70 percent (Jones & Stokes 1998 and 2000, SE Group 2003). On fifteen of the plots, tree DBH data was also collected, with Jones & Stokes (2000) collecting data only for trees greater than 4 inches DBH and SE Group (2003) collecting DBH for all trees in the plot. These data sets combined, and including only trees greater than 4 inches DBH for consistency, show that understory trees are generally less than 8 inches DBH, while overstory trees are generally greater than 22 inches DBH. Some plots also contain large specimen trees with diameters greater than 40 inches DBH and one reaching a DBH of 64 inches (Jones & Stokes 2000, SE Group 2003).

Canopy cover information from the three data sets was then incorporated into a GIS database and as used to model over-story canopy cover within Section 16. The result of this modeling effort showed that most

of the mature forest in Section 16 currently has a canopy cover below 70 percent with areas greater than 70 percent occurring immature western hemlock down-slope of the existing trail 71, on either side of the transmission line ROW where it is coexistent with existing Trail 49, and in scattered patches south of this area.

7. Key Wildlife Habitats and Associated Species

The USFS and WDFW have identified certain wildlife habitats as “unique” or “priority” habitats, respectively. These habitats are recognized as providing important life requirements to a variety of wildlife species. Key habitats, including LSHs, wetlands, riparian areas, cliffs, talus slopes, snags, woody debris, and meadows, are discussed below.

7.1. Late Successional Habitat

LSH contains features that are infrequent or absent in younger forests. The SPAMA FEIS (USFS 1997) lists 43 vertebrate species known or suspected to occur within the SPAMA that are believed to be closely associated with late successional forest. This list includes 5 amphibians, 28 birds, and 10 mammals. Some require only one patch for a single life cycle, some require multiple patches and some require a combination of LSH and other habitat, such as open or small tree.

For the purposes of this analysis, late-successional forest habitat (LSH) consists of both mature forest and old-growth forest. Old-growth forests are characterized by a multi-layered, multi-species canopy, a high incidence of large snags and damaged trees, and accumulations of large downed wood. Mature forests are those with similar age to old growth (80 to 220 years minimum) but without the defining structural components of old growth. Approximately 1,053 acres of LSH forest occur in the Study Area (see Table 2), with the majority in the Pacific silver fir and mountain hemlock series, with small areas of mature western hemlock forest at lower elevations along SR 906.

LSH in the Study Area has been reduced and fragmented by timber harvest, road building and development. Fragmentation of LSH affects the value of the habitat for species that require forest interior conditions. Edge effects, such as increased risk of predation from open habitat species, direct sun and unbuffered wind, reduce the effective size of a LSH patch. Depending on the adjacent vegetation type, a variable edge zone is considered necessary to dilute these effects. In LSH surrounded by clear cut forest, it has been estimated that this edge would need to be approximately 1,200 feet to completely compensate for affects from wind, temperature, light and changes to relative humidity and a patch of mature forest 25 acres or smaller is all edge and has little value as LSH habitat (Harris 1984 in USFS and USFWS 1997). The SPAMA EIS recommends that small patches of LSH not be ignored, however, because they can serve as refuges during movements. Fragmentation also divides wildlife populations into separate subpopulations, hindering dispersal, genetic interchange and recolonization of unoccupied habitat (USDA 1998). The fragmentation effect on wildlife in a specific patch is determined not only by the size of the patch but the distance to other similar patches, the degree of contrast between the patch and the surrounding habitat, the landscape level isolation of the patch, and the function the LSH serves for an

individual species. Most of the mature forest in the Study Area is in the small size class defined by the TVHC model, (0-60 acres).

7.2. Riparian Reserves

One of the objectives of the MBSNF Forest Plan, as Amended, is to "restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands" (USDA 1990a, USDA and USDI 1994). The Aquatic Conservation Strategy was designed to accomplish this. The Strategy designates Riparian Reserves that overlay all other land allocations and buffer streams, lakes, ponds (including constructed ponds/reservoirs), wetlands, and unstable or potentially unstable areas. These riparian reserves only apply to the public lands in the Study Area.

Riparian Reserve widths vary according to the type of resource they are designed to protect. In general, the following widths apply:

- Fish-bearing streams (Type 1 and 2) have Riparian Reserve widths of 300 feet on either side or a distance corresponding to two site potential tree heights, whichever is greater.
- Permanently flowing nonfish-bearing streams (Type 3) have Riparian Reserve widths of 150 feet on either side or a distance corresponding to one site potential tree height, whichever is greater.
- Seasonally flowing or intermittent streams (Type 4 and 5) have a Riparian Reserve width of 100 feet or a distance corresponding to one site potential tree height, again whichever is greater.
- Riparian Buffer widths also vary depending on wetland or stream class or type and on jurisdiction. Riparian Buffer widths on private land in the Study Area are shown in Table 3.

Table 3:
Definition of Riparian Resources by Jurisdiction within the Study Area[1]

Jurisdiction /Authority	Classification	Riparian Buffer Width (feet)
Streams		
Private Land in King County (classified according to King County Code [KCC] 21A.06.1240; buffer widths defined by KCC 21A.24.360)	Class 1	100
	Class 2, with salmonids	100
	Class 2, without salmonids	50
	Class 3	25
Private Land in Kittitas County(classified according to Washington Forest Practices Water Typing System [WDNR, 2002]; buffer widths defined by Kittitas County Ordinance 17A.07.010)	Type I	200
	Type II	100
	Type III	50
	Type IV	20
	Type V	0
Wetlands		
Private Land in King County(classified according to KCC 21A.06.1415; buffer widths defined by KCC 21A.24.320)	Class 1	100
	Class 2	50
	Class 3	25
Private Land in Kittitas County(classified according to Wetlands Rating System for Western Washington [WSDOE, 1993]; buffer widths defined by Kittitas County Ordinance 17A.04.020)	Category I	200
	Category II	100
	Category III	80
	Category IV	0

[1]Table presents generalized information for streams and wetlands as applied to the Study Area for this EIS only. Reader is referred to authorities identified for each jurisdiction for additional information regarding classification definitions, additional sensitive areas such as steep slopes and floodplains, and implementation guidance.

Riparian areas are recognized by the USFS as important wildlife habitats for reproduction, foraging, and as movement corridors. Approximately 160 species of wildlife are dependent on riparian habitats (Brown 1985).

Riparian Reserves/Buffers (RR/Bs) in natural vegetation condition include all reserves covered in natural forest (including mature and second and third growth forests) and natural nonforest vegetation types. Such RR/Bs cover 435 acres, approximately 54 percent of the total RR/B acreage within the Study Area. Riparian Buffers in modified vegetation condition include all RR/Bs cleared by historic timber harvest and for ski area operations (i.e., areas maintained in early-successional conditions of grassland or shrub cover). Some areas retain their original soils, but grading has occurred in other areas. Riparian Buffers in modified shrub and herbaceous vegetation equal 263 acres, approximately one-third of the total RR/Bs acreage within the Study Area. Riparian Buffers in developed condition include all areas entirely or

largely cleared of vegetation and include ski area access/maintenance roads, sections of SR906, parking lots, buildings, and maintenance areas. Such reserves may contain patches of grass, shrub, or trees, but pavement, gravel road surfaces, roofs, or similar surfaces cover most areas. The developed condition is present on about 30 acres, representing 4 percent of RR/Bs within the Study Area.

7.3. Wetlands

Wetland habitats include wet meadows, forested wetlands (coniferous and hardwood), shrub wetlands, and stream-associated (riverine) wetlands. Wetlands are considered by the USFS to be important wildlife habitats for reproduction, foraging, and as movement corridors. Approximately 130 species of wildlife are dependent on wetland habitats (Brown 1985), including beaver, muskrat, mink, herons, waterfowl, and numerous amphibians and neotropical migrant birds.

A total of 227 wetlands with a combined area of 72.29 acres have been identified in the Study Area, with most being in the Yakima River watershed. Many of the wetlands are small seeps on maintained ski trails, formed by either natural flows or ground re-contouring and the majority are less than ¼ acre in size. Larger wetlands occur at the base of slopes. The largest wetland at Alpental is an emergent wetland in the St. Bernard ski area, which receives some disturbance from ski development. The largest wetland complex at The Summit is Hyak Lake and the surrounding shallow emergent wetlands. This wetland complex is relatively free from disturbance and development and provides important amphibian habitat and possible bedding and calving for elk. Also, a complex of relatively large and undisturbed wetlands occurs between SR 906 and I-90, across from Summit Central. Some of these wetlands are bogs, a rare and sensitive wetland type that often contains plants that do not grow in other types of wetlands.

Most of the wetlands display a single habitat type, usually either herbaceous or shrubby vegetation. Wetlands that are dominated by native vegetation provide superior habitat value for wildlife while wetlands in ski trails, lift lines or roads show little species and habitat diversity because of disturbance from development, maintenance and summer recreation. A total of 146 wetlands occur in areas modified by land management and 81 are located in areas containing natural vegetation.

Wetlands within the Study Area contain several species of amphibians and appear to support large breeding populations of the Cascades frog, however the Watershed Condition Assessment (Jones & Stokes 1998) rated the overall habitat functions of the Study Area wetlands as low to moderate because of their small size, limited habitat diversity, and impacts from development and recreation. Therefore most wetlands in the area will have limited values for species that require larger wetlands or undisturbed sites for foraging and breeding, such as beavers, herons, otters and breeding waterfowl. Beaver Lake and several lakes just outside the boundary of the Study Area, such as Hyak, Lodge, Divide and Rockdale Lakes, may provide wetland habitat for these species.

7.4. Unique Habitats

The MBSNF Forest Plan, as Amended (USDA 1990a, USDA and USDI 1994), has defined unique habitats as cliffs, rock outcrops, talus, snags, and downed logs. Unique habitat features typically provide critical breeding sites as well as forage and roosting for cavity-nesting birds, bats, and denning mammals. The level of dependence of a species on unique habitat features varies from species to species (USDA 1998).

7.4.1. Cliffs and Talus Slopes

Cliff areas can provide hiding and escape habitat for mountain goats and nesting habitat for raptors, cliff swallows, and swifts. Talus areas support marmots and pika. According to Thomas (1979) approximately 90 species of wildlife are associated with cliff, rock outcrops and talus features. Cliff habitat is limited at The Summit although there are cliffs with potential small caves south of Beaver Lake at Summit West. Alpental contains most of the cliff/talus habitat on the four ski areas, below the peak of Denny Mountain and the Edelweiss chairlift. The SPAMA FEIS states that the cliff habitat in the Snoqualmie Pass area was rated as fair by the WDFW, based upon a helicopter survey. All cliffs in the South Fork Snoqualmie River watershed were rated as fair with the exception of Guye and Snoqualmie Peaks, which were rated as good (USFS 1995).

7.4.2. Snags and Coarse Woody Debris

Within forested habitats, snags and CWD are important components of wildlife habitat. Many wildlife species depend on snags or downed logs for a portion of their life requirements. Snags are used by at least 100 vertebrate species in forests in western Washington and Oregon (Brown 1985), of which 53 use them as primary habitat for breeding, foraging or resting (USFS 1995). Some species require snags in conjunction with early seral habitat, while others are generalist species that prefer mid- to late-seral habitats.

The MBSNF Forest Plan, as Amended (USDA 1990a, USDA and USDI 1994) and the OWNF Forest Plan, as Amended (USDA 1990b, USDA and USDI 1994) emphasize protection and management of CWD to meet the needs of species and provide for ecosystem functions. The SPAMA EIS (USFS and USFWS 1997) provides guidelines for the maintenance of CWD and snags.

In order to assess conditions in the Study Area, vegetation data, including data on snags and CWD, was collected in 16 0.1-acre plots located in areas of LSH in the vicinity of Summit East, the existing snow-play area, and along Forest Service Road 9070-110. These areas were considered to be representative of the existing unmanaged forested habitat within the Study Area. All woody debris larger than 4 inches diameter and 2 feet long was tallied, as were all snags. The results of the field data collected and how it compares with SPAMA Management goals are presented in Table 4.

Table 4:
Snag and CWD Survey, Summit at Snoqualmie

Parameter	SPAMA Management Goal	Summit at Snoqualmie Field Surveys 1/
Linear feet per acre (Average)	540 to 720	798
9-16” diameter	10%	60%
16-24” diameter	30%	24%
24-36” diameter	30%	13%
36-40” diameter	20%	0%
>40” diameter	10%	0%
Snags per acre	21-40	Not measured

1/ 1/10 acre plots surveyed in areas of natural vegetation mature forest in the vicinity of Summit East (Section 16) and Summit West (between SR906 and existing maintenance facility).

The SPAMA Plan has a goal for enough snags to maintain 100 percent of the maximum population level of cavity nesting birds and to provide snags of a variety of diameter size classes distributed across the landscape for a variety of animals including cavity nesting birds, and mammals that utilize snags such as marten and several species of bats. Since precise estimates of how many snags are required for this goal are lacking, the SPAMA plan encourages a conservative strategy for retaining snags, with a recommendation of 21-40 snags per acre in the wet series forests of the Snoqualmie Pass area. The plan also strives for retention of 540 to 720 lineal feet of CWD in Pacific silver fir forest (USFS and USFWS 1997).

Although the sample size was small, the results of the field studies indicate that CWD length is within the range recommended by the SPAMA but that the larger diameter pieces are deficient. This may be due to harvest and incidental removal of large wood since most plots showed evidence of harvest activity in the form of cut stumps and sawed logs. The lack of large diameter downed wood limits the habitat value of the mature forests for species such as marten, fisher, and pileated woodpecker.

Overall snag density could not be estimated from the small plots but the same pattern of large diameter deficiency was observed. Large snags and live trees with broken tops or other wildlife value appeared to be present at useful densities in the mature mountain hemlock forest and in the patches of mature mixed conifer/western hemlock along SR-906 and the snow-play area. Blow-down is the largest source of large downed logs in the area.

7.4.3. Meadows

Meadows are recognized as important foraging areas for a number of species, in particular golden eagles, kestrels, red-tailed hawks, certain neotropical migrant birds, deer, elk, small mammals, and many species of butterflies. True meadows are not common at The Summit or Alpental because of the dominance of tall

shrubs in open areas. However, vegetation management in ski trails has maintained areas of herbaceous or low shrub vegetation that appear to function as meadows, based upon field observations of butterflies, birds, small mammal signs, and soaring raptors. Meadow habitat in the Study Area consists of 14.77 acres of herbaceous natural vegetation and 433.97 acres of herbaceous modified vegetation.

8. Special Status Species Potentially Present in the Snoqualmie Pass Area

8.1. Vertebrate Threatened and Endangered Species

There are 6 species of terrestrial vertebrates that are listed as threatened or endangered or are candidates for such listing that may occur on the MBSNF and/or the OWNF. Of these, 5 may occur in the Study Area and are discussed below, while 3 are not expected to occur in the Study Area due to a lack of habitat for them, as described in Section 10 of this document.

8.1.1. Northern Spotted Owl

The northern spotted is listed as threatened by the USFWS. The northern spotted owl is one of three subspecies of spotted owl occurring in western North America. The northern subspecies occurs from southwest British Columbia south through the Coastal Mountains and east and west slopes of the Cascade Range in Washington and Oregon, through the Coast Ranges of northern California south to Marin County (Gutierrez et al. 1995). In Washington State, spotted owls occur in the remaining patches of suitable habitat on the eastern and western slopes of the Cascade Range and on the Olympic Peninsula.

Declines in populations of spotted owls are thought to be the result of extensive habitat loss, primarily from timber harvest. The percentages of habitat loss in the Pacific Northwest physiographic provinces have been estimated to range from 54 percent to greater than 99 percent (Gutierrez et al. 1995). Secondary sources of habitat loss include urban and suburban expansion, water development, agricultural development, fuel wood harvest, reservoir development, and mining. According to the most recent published information, the population in Washington State has been conservatively estimated at 671 pairs (Gutierrez et al. 1995). The USFWS is currently conducting a status review of this species (68 FR 44093-44094) which will provide a more accurate population estimate, however results of this review have not yet been published.

8.1.1.1. Habitat Requirements

The majority of northern spotted owl nest sites observed on public lands are in late successional or mature forest stands. In addition, the proportion of older seral stage forest surrounding nest sites is significantly greater than in random sites in the same area. In general, northern spotted owls nest in stands with greater complexity and structure than random sites in both managed and unmanaged forests. Nests typically occur in dense, multi-layered stands with high canopy closure but are occasionally found in sites lacking some of these characteristics. Spotted owls do not construct their own nests and are thus dependent on naturally occurring nest sites such as broken-top trees, large tree cavities, or platform nests built by other animals (57 FR 1796-1838).

Roosting habitat typically consists of stands containing large-diameter trees with high canopy closure and multiple canopy layers. These sites tend to be in shady spots near streams on the lower third of the slope. Foraging habitat is more variable however complex structure (multiple canopy layers, large downed woody debris, etc.) and high canopy closure are also characteristic of spotted owl foraging habitat (57 FR 1796-1838).

Dispersal habitat is more difficult to define. It can encompass nesting, roosting, and foraging habitat as well as vegetation types that are not suitable for any of these other uses. In the context of the northern spotted owl, dispersal refers not only to movement away from the nest stand by young owls but also movement within home range territories and between habitat patches, both on a local scale and across the range of the owl. Minimum requirements for dispersal habitat are stands with large enough trees and high enough canopy closure to provide protection from avian predators and some opportunity for foraging (57 FR 1796-1838).

Spotted owls utilize a wide of range of elevations throughout their known range, and have been found as low as 70 feet above sea level and as high as 6,000 feet. In general, the elevational limit at which owls are found is greater in the southern portion of their range than in the north, and lower elevation sites are more likely to contain high quality habitat (57 FR 1796-1838).

8.1.1.2. Study Methods

Spotted owl surveys were conducted in potential spotted owl habitat within and adjacent to the Study Area in 1994 and 1995, and again in 2001 and 2002. This area is also monitored by the OWNF and by Raedeke Associates as part of a long-term demographic study. Information on spotted owls was also derived from data cited in Section 4.1 - Setting. Figure 2, Habitat Map – The Summit and Figure 3, Habitat Map - Alpental show the location of stands of potentially suitable spotted owl habitat within the analysis area.

8.1.1.3. Discussion

Spotted owls are known to occur on both the east and west sides of the Cascades in the vicinity of the Snoqualmie Pass area. According to the SPAMA plan EIS, there are 33 known spotted owl activity centers within the SPAMA and 128, 490 acres of suitable spotted owl habitat available (USFS and USFWS 1997).

As of 1994, there were 20 known spotted owl activity centers in the Yakima River watershed (USFS 1997), 13 of which are also in the AMA and included in the above count. There is 80,760 acres of suitable habitat within the watershed. There are three known spotted owl activity centers in the South Fork Snoqualmie River watershed and 10,143 acres of potential habitat (USFS 1995).

In the Washington Cascades Physiographic province, spotted owl home range territories are considered to encompass 1.8 miles of land around an activity center (USFWS 1990). Of the activity centers mentioned

above, the 1.8-mile radius circle of only one includes lands within the Study Area. This territory is centered near Mt Catherine and includes a portion of the SW corner of Section 16 near Summit East.

Spotted owl surveys were conducted in potential spotted owl habitat within and adjacent to the Study Area in 1994 and 1995, and again in 2001 and 2002. One call response was obtained in the Mt Catherine area in 1994, while no spotted owls were found during 2001 and 2002. This area is also monitored by the OWNF and by Raedeke Associates as part of a long-term demographic study. Surveys conducted by Raedeke Associates in 2003 resulted in a pair of nesting spotted owls being found, however no young were fledged (Sovern 2004 pers com). The site center for this pair is approximately 1 mile away from the Study Area boundary. Potentially suitable spotted owl habitat within the Study Area is defined as LSH within the western hemlock or Pacific silver fir vegetation zones.

Northern spotted owl nesting, roosting, and forging habitat in west-side forests has historically been defined as LSH in the western hemlock and Pacific silver fir zones (USFS 1995) however recent research suggests that the Pacific silver fir zone may not be regularly utilized as nesting habitat, with the majority of nesting occurring in LSH in the western hemlock zone (Herter and Hicks 2000). Based on this and the lack of spotted owl responses during surveys in the Study Area, northern spotted owls are not expected to nest in the study area but may use the habitat within the Study Area for foraging and dispersal habitat.

The Snoqualmie Pass area was identified in the SPAMA Plan EIS as an important area for habitat connectivity for spotted owls. Of particular concern is the area of mature forest located in Section 16 between Summit East and Summit Central. This area of relatively contiguous habitat is considered an important link in the north-south movement of a variety of species including spotted owl and is described in greater detail in Section 6 – Habitat Connectivity and Fragmentation.

8.1.1.4. Critical Habitat Units

The Snoqualmie Pass Study Area is not within designated critical habitat for the northern spotted owl. The boundary of the nearest critical habitat unit, CHU-WA-33, abuts the Study Area where the corners of Section 20 and Section 16 meet.

8.1.2. Marbled Murrelet

The marbled murrelet is listed as threatened by the USFWS (see Table 1). The North American subspecies of marbled murrelet occurs from the Aleutian Islands south along the coasts of Alaska, Washington, Oregon, and California. Its distribution is closely correlated with the presence of late successional coastal forests (Carter and Erickson 1988, Nelson 1989, Paton and Ralph 1988, Sealy and Carter 1984). When at sea, marbled murrelets are mostly found within 1 mile of shore (Strachan et al. 1995). In Washington, the marbled murrelet is found in all near-shore marine environments, with the greatest concentrations found in the northern Puget Sound area (Washington Department of Wildlife 1993a).

The primary factor contributing to declines in populations of marbled murrelets is the loss and alteration of late successional coniferous forests, the species' primary nesting habitat, due to commercial timber

harvest. Additional factors potentially contributing to population declines include reduced food availability (Burkett 1995) from human over-harvesting of fish (Ainley et al. 1995), direct mortality associated with gill-net fishing, predation, urbanization, and the effects of oil spills (Fry 1995, Carter and Kuletz 1995, Washington Department of Wildlife 1993a).

8.1.2.1. Habitat Requirements

Murrelets live primarily in a marine environment but during the nesting season fly inland to nest in older forests. Murrelets typically nest in low-elevation old-growth and mature coniferous forests (Hamer 1995; Hamer and Cummins 1991). Once at sea, murrelets can be found as dispersed pairs or in flocks or aggregates (Strachan et al. 1995, Strong et al. 1996). Strong et al. (1996) found that most murrelets occurred within 1 mile of the shoreline, regardless of their age. However, hatch-year fledglings were closer to shore than the general population.

Marbled murrelets establish their nests high in older conifers with wide horizontal limbs. In Washington State, murrelets have been detected up to 50 miles inland from the coast, most typically adjacent to major drainages (Hamer and Cummins 1991). However, over 90 percent of all observations have been within 37 miles of the coast in the northern Washington Cascades (57 FR 15328-45337).

Although marbled murrelets have been known to nest in stands as small as 7.5 acres, the average nest stand size in Washington is 515 acres (Hamer and Nelson 1995), and large contiguous stands of suitable habitat are considered important to marbled murrelet recovery (USFWS 1996c). Marbled murrelet nests in Washington are usually found at elevations below 3,500 feet, within 40 miles of the nearest body of salt water (Hamer 1995), and in stands with old growth characteristics (Raphael et al. 1995).

Potential habitat for the marbled murrelet is defined in the survey protocol as mature, old-growth, or younger coniferous forests that have deformations or other structures suitable for nesting (Ralph et al. 1993). Although this definition is general, it encompasses some of the new information on murrelet nesting, including documented activity in younger forests (40-80 years) in the Oregon Coast Range (Grenier and Nelson 1995). Nonetheless, nearly all marbled murrelet nest trees have been located in old-growth and mature stands or stands with old-growth characteristics (Hamer and Nelson 1995). The percentage of old-growth tree crown cover appears to be an important factor associated with occupied sites (Miller and Ralph 1995, Hamer and Nelson 1995).

Because so few marbled murrelet nests have been found, an understanding of the microhabitat requirements of the bird is limited. The few nests that have been measured suggest that the number of potential nest sites on trees may be the best predictor of stand occupancy by this species (Hamer and Nelson1995). Murrelets require a broad flat surface (referred to as a platform) on a large lateral limb or other lateral structure; large lateral limbs are usually found on trees with larger diameters and/or on older-aged trees. Potential nest platforms include mistletoe brooms, deformed limbs, and areas where a tree has been damaged (Hamer and Nelson 1995). The essential element of a murrelet nest site, therefore, is the presence of a horizontal limb that is sufficiently large, wide, and flat to support a nest.

8.1.2.2. Study Methods

Protocol surveys were conducted for marbled murrelets in the Snoqualmie Pass area in 1994 and 1995 and again in 2001 and 2002. No marbled murrelets were detected during these surveys. Information on marbled murrelets was also derived from data cited in Section 4.1 - Setting. Figure 2, Habitat Map – The Summit and 3, Habitat Map – Alpental show the location of stands of potentially suitable marbled murrelet habitat within the analysis area.

8.1.2.3. Discussion

According to the Snoqualmie Pass AMA EIS, there are approximately 89,266 acres of suitable marbled murrelet habitat within the AMA analysis area. There has been a single marbled murrelet detection within the AMA, approximately 2 miles east of the Cascade Crest, and the next nearest detection occurred approximately 5 miles to the north in the Middle Fork Snoqualmie watershed (USFS and USFWS 1997). There have been no detections within the Study Area, however.

The majority of the Study Area is within the Pacific silver fir vegetation zone, however the largest trees in the late successional stands in the Study Area are generally either western or mountain hemlock, depending on elevation. Late successional forest containing large (>32 inches d.b.h.) western hemlocks are considered suitable nesting habitat for marbled murrelets (Federal Register 1996, 60 FR 26256-26320). Potentially suitable habitat for marbled murrelets within the Study Area occurs primarily in the area near the existing maintenance shop at Summit West and in Section 16 between Summit Central and Summit East.

Potential marbled murrelet nesting habitat within the Snoqualmie Pass area is between 40 and 50 miles inland from salt water. On the MBS, the majority (52 percent) of marbled murrelet detections to date have occurred within 20 to 29 miles inland; 42 percent within 30 to 39 miles inland; 4 percent within 40 to 49; and less than 1 percent between 50 and 60 miles inland. While this suggests a preference for habitat closer to salt water, surveys were not evenly distributed, with more surveys conducted within the 40 miles or less zone (USDA and USDI 1997).

Hamer (1995) found that murrelet detections decreased with both increased distance from salt water and increased elevation, with a sharp decline in detections occurring above 3500 feet elevation. While the Snoqualmie Pass area is greater than 40 miles from salt water, potentially suitable habitat in the area occurs at elevations less than 3500 feet.

Marbled murrelets are believed to be absent from The Summit-at-Snoqualmie Study Area based on the following information:

- Surveys conducted to protocol during 1994 and 1995 and again in 2001 and 2002 did not detect marbled murrelets in the Study Area.
- The distance of the summit area from salt water (>40 miles) reduces the probability of murrelets occurring in the area (Hamer 1995).

8.1.2.4. Critical Habitat Units

The Snoqualmie Pass Study Area is not within designated critical habitat for marbled murrelets. The boundary of the nearest Critical Habitat Unit is CHU-10-c, is approximately 1 mile west of the Study Area.

8.1.3. Grizzly Bear

The grizzly bear is listed as threatened by the USFWS. Historically, the grizzly bear occurred from the mid-plains west to the coast of California and south into Texas and Mexico. Currently, grizzly bears remain in only five areas in the conterminous United States: the Greater Yellowstone Ecosystem, the Northern Continental Divide, the Cabinet-Yaak area, the Selkirk Mountains, and the North Cascade Mountains. Two additional areas, the San Juan Mountains in Colorado, and the Selway-Bitteroot Mountains in Idaho, may also support grizzly bears (USFWS 1993a). Human- caused mortality and habitat loss and degradation are currently the greatest threats to grizzly bear populations in the conterminous United States (USFWS 1993a).

8.1.3.1. Habitat Requirements

Grizzly bears historically occurred in a wide variety of habitat types, suggesting a wide range of habitat tolerances. Morphological adaptations in the digestive system and teeth allow grizzly bears to exploit a wide variety of food sources. The spatial and temporal distribution of food has a pronounced influence on grizzly bear movements. In general, grizzlies seek lower elevations and drainage bottoms upon emergence from the den where ungulate winter ranges and new plant growth are most abundant. Through spring and early summer, the bears will follow plant growth back up to higher elevations. Thus, an abundant and varied food supply and large tracts of land providing relative isolation and freedom from human encroachment are important components of grizzly bear habitat.

Cover is another important component of grizzly bear habitat. Although grizzly bears occur most often in a mosaic of forested habitat interspersed with open parks for foraging, the majority of locations of radio-collared bears are from dense forest habitat. In addition, the vast majority of grizzly bear bedding sites are in forest habitats less than 2 yards from a tree (USFWS 1993a).

Denning habitat is an essential component of grizzly bear habitat because grizzly bears do not enter true hibernation (body temperature remains constant in grizzly bears during hibernation). Bears have been documented to abandon denning sites in response to disturbance. Dens are excavated from September to November, typically on steep slopes where wind and topography cause large accumulations of deep snow. Den sites usually occur at higher elevations well away from development and human activity (USFWS 1993a).

8.1.3.2. Study Methods

Resource information for grizzly bears was derived from existing information cited in Section 4.1 - Setting, from reconnaissance survey data collected during 1994 and 1995, and from interpretation of aerial photos of the Study Area.

8.1.3.3. Discussion

Within the conterminous United States, there are 5 grizzly bear recovery areas, one of which is the North Cascades Recovery Zone. This zone extends from the Canadian border along the Cascades to I-90, encompassing approximately 9,565 square miles (USFWS 1993). Alpental lies within that North Cascades recovery zone. Within the recovery zone, Bear Management Units have been identified but management requirements have not yet been assigned in the area (USFS 1995). The Alpental SUP has a land allocation of Administratively Withdrawn under the NWFP and is designated as having a winter sports recreation emphasis. Part of the SUP is located within a Bear Management Unit and contains core habitat. However, the area would not be managed for grizzly bear due to the high level of human activity and development.

Grizzly bears may also occur outside of the recovery zone. Since grizzly bears are large, wide ranging animals, they may utilize the Study Area as a portion of a larger home range although use of the Study Area would be limited by the amount of human activity since grizzly bears are known to avoid areas with high levels of human activity.

Within the AMA, there are an estimated 21,087 acres of key habitat types for grizzly bears. Use of much of this habitat is likely limited by road densities exceeding the 1 mile of road per square mile of land recommended as a maximum for grizzly bear habitat (USDA and USDI 1997). Between 1974 and 1991, there were 9 grizzly bears sightings within the AMA, three of which were rated “confirmed” by the WDFW and six of which were rated “highly reliable”. Grizzly bears have also been confirmed to the east of the AMA (USDA and USDI 1997). In addition there have been two grizzly bear sightings in the Alpine Lakes wilderness, northeast of the Study Area, for which the reliability was not reported (WDFW 2000).

According to the South Fork Snoqualmie Watershed Analysis (USFS 1995), there have been no class 1 (confirmed) grizzly bear sightings on the Snoqualmie Ranger District. The watershed does contain an estimated 1,251 acres of spring foraging habitat and 8,467 acres of fall foraging habitat, however. Use of the watershed by grizzly bears is likely to be limited by high human use, however, since the watershed has a human accessibility index of 3.35. This is a measure of the road, trail and other human development density and the optimal maximum index value for grizzly bear management is 1.00 (USFS 1995). Within the Yakima watershed there is an estimated 13,109 acres of grizzly bear habitat and an open road density of 2.58 miles per square mile of land (USFS 1997).

Grizzly bears are not expected to regularly occur in the Study Area due to the high level of development within the Study Area and the associated high level of human activity. Grizzly bears may rarely occur in

the Study Area, however, potentially utilizing it as part of a larger home range territory or as travel habitat between patches of more remote habitat.

8.1.4. Gray Wolf

The gray wolf is listed as endangered by the USFWS. Gray wolves are found in all habitats of the northern hemisphere except tropical forest and arid deserts (Nowak and Paradiso 1983). In North America, gray wolves historically occurred throughout Canada and the United States, except the southeastern quarter, and into Mexico. Currently, naturally occurring viable populations of the gray wolf in the United States have been documented from Minnesota, Wisconsin, Michigan, and northwestern Montana. In addition, gray wolves have been reintroduced in Yellowstone National Park and in Idaho. In Washington, gray wolf family units have been documented in two areas in the last 10 years, including the North Cascades National Park. There have been sightings in the North Cascades and Selkirk Mountains.

Declines in gray wolf populations coincided with the westward expansion of European settlers in the late 19th and early 20th centuries. Human persecution is the primary cause of gray wolf population declines. Additional factors include severe reductions in ungulate prey populations and habitat loss (USFWS 1987).

8.1.4.1. Habitat Requirements

Historically, gray wolves occupied a variety of habitat types, suggesting a broad array of habitat tolerances. Key components of suitable habitat for gray wolves include a year-round large ungulate and alternative prey base, space with minimal human encroachment and contact, and suitable denning and rendezvous sites (USFWS 1987).

Gray wolves typically dig their own dens, often weeks in advance of the birth of pups. Whelping dens tend to occur on southerly aspects of moderately steep slopes on well-drained soils, usually within 400 yards of surface water in an area overlooking surrounding terrain. In addition, these sites tend to be at least 1 mile from recreational trails and 1 to 2 miles from backcountry camp sites (USFWS 1987).

Rendezvous sites are specific resting and gathering sites used by wolf packs during the summer and fall after natal dens have been abandoned. The sites are typically composed of a meadow or complex of meadows and adjacent stands of timber located near water. Wolves are particularly sensitive to disturbance at the first few rendezvous sites used after abandonment of the natal den. Rendezvous sites are often located in bogs or abandoned and revegetated beaver ponds. The size of rendezvous sites varies from 0.5 acre to sites along drainages 0.6 mile long, but are typically about 1.0 acre.

8.1.4.2. Study Methods

Resource information for gray wolves was derived from existing information cited in Section 4.1 - Setting, from reconnaissance survey data collected during 1994 and 1995, and from interpretation of

aerial photos of the Study Area. In addition, howling surveys were conducted in the Study Area vicinity during 1994 and 1995.

8.1.4.3. Discussion

Gray wolves, once thought to be extirpated from Washington, are becoming reestablished in the State. Three family units have confirmed in Washington, one in Okanogan, one in North Cascades National Park, and one in the Glacier Peak Wilderness (USFS 1999).

There have been no confirmed wolf sightings within the AMA, however several unconfirmed sightings are reported each year. Wolves are sensitive to human activity and wolf use of otherwise suitable habitat is limited by road densities above 1 mile of road per square mile of land (Theil 1985, Mech 1988). Road densities within the AMA are considerably higher than this level, with densities of 2.44 miles/square mile in the portion of the AMA east of the Cascade crest, and 2.79 miles/square mile in areas west of the Cascade crest (USDA and USDI 1997).

There have been no confirmed wolf sightings within the Yakima River watershed, however unconfirmed sightings are common. There is an estimated 5,204 acres of potentially suitable wolf denning and rendezvous habitat within the watershed, but road densities are 2.58 miles per square mile and so may limit wolf use of the area. Since roads are not uniformly distributed on the landscape, there are areas where road densities are below 1 mile per square mile. Areas within the Yakima River watershed with road densities below 1 mile per square mile are the Silver Creek, Gold Creek, and Box Canyon subwatersheds (USFS 1997).

Within the South Fork Snoqualmie watershed, there is an estimated 1,631 acres of suitable gray wolf denning and rendezvous habitat available. As in the above analysis units, high levels of human access are likely to limit wolf use of the area. There have been no confirmed wolf sightings within the South Fork Snoqualmie watershed, however there have been two sightings which, although unconfirmed, have a high reliability rating (USFS 1995).

There have been no wolf sightings within the Study Area and given the high levels of human use in the area year round and the proximity of I-90, it is unlikely that wolves would use the area for either denning or rendezvous sites. Of the ski areas, Alpental has the highest potential for use by wolves due to being the most remote, however denning and rendezvous sites are usually located in broad flat valley bottoms (Mech 1988) and Alpental contains predominantly steep slopes and cliff habitat. Howling surveys were conducted in the Snoqualmie Pass area in 1994 and 1995, however no responses were heard.

Gray wolves are not expected to regularly occur in the Study Area due to the high level of development within the Study Area and the associated high level of human activity. Gray wolves may rarely occur in the Study Area, however, potentially utilizing it as part of a larger home range territory or as travel habitat between patches of more remote habitat.

8.2. Rare and Uncommon and Other ROD Species

At the time the Northwest Forest Plan (USDA and USDI, 1994) was implemented, there were 8 species included on the list of Survey and Manage species that were determined to have the potential to occur in the Study Area:

- One bird, the great gray owl;
- Two terrestrial amphibians, Van Dyke's salamander and Larch Mountain salamander;
- And 5 species of mollusks, blue-gray taildropper, evening fieldslug, keeled jumping slug, warty jumping slug, and pappilose taildropper.

Since the Northwest Forest Plant and associated ROD were published, the USFS and USBLM have issued several amendments (USDA and USDI 2000, 2001, 2002, and 2003) which variously altered the categories in which species were included under the Survey and Manage Standards and Guidelines and amended the list of species included under the Survey and Manage provisions. In 2004, the USFS and USBLM issued an EIS and associated ROD that removed in their entirety Sections I through VIII and XII of the Survey and Manage Mitigation Measure Standards and Guidelines from Land and Resource Management Plans of FS and BLM units within the range of the northern spotted owl. This decision removed the survey and mange designation for the species listed above.

Of the species having the potential to occur in the Study Area, the great gray owl, Van Dyke's salamander, and Larch Mountain salamander have been added to the Regional Foresters Sensitive Species list and 5 species of mollusks are no longer considered special status species on the MBSNF or the Wenatchee portion of the OWNF.

Information about the great gray owl, Van Dyke's salamander, and Larch Mountain salamander is included in Section 9.3 – Forest Service Sensitive Species of this document, reflecting the change in status to Forest Service Sensitive. Information about species is retained here to document compliance with Standards and Guidelines in effect during the time that information was being collected to support The Summit-at-Snoqualmie MDP EIS.

In addition to the former Survey and Manage species, there are 7 species of bats listed in appendix J2 of the Northwest Forest Plan with the potential to occur on either the MBSNF or OWNF. Of the species of bats listed in appendix J2 of the Northwest Forest Plan, 4 have the potential to occur in the Study Area and 3 are not expected to occur and are described in Section 10 – Determination of Effect of this document. Of the 4 with the potential to occur, two are discussed below while two species that are also USFWS species of concern are discussed in Section 9.5 – USFWS Species of Concern of this document, along with other bats in the genus Myotis.

8.2.1. Mollusks

The USFS and BLM have developed a survey protocol for terrestrial mollusk species (Furnish et al. 1997, revised by Duncan et al 2003) under the Northwest Forest Plan (USFS and BLM 1994), as amended (USDA and USDI 2001, 2002, 2003 and 2004). The Survey and Manage provisions of the Northwest Forest Plan, which are no longer in effect, required that terrestrial mollusk surveys be carried out within the suspected range of terrestrial mollusk species before any habitat-disturbing activities occurred on federal land. Based on the understanding of the range and habitat requirements of terrestrial mollusks, it was determined that the Study Area may be within the suspected range of 5 former Survey and Manage species, the blue-grey tail-dropper (*Prophysaon coeruleum*), evening fieldslug (*Deroceras hesperium*), the keeled jumping slug (*Hemphillia burringtoni*), the warty jumping slug (*H. glandulosa*), and the pappillose tail-dropper (*Prophysaon dubium*). All of these species were included in the list of species for which surveys were conducted in the Study Area between 1998 and 2001.

8.2.1.1. Habitat Requirements

The Puget Oregonian snail is associated with mature and old-growth forests of low and middle elevations. They have usually been found in moist forests with canopy cover of 70 percent or more and a significant hardwood component, especially big-leaf maple. They live under hardwood debris, forest floor litter or swordferns. The species appears to be distributed widely but patchily throughout the western Cascades and the Puget Sound region. They have been found in the MBSNF and one expert expects them to inhabit the OWNF in valleys in the east slope of the Cascades (Burke 1999).

The evening fieldslug is very rare and has been found in only a few well-separated locations from northwestern Oregon to northeastern Vancouver Island. The current status of the species is unknown because few have been found in the last 50 years. It appears to inhabit low elevation, moist forests with shrubs and hardwood trees (Burke 1999).

The keeled and warty jumping slugs belong to a genus *Hemphillia*, endemic to the Pacific Northwest. They are small slugs, less than 1 inch long, which retain a visceral hump on their backs covered by a small shell visible through a slit. When disturbed they thrash their tails and twist their bodies, giving them their common name as jumping slugs. They inhabit moist conifer forests west of the Oregon and Washington Cascades and are usually found in or under decaying logs and forest floor litter (Burke 1999).

The blue-gray and papillose taildropper slugs are usually found in moist, late successional forests with high canopy closure and abundant woody debris. Within these forests they are commonly associated with debris and leaf litter of hardwoods, especially vine and big-leaf maple. They feed on fungal fruiting bodies and may serve to distribute spores (Burke 1999).

8.2.1.2. Study Methods

The original list of species potentially occurring in the Study Area was derived from Furnish et al. (1997), Deixis Consultants (1998), and BLM management recommendations and survey protocols (Burke 1999).

The survey area at The Summit-at-Snoqualmie was determined from review of aerial photographs, correlation of vegetation communities defined for the Study Area, identification of project areas to be impacted by habitat-disturbing activities, definition of areas of potentially suitable habitat (presence of mature or old-growth forest, streams or wetlands, and talus), and field verification of habitat suitability. Survey areas are described in Table 5 below.

Table 5:
Characteristics of mollusk survey areas in the Study Area.

Survey Area	Location	Number of plots	Acres	Elevation (feet)	Habitat
1	Alpental	0	NA	3400-3550	Dense understory, no rock
2	Alpental	2	8	3500-4100	Dense understory, some bedrock
3	Summit West	2	2.9	~3060	Dense understory, some wetland; Beaver Lake Creek
4	Summit West	2	0.9	~3080	Dense understory, fairly open
5	Summit West	2		3200-3300	Dense understory, no rock
6	Summit West	0	NA	3400-3600	Dense understory, no rock
7	Summit Central	4	19.8	2800-3100	Dense understory, no rock, some open areas; Hyak Creek and two tributaries
8	Summit East	2	7.7	3000-3150	Dense understory, no rock; Pulse Creek headwaters
9	Summit East	2		3550-3600	Moderate understory, no rock
10	Summit East	2	10.5	3400-3500	Large trees, blowdown common, no rock; Hyak Creek
11	Summit East	19	115.3	2850-3550	Variable understory, blowdown comon, no rock; Stream A, Stream B, Pulse Creek
12	Summit East	0	NA	3300	No forest or rock to be disturbed
13	Summit Central	2	NA	3660-3700	Forested w/ moderate understory, some bedrock
14	Summit West	2		>3700	Hemlock forest w/ *Vaccinium* understory, occasional talus patches
15	Summit East	2			Hemlock forest w/ *Vaccinium* understory
16	Summit East	2		3300	Hemlock forest w/ *Vaccinium* understory
17	Summit East	2		3400	Hemlock forest w/ *Vaccinium* understory
18	Summit East	2		3400	Hemlock forest w/ *Vaccinium* understory

Under the protocol (Furnish et al. 1997), two sample areas of approximately 270 square feet each are sampled for every 10 acres of suitable habitat in each survey area. Additionally, point searches are conducted in suitable habitat outside of the specific sample site. Surveys were conducted between falloff 1998 and spring of 2001.

Mollusk surveys were conducted according to Furnish et al. (1997) and with guidance from Frest (pers. comm.). The protocol requires a total of two surveys of each survey and sample area be conducted in the spring or fall. Surveys were continued until the soil and air temperature conditions were outside of the protocol requirements. Slugs and snails observed in the Study Area were collected by hand, and all logs and rocks overturned during the survey were returned to their original positions.

Voucher specimens of each taxa found were preserved and identified by Dr. Terrence Frest and Edward Johannes. As a general procedure, live specimens of any suspected Survey and Manage species encountered would be collected for positive identification. The locations of the specimens would be flagged and recorded, and the specimen returned to the point of capture after identification verification. Specimens were kept cool and moist in containers with an adequate air supply during transport.

8.2.1.3. Discussion

Six different species of terrestrial mollusk were found during surveys and are listed in Table 6 but no species listed as Survey and Manage at the time surveys were conducted were found. There are no historical records of any Survey and Manage mollusks species in the Study Area. Three specimens of the papillose taildropper, a former survey and manage species, were found during surveys for the I-90 land exchange (USFS 1998a), at lower elevation sites east of Kachess Lake (townships T21N R14E, T22N R14E, and T22N R13E) and well to the east of the Study Area. They were all found in moist leaf litter in hardwood forests, a habitat type that is lacking within the Study Area.

Table 6:
Terrestrial Mollusk species detected in the Study Area.

Species	Survey areas at which detected																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Haplotrema vancouverense		X				X	X	X			X							
Ancotrema sportella							X	X			X							
Vespericola columbianus							X				X							
Hemphillia dromedarius		X	X	X	X		X	X	X	X	X		X	X	X	X	X	X
Prophysaon vanattae			X	X			X	X		X	X		X		X			
Deroceras laeve			X															

The location, elevation and habitat for the 18 survey areas are shown in Table 5. Most of the areas required for survey for this project are at or above the maximum known elevation limit of 3000 feet (Furnish et al. 1997) for the former Survey and Manage species. An important component of habitat for these mollusks, large big-leaf maple, is only common in warmer areas of light snowpack and is completely absent from the forests of the area. Other common habitat elements for many of these species are the presence of deciduous forest overstory, substantial leaf litter and decaying logs. All of these features are absent or rare in the study area and therefore it is unlikely that these mollusk species are present.

8.2.2. Silver-Haired Bat

The silver haired bat is one of several bat species identified in Appendix J2 of the FSEIS on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern spotted Owl (USDA and USDI 1994b) as failing to be adequately protected by the Northwest Forest Plan. Although additional mitigation measures for this species are required only on lands designated as matrix under the Northwest Forest Plan, the silver-haired bat is included in this analysis because it has been identified as a species for which there is concern.

8.2.2.1. Habitat Requirements

The Silver haired bat is a medium sized, moth eating species widespread in the forested areas of Washington State (Johnson and Cassidy 1997). They are solitary breeders and are believed to migrate long distances for winter, although few winter locations have been found. Migration patterns are sexually segregated, with males and juveniles migrating earlier and farther and females following later in the summer, presumably because bearing and rearing young requires favorable climate and high prey densities (Christy and West 1993).

Studies of habitat preferences in Oregon and Washington have found that they strongly prefer older Douglas-fir/western hemlock forest to younger forests. Radio-telemetry studies to locate and study roost trees found that silver-haired bats consistently chose trees larger and taller than average, and chose dead or damaged trees that contained cavities, loose bark or some other type of refuge (Christy and West 1993, Vonhoff 1996, Betts 1996). Bat call surveys of bat use of managed forest landscapes have found that silver-haired bats forage primarily in clearcuts and avoid young closed canopy and harvest age forests (Erickson and West 1996).

8.2.2.2. Study Methods

Resource information for silver-haired bats was derived from literature cited in Section 4.1 - Setting, WDFW PHS database (2002) information, and field searches for suitable caves and other roosting sites.

8.2.2.3. Discussion

The Snoqualmie Pass area is within the geographic range and habitat types used by the Silver-haired bat, according to the analysis performed by the Gap Project (Johnson and Cassidy 1997). Older forests with large damaged or dead trees are present in the Study Area, but are only common at Summit East. Open areas and lakes for foraging are present at the higher elevations of The Summit. Although not known to occur, silver haired bats may occur in the Study Area.

8.2.3. Hoary Bat

The hoary bat is one of several bat species identified in Appendix J2 of the of the FSEIS on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern spotted Owl (USDA and USDI 1994b) as failing to be adequately protected by the Northwest Forest Plan. Although additional mitigation measures for this species are required only on lands designated as matrix under the Northwest Forest Plan, the hoary bat is included in this analysis because it has been identified as a species for which there is concern.

8.2.3.1. Habitat Requirements

A large, fast-flying bat that feeds on large insects such as moths and beetles, the hoary bat occurs throughout the state in forested areas. Hoary bats are thought to be migratory, wintering south of the United States, although two museum records exist for hoary bats found in Washington in the winter. The number of hibernating hoary bats in Washington is thought to be low, with most occurring in the area as summer residents or spring and fall migrants (Johnson and Cassidy 1997).

Hoary bats roost almost exclusively in trees and forage in open areas (Johnson and Cassidy 1997). A study in Oregon found that they preferred older conifer forest to younger forests, probably due to higher quality roost sites being available in older forests (Johnson and Cassidy 1997, Nagorsen and Brigham 1993).

8.2.3.2. Study Methods

Resource information for hoary bats was derived from literature cited in Section 4.1 - Setting, WDFW PHS database (2002) information, and field searches for suitable caves and other roosting sites.

8.2.3.3. Discussion

The Snoqualmie Pass area is within the geographic range and habitat types used by the hoary bat, according to the analysis performed by the Gap Project (Johnson and Cassidy 1997). Older forests with large damaged or dead trees are present in the Study Area, but are only common at Summit East. Open areas and lakes for foraging are present at the higher elevations of The Summit. Although not known to occur, hoary bats may occur in the Study Area.

8.3. Forest Service Sensitive Species

There are 17 species on the Regional Forester's sensitive species list and two species that are proposed for addition to this list that may occur on either the MBSNF and/or the OWNF. Of these, 6 of the species on the Regional Forester's sensitive species list and both of the species proposed for addition to this list may occur in the Study Area and are discussed below. Ten species that are on the Regional Forester's sensitive species list are not expected to occur in the Study Area, as described in Section 10 – Determination of Effect of this document.

8.3.1. Pacific Western (Townsend's) Big-Eared Bat

Townsend's big-eared bat is a colonial species that is considered a "moth specialist", feeding predominantly on lepidopteran prey. It is present throughout Washington state except at higher elevations (Johnson and Cassidy 1997). Population declines have been noted in California and other western states (Williams 1986, Pierson 1988) as well as in the east, where two subspecies are federally listed as endangered (Dobkin et al. 1995). The Pacific western (Townsend's) big-eared bat is both a Forest Service sensitive species and a USFWS Species of Concern. The AMA plan requires surveys of caves, mines and abandoned wooden bridges and buildings for roosting bats and special protection for sites used by bats. It also requires notification of the state wildlife department of detections of Townsend' big-eared bat roosting sites.

Human disturbance, including destruction of roosting habitat and human activity near maternity roosts, is considered the primary cause of declines in Townsend's big-eared bat populations (Pierson 1988). The species' extreme sensitivity to human disturbance (Christy and West 1993) has caused entire maternity colonies to abandon breeding sites when approached by humans. A comparison of counts of individuals in known hibernacula with historical records suggests that some Oregon populations have declined since about 1958 (Christy and West 1993).

Townsend's big-eared bat may occur within the Snoqualmie Pass area because of the presence of potential foraging and roosting habitat.

8.3.1.1. Habitat Requirements

Townsend's big-eared bat requires roosting, maternity, and hibernation sites free from human disturbance (Williams 1986). Females congregate in the spring, using caves, mine tunnels, or abandoned buildings as maternity sites. Most maternity colonies are within about 300 feet of a stream or riparian system (Pierson 1988). Fidelity to maternity colonies between years is apparently high (Christy and West 1993).

Hibernation sites may be a limiting factor for the species and include buildings, mine tunnels, and caves that are structurally similar to maternity sites, except that they often have lower ceilings (Pierson 1988, Christy and West 1993). Known roost sites in California include limestone caves, lava tubes, mine tunnels, buildings, and other man-made structures (Williams 1986). Unlike many bat species that roost in crevices, Townsend's big-eared bat will apparently only roost hanging from walls and ceilings and

requires a relatively large open space that permits extended flight in the roost (Pierson 1988). Although some bat species appear to find optimal roosting habitat in old-growth forests (Thomas and West 1991), Townsend's big-eared bat apparently does not require forested habitats for roosting or hibernating (Pierson 1988, Christy and West 1993). In fact, the species is considered a habitat generalist, inhabiting deserts in Arizona, native prairie in Kansas and Oklahoma, and agricultural and coastal areas in California and Washington (Dobkin et al. 1995).

Townsend's big-eared bats forage mostly along forest edges and in forest openings and over water (Christy and West 1993, Erickson 1997).

8.3.1.2. Study Methods

Resource information for the Townsend's big-eared bat was derived from literature cited in Section 4.1 - Setting, WDFW PHS database (2000) information, and field searches for suitable caves and other roosting sites.

8.3.1.3. Discussion

The TVHC model predicts 70,045 acres of potential foraging habitat within the AMA for the Townsend's big-eared bat. The species has been documented on the MBSNF (USFS 1990a), with one winter hibernaculum about 20 miles south of the Pass area and hibernacula for males and juveniles elsewhere on the MBSNF and OWNF (USFS and USFW 1997). Habitat surveys conducted at Alpental in 1994 did not find any caves or detect this species. The large amount of forest edge and the numerous lakes in and adjacent to the Study Area provide suitable foraging habitat. Although not documented within the Study Area, Townsend's big-eared bat may occur.

8.3.2. Fisher

The fisher is considered a Species of Concern by the USFWS and is listed as endangered by the WDFW. The species prefers dense mature forest, although it inhabits second-growth forests that provide ample cover (Powell and Zielinski 1994, Johnson and Cassidy 1997). Records indicate that heavy snowfall at higher elevations may be detrimental to fisher (Johnson and Cassidy 1997).

Historically, fishers were present throughout Washington, although numbers were low relative to other western states. Currently, the fisher is exceedingly rare and in danger of extirpation in the near future (Stinson and Lewis 1998). Infrequent sightings and incidental captures in low to mid elevation forests and occasionally in silver fir dominated forests are the only reports that fishers still exist within the state (Stinson and Lewis 1998).

Fisher populations declined dramatically during the early part of this century, and the species was extirpated over much of its range in the United States by a combination of over-trapping and timber harvesting (Powell and Zielinski 1994). Contemporary declines in fisher populations have been attributed

to timber harvesting, but little empirical data exist to support this conclusion, largely because the species is too rare to study in most areas.

Fishers are assumed absent from the Snoqualmie Pass area because habitat is unsuitable due to the openness of the forest canopy and depth of yearly snowpack.

8.3.2.1. Habitat Requirements

Fishers occur most commonly in landscapes dominated by mature conifer forest (Arthur et al. 1989, Buck et al. 1994) and are associated with late successional forests (Ruggiero et al. 1991, Jones and Garton 1994). In the Pacific Northwest, fishers are considered obligate late successional mammals (Allen 1983, Harris et al. 1982). In the western United States in general, they prefer late successional forests and use riparian corridors disproportionately more than their occurrence (Buck et al. 1994; Jones and Garton 1994; Raphael 1984, 1988; Rosenburg and Raphael 1986). High canopy closure appears to be a consistent habitat feature selected by fishers throughout their range (Powell and Zielinski 1994). Fishers will avoid open places with limited cover (Strickland et al. 1982).

In the western United States, fishers appear to be sensitive to forest fragmentation. Rosenberg and Raphael (1986) reported that fishers in northwestern California are sensitive to stand insularity and stand area. Frequency of occurrence decreased rapidly in stands less than 247 acres.

Fishers have been associated with riparian habitat (Buck et al. 1983, Rain 1983) and are known to use riparian corridors and saddles between drainages as travel corridors, permitting movement through clearcut areas between stands (Heinemier 1993). Buskirk and Powell (1994) hypothesized that forest structure is more important to fishers than species composition. Strickland et al. (1982) suggested that fishers move according to available food, cover, weather, den availability, and topography.

Fishers use brush piles, snow dens, tree cavities, burrows of other animals, or hollow logs as sleeping and shelter sites (Stinson and Lewis 1998, Strickland et al. 1982). They typically require snags and logs for maternal dens (Paragi et al. 1996). Powell and Zielinski (1994) reported that all natal and maternal dens found in the western states are in large-diameter logs or snags, habitat elements that are reduced in heavily managed forests.

In the western Washington Cascades, fisher have been sighted in forests up to 3000 feet, avoiding higher elevations because of their difficulty in moving in deep snow (Powell and Zielinski 1994).

8.3.2.2. Study Methods

Resource information for the Pacific fisher was derived literature cited in Section 4.1 - Setting and habitat surveys by Jones & Stokes field biologists.

8.3.2.3. Discussion

During intensive surveys for forest carnivores in Washington in the 1980’s and 90’s, no fishers were detected (Lewis and Stinson 1998). From 1969 to the present there have been only 4 incidental captures

of fisher by trappers, and only four reliable sightings per year from 1980 to 1991. From this information the Washington State Status Report for the Fisher (Lewis and Stinson 1998) concluded that the fisher was either extirpated from the state or so rare that the population could not recover without re-introductions for other areas.

The South Fork Snoqualmie Watershed Analysis (USFS 1995) concluded that habitat in the watershed was too fragmented to support fisher, but that the habitat in basins of the Middle and North forks of the river was suitable and probably supported at least one pair for fishers. The width of I-90 and the road density (2.77 miles/mile^2) in the Snoqualmie Pass area were considered an almost complete barrier to fisher dispersal.

The SPAMA FEIS (USFS and USFWS 1997) states that the TVHC model identified a total of 127,000 acres of suitable fisher habitat in the AMA. If fishers are present or re-introduced in Washington the Snoqualmie pass area will be an important feature in the dispersal required for such a wide-ranging species.

8.3.3. California Wolverine

The wolverine is the largest of the terrestrial North American mustelids and apparently one of the rarest (Wilson 1982). The species is regarded as a Species of Concern by the USFWS, is listed as a sensitive species by USFS Region 6, and is a candidate for listing by the WDFW. In Washington, the current distribution of wolverines is unknown. However, the 28 records for the state documented from 1970 to 1990 are concentrated primarily in the north and central Cascades and the northeastern corner of the state (Banci 1994, Johnson and Cassidy 1997). A recent examination of wolverine sightings in the Pacific Northwest from about 1960 to 1998 found a similar concentration in mountainous areas (Edelman and Copeland 1999) and an increasing trend in sightings.

Declines in wolverine populations have been attributed to over-trapping and human persecution in the early part of the 20th century (Nowak and Paradiso 1983). Habitat loss and alteration due to agricultural development, cattle grazing, forestry, mineral and petroleum exploration and development, hydroelectric power development, human settlement and increased human access, and recreational activity have contributed to the decline of the species. The extreme rarity of wolverines has made them difficult to study, and many important features of their habitat use, population structure and dispersal habits are largely unknown (Banci 1994).

8.3.3.1. Habitat Requirements

Wolverines can be found in a wide variety of habitat types, from tundra, taiga, and boreal forest in the northern part of the range, to high-elevation mixed conifer forest at the southern end of their range. Throughout their range, the distribution of wolverines appears to be tied to the availability of large ungulates (or large marine mammals in coastal areas) that are taken primarily as carrion (Banci 1994).

Wolverines are currently found almost entirely in areas that have not been developed, extensively modified, or accessed by humans, such as large national parks or wilderness areas. Wolverines appear not to tolerate land use activities that permanently alter or fragment habitat and provide human access (Banci 1994).

In Washington, wolverines may utilize the subalpine and alpine zones (Johnson and Cassidy 1997). During winter months, wolverines are known to occasionally descend into valley regions in search of food. Food resources include ungulate species, small mammals, birds, and plants (Strickland et al. 1982). They mostly feed on carrion but are able to kill large mammals, particularly in deep snow. The species is primarily nocturnal and does not hibernate (Strickland et al. 1982).

There is limited information on wolverine use of specific habitats for denning, resting, foraging, and dispersal in the southern portions of their range. In tundra areas, natal dens consist of snow tunnels up to 60 meters long. In forested areas, natal dens consist of holes dug under fallen trees, in decayed hollow logs or cavities in large trees, in old bear dens, abandoned beaver lodges, caves, in piles of woody debris, under exposed, snow-covered tree roots, and in rocks and boulders. Such sites may also be used as resting areas (Banci 1994). In Montana, resting sites were often in snow in timber types that afforded cover (Hornocker and Hash 1981). Foraging habitat appears to be highly variable and tied to the distribution of food resources (Banci 1994).

8.3.3.2. Study Methods

Resource information for wolverine was derived from literature cited in Section 4.1 - Setting.

8.3.3.3. Discussion

For the Snoqualmie Pass area, The WDFW PHS database contains one sighting of wolverine tracks in 1999 between Keechelus and Kachess lakes. Edelman and Copeland (1999) made a comprehensive summary of sightings in Washington and found 150 since 1960, less than 4 per year. Therefore the wolverine is apparently still present in Washington, but the population is so small that it is not clear if these are individuals dispersing from Canada or representatives of a self-sufficient population in the state (Banci 1994). Conservation of wolverines will require large areas of high elevation wilderness refugia connected by dispersal corridors, so the value of the Snoqualmie pass area for wolverine movement may be a critical for their future survival (USFS and USFWS 1997).

8.3.4. Northern Goshawk

The northern goshawk is a USFWS Species of Concern. The northern goshawk is a large, dark gray hawk with short, rounded wings and a long rounded tail. These features allow for quick acceleration and sharp turns. The species is found in the mountainous regions of the Northwest. Northern goshawks are woodland raptors that are adapted to hunting under the forest canopy. (Johnsgard 1990).

Northern goshawks live primarily in dense coniferous forest and occasionally in deciduous forest particularly in mountainous regions (Beebe 1974). The species will wander to edges of clearings or snag areas in lowlands during the winter (Johnsgard 1990).

The species prefers mature forest for nesting (Larsen et al. 2004). Either tall conifers or hardwoods will suffice for nesting but an important feature is a sizable crotch within the tree (Smith et al. 1997). The northern goshawk lines its nest with bark flakes and uses large amounts of greenery on the nest, replacing the greenery on a regular basis. When nesting, the northern goshawk can be fierce in defending its nest site.

Northern goshawks are year-round residents in the Cascade Range and western Washington. They range south from Washington through Oregon and into northern California. The species can been seen as far south as northern Arizona and New Mexico (Smith et al. 1997).

8.3.4.1. Habitat Requirements

Habitat requirements for northern goshawk include large dense stands of multilayered, old-growth forest containing small openings and a moderately developed understory (Johnsgard 1990). Northern goshawks feed on small mammals, birds, reptiles and invertebrates. Beebe (1974) suggested a decline in prey species will force the northern goshawk to move out of its breeding range, especially in the winter.

Northern goshawks typically nest near a source of water, in the most dense area of the forest stand (Johnsgard 1990). Either tall conifers or hardwoods suffice for nesting but the tree must be large, with a sizable crotch and on a moderate slope or no slope at all.

The home range of a goshawk is approximately 6,000 acres, with a core nest site area of 430 acres (USFS 1995).

8.3.4.2. Study Methods

Resource information for northern goshawks was derived from the information cited in Section 4.1 - Setting, from incidental observation data from the North Bend and Cle Elum Ranger Districts, and from PHS data. This information was supplemented with habitat assessment surveys conducted during 1994 and nesting surveys conducted during 1995.

8.3.4.3. Discussion

Within the SPAMA there is approximately 170,964 acres of potentially suitable habitat for northern goshawks, 30 sites with goshawk detections, and 8 confirmed nests (USFS and USFWS 1997). The known goshawk nests within the SPAMA occur on the east side of the Cascade Crest, within the Yakima River watershed, which contains 80,760 acres of potentially suitable goshawk habitat (USFS 1997). No nests have been discovered in the south Fork Snoqualmie Watershed (USFS 1995), and only one sighting has been recorded in the watershed (WDFW 2002).

Habitat suitability surveys for goshawk were conducted in conjunction with this project in 1994 and potentially suitable nesting habitat for goshawks was found to occur in the Study Area in areas containing mature forest habitat.

No goshawks were detected during surveys conducted for this project or during other surveys conducted within the Study Area. The PHS data shows one goshawk nest in the general vicinity of Snoqualmie Pass. It is located south of the Study Area in the Rocky Run drainage. Breeding behavior was recorded at this site in 1991. In 1998 an individual goshawk was seen in the same general vicinity but no nest was found (WDFW 2002).

There is also a sighting of an individual juvenile goshawk reported in the PHS data, the only known goshawk sighting within the South Fork Snoqualmie Watershed. This bird was seen flying over the treetops in Section 18, T22N, R11E, approximately a mile from the SUP boundary in 1991 (WDFW 2002). It is not known if this bird was near its nest site or dispersing.

8.3.5. Great Gray Owl

The great gray owl is the largest owl species in North America. The North American range for the great gray owl is from Alaska south to the Sierra Nevada Mountains in California (USFS et al. 1995).

Great gray owls can be found in a variety of habitats but prefer dense conifer forest with interspersed open spaces (USFS et al. 1995). They typically forage during the daylight in meadows or other openings (Bull et al. 1990). The main prey base is small mammals, and in other regions their population numbers have fluctuated with changes in small mammal populations.

The great gray was identified as needing specific management in the ROD for the Northwest Forest Plan. The species was given special nesting habitat buffers and surveys are required to locate occupied sites (Huff et al. 1998).

8.3.5.1. Habitat Requirements

The great gray owl has key habitat requirements similar to the spotted owl. Mature, old-growth stands or remnants of older trees and snags are an essential element. They utilize abandoned nests, typically built by other raptors, or broken tree tops and snags large enough to suit the species (> 24 inches diameter). Great gray owls typically choose nest stands near an opening (man-made or natural) and with 60 percent canopy closure with an open understory (USFS et al. 1995) (see Table 6).

Wet montane meadows, often used for foraging, are usually near nest sites. Foraging occurs from low, exposed perches in or near the meadows. According to USFS et al. (1995), great gray owl nesting and roosting occurs in old-growth forest, mature forest, and in forest stands that have had light selective harvest. Foraging occurs in a wide range of habitats including those mentioned above plus meadows, grass/forb/shrub, clearcut (< 10 years), and heavy selective harvest.

8.3.5.2. Study Methods

Resource information for great gray owls was derived from the information cited in Section 4.1 - Setting, great gray owl protocol and amendments to the protocol (USFS et al. 1995; 1997), and incidental observation data from the North Bend and Cle Elum Ranger Districts. This information was supplemented with habitat occupancy surveys conducted during 1999 and 2000.

Potential great gray owl habitat within the Study Area was defined from aerial photo interpretation followed by field verification. Identification of potentially suitable great gray owl habitat in the Study Area was based on the following:

- Vegetative types considered mature or old growth having >60 percent canopy cover;
- Distances of 1,000 feet from natural meadows >10 acres in size; and
- Locations of proposed master plan elements (e.g., new trails, lifts, and buildings) that would involve ground-disturbing activities.

Survey locations were established based on aerial photographs of the Study Area, the potential great gray owl habitat map, and field reconnaissance surveys verifying aerial photo and vegetative type interpretation.

Survey transect locations were also based on the proximity of proposed MDP components (e.g., new lifts, trails etc.) to potential owl habitat. A total of 18 stations were surveyed 6 times in both 1999 and 2000 within Section 16, between Summit Central and Summit East.

8.3.5.3. Discussion

No observations of great gray owls have occurred in the South Fork Snoqualmie or Yakima River watersheds (USFS unpub.). In addition, there were no responses obtained during the 1999 or 2000 habitat occupancy surveys. Based on review of the literature and characterization of the habitat at the Snoqualmie Pass Study Area, there is potential for great gray owls to occur in the area. Potentially suitable nesting habitat occurs primarily in Section 16, with potential foraging habitat in the meadow south of Hyak Lake and in regenerating forest stands in the vicinity.

8.3.6. Van Dyke’s And Larch Mountain Salamander

The Snoqualmie Pass area lies within the suspected range of two amphibian species that are now included on the Regional Foresters Sensitive Species List, the Van Dyke’s salamander and the Larch Mountain salamander.

8.3.6.1. Habitat Requirements

Van Dyke’s salamander is endemic to Washington with three population centers: the Cascades, Willapa and the Olympic Mountains (Leonard et al. 1993). According to Jones (1998), habitat affinities for the Van Dyke’s salamander are poorly defined and habitat associations for the Cascade Range populations

have not been assessed. Within the different habitat types, Van Dyke's salamanders tend to seek out cool and moist cover. Rock outcrops, colluvial slumps, talus, suspended logs, seeps, and splash zones associated with streams are the most likely locations. In uplands, Van Dyke's salamanders are most often found in microhabitats along north-facing slopes (Jones 1998).

The Larch Mountain salamander is associated with forested and talus environments that provide cool, moist conditions. It is largely nocturnal, and when climatic conditions are appropriate, animals can be found on or near the surface, hiding under wood or rock substrates. The species has a broad habitat breadth and occupies forests with late seral characteristics, early to late seral forests, non-forested talus, caves, and occasionally seeps. (Crisafulli 1998). Its core distribution is along the Columbia River Gorge at elevations ranging from 2,000 to 4,000 feet but during the time Survey and Manage requirements were in effect, additional populations of this species were been found on the MBSNF in the Green River watershed and on the OWNF, Cle Elum Ranger District.

8.3.6.2. Study Methods

Resource information for Van Dyke's and Larch Mountain salamanders was derived from literature cited in Section 4.1 - Setting, WDFW PHS database (2002) information and field surveys by Jones & Stokes Associates.

The field surveys were performed according to USFS protocols from 1997 to 1999. The then-required process involves three site visits in areas where ground disturbing activity is planned, strict weather and soil moisture condition requirements to insure the best chance of surface activity by these species, and specific search methods and patterns (Jones 1998, Crisafulli 1998). Although absence of a species from an area cannot be proven, after performance of the proper surveys without detection of any individuals the site is given "not detected" status. The location and characteristics of the survey sites are shown in Table 7.

Table 7:
Characteristics of amphibian survey areas in the Study Area.

Survey Area	Location	Number of Transects	Area (acres)	Elevation (feet)	Slope	Site Description
1	Alpental	3	2.4	3400-3550	50%	Dense understory, no rock
2	Alpental	12	8	3500-4100	50-75%	Dense understory, some bedrock
3	Summit West	3	2.9	~3060	<20%	Dense understory, some wetland; Beaver Lake Creek
4	Summit West	2	0.9	~3080	10-30%	Dense understory, fairly open
5	Summit West	8		3200-3300	29%	Dense understory, no rock
6	Summit West	4	1.5	3400-3600	50%	Dense understory, no rock

Table 7:
Characteristics of amphibian survey areas in the Study Area.

Survey Area	Location	Number of Transects	Area (acres)	Elevation (feet)	Slope	Site Description
7	Summit Central	4	19.8	2800-3100	<25%	Dense understory, no rock, some open areas; Hyak Creek and two tributaries
8	Summit East	7	7.7	3000-3150	25-33%	Dense understory, no rock; Pulse Creek headwaters
9	Summit East	4		3550-3600	29%	Moderate understory, no rock
10	Summit East	4	10.5	3400-3500	25%	Large trees, blowdown common, no rock; Hyak Creek
11	Summit East	59	115.3	2850-3550	0-32%	variable understory, blowdown comon, no rock; Stream A, Stream B, Pulse Creek
12	Summit East	0	0	3300	25%	No forest or rock to be disturbed
13	Summit	7		3660-3700	<20%	Forested w/ moderate understory, some bedrock

8.3.6.3. Discussion

Six species of amphibians were found during the field surveys, but no Van Dyke's or Larch Mountain salamanders were found. The PHS database contains one 1994 capture of an adult and a juvenile Larch Mountain salamander in the Box Creek drainage between lakes Keechelus and Kachess, approximately 3 miles east of The Study Area (WDFW 2002). Based on survey results, these species have a status of not detected within the Study Area.

8.3.7. Bald Eagle

The bald eagle is listed as Forest Service Sensitive (see Table 1). The species breeds across much of Canada, the Pacific Northwest, throughout the Great Lake states, and along the Eastern and Gulf coasts. Bald eagles are recovering as a breeding species in other areas of the interior of North America. Washington hosts one of the largest populations of wintering bald eagles in the lower 48 states as well as one of the largest populations of nesting pairs. The majority of birds occur in forested areas west of the Cascade Mountains (USFS 1990).

Early declines in bald eagle populations were attributed to human persecution and destruction of riparian, wetland, and conifer forest habitats. However the widespread use of organochlorine pesticides that caused eggshell thinning and subsequent reproductive failure was the most important factor in the decline of the species (Detrich 1985).

Various legal and management measures, including restrictions placed on the use of organochlorine pesticides in 1972, development and implementation of the Pacific Bald Eagle Recovery Plan (USFWS 1986), and local bald eagle management plans, have contributed to the continuing recovery of bald eagle populations. Target numbers of nesting pairs in the region have been met (USFWS 1996b).

8.3.7.1. Habitat Requirements

Bald eagles typically nest in stands of old-growth trees near large water bodies. Nests are often constructed in the largest tree in a stand with an open view of the surrounding environment. Nest trees are usually near water and have large horizontal limbs. Snags and dead-topped live trees may be important in providing perch and roost sites within territories. Because of their large size, eagles require ready access to an abundant supply of medium sized to large fish during breeding (Johnsgard 1990).
Bald eagles winter along rivers, lakes, and reservoirs that support adequate fish or waterbird prey and have mature trees or large snags available for perch sites. Bald eagles often roost communally during the winter, typically in a stand of mature trees with an open branching structure and well developed canopies. Winter roost areas are usually isolated from human disturbance (Johnsgard 1990).

8.3.7.2. Study Methods

Resource information for bald eagles was derived from existing information cited in Section 4.1 - Setting, from reconnaissance survey data collected during 1994 and 1995, and from interpretation of aerial photos of the Study Area.

8.3.7.3. Discussion

According to the AMA analysis (USDA and USDI 1997), there are approximately 23,385 acres of available nesting habitat and 156,537 acres of winter roosting habitat available within the AMA. The only known bald eagle nest within the AMA, however, is near Lake Cle Elum, approximately 14 miles east of the Snoqualmie Pass area. This nest is located outside of the Yakima River watershed and there are no known bald eagle nests within the Yakima River watershed (USFS 1997). Five potential nesting territories for bald eagles have been identified within the Yakima River watershed, however, two adjacent to Lake Keechelus and 3 adjacent to Lake Kachess. These are areas with suitable habitat that have a high likelihood of being occupied within a 50 year timeframe (USFS 1997). Within the Yakima watershed there are an estimated 22,093 acres of potential nesting habitat available and 44,366 acres of potential roosting habitat (USFS 1997).

Within the South Fork Snoqualmie River watershed, bald eagles are known to nest below Snoqualmie Falls, over 20 miles for the Snoqualmie Pass area (USFS 1995). According to the South Fork Snoqualmie watershed analysis there is, however, approximately 618 acres of winter roosting habitat and 375 acres of nesting habitat available for bald eagles in the watershed.

There are no known bald eagle nest sites or winter roost sites within the Study Area (USFS 1995, USFS 1997, WDFW 2000). Bald eagle nesting in the Study Area is likely to be limited by the distance to the

nearest large body of water containing adequate fish. The nearest potential nesting area is adjacent to Lake Keechelus, as mentioned above. Bald eagle winter roosting within the Study Area is also likely limited by a lack of available food during winter and by high levels of recreational use in the area. Bald eagles may occur in the Study Area as occasional visitors but are not expected to regularly utilize the area as part of a territory.

There has been one reported bald eagle sighting in the Study Area, with an eagle seen soaring over the Alpental ski area in 1994.

Bald eagles are not likely to utilize the Study Area as either nesting habitat or winter roost habitat for the following reasons:

- Mature trees suitable for bald eagle nesting within the Study Area are greater than 1 mile from the nearest body of water containing an adequate fish supply for bald eagles (Lake Keechelus). Bald eagle nests usually occur within 1 mile of water (USFWS 1986).
- Lack of available forage and high levels of human use in the Study Area during winter limit the suitability of the Study Area as bald eagle winter roosting habitat.

8.4. Management Indicator Species

There are six species and one species group identified as MIS in the Land and Resources Management Plan for either the MBSNF and/or the OWNF. MIS were identified in these plans as species that are representative of groups of species that rely upon similar habitats. Potential habitat for 4 of these species and one species group is available within the Study Area and the associated species are discussed below. The representative habitat for two of these MIS species is not present in the Study Area, as described in Section 10 – Determination of Effect of this document.

8.4.1. Pileated and Other Woodpeckers

The pileated woodpecker is an MBSNF MIS and the largest extant woodpecker in North America (Bent 1964). In the western United States, the species occurs throughout Washington and Oregon to northcentral California and east to Idaho and Montana (Winkler et al. 1995). The downy and hairy woodpeckers are MBSNF MIS. The Lewis’, three-toed and black-backed woodpeckers are MBSNF species of concern.

The nest cavities excavated by pileated and other woodpeckers are critical to many other species, such as swallows, bluebirds, chipmunks, and bats, which use cavities but are not capable of creating them. Brown (1985) lists 46 species of these secondary cavity users.

Apparent declines in pileated woodpecker populations have been attributed to logging of mature forests and the removal of snags (Bull 1987, Zeiner et al. 1990). Concern for the species is related to intensified forest management resulting in fewer large dead trees, large hollow trees, and standing and down dead woody material that the species uses for roosting, nesting, and foraging (Bull et al. 1990).

Pileated woodpeckers have been observed in the Snoqualmie Pass area (WDFW 2002).

8.4.1.1. Habitat Requirements

Pileated woodpeckers inhabit a wide variety of forest types throughout their range, including deciduous, coniferous, and mixed deciduous/coniferous forests, but they occur most commonly in mixed conifer and deciduous riparian habitats in the western United States (Winkler et al. 1995). In other parts of the species' range and in drier habitat conditions, pileated woodpeckers are associated with mature and old-growth forests (Bull 1987). In the southern Washington Cascades, most nests were found in old-growth stands (Lundquist and Mariana 1991).

Pileated woodpeckers are primary cavity nesters. The species will excavate a new nest cavity each year. A diversity of other species use the cavities excavated by the pileated woodpecker. Therefore the pileated woodpecker is considered an important species in forested areas. Nest trees are typically large-diameter dead trees with little bark, few limbs, and broken tops. Forest stands used for nesting contain many large-diameter live, dead and downed trees with at least two canopy layers (Mellen et al. 1992). Roost trees are similar to nest trees but typically have less bark remaining on the tree, fewer limbs, more cavities, more broken tops, and more canopy layers, indicating that roost trees are typically dead longer than nest trees (Bull 1987).

Pileated woodpeckers forage on or near the ground, particularly on large-diameter downed trees and logs. They feed primarily on carpenter ants, wood boring beetle larvae, fruits, nuts, and other insects and arthropods (Bull 1987).

Hairy and downy woodpeckers are very similar and common in forests throughout the state, but differ in their preferred habitat. The hairy woodpecker specializes in conifer forests at all elevation while the downy uses low elevation hardwood and riparian forests and is therefore not expected to occur in the Study Area. The three-toed woodpecker uses high elevation, closed canopy conifer forests and the black-backed woodpecker uses high elevation open canopy forests on the east side of the Cascade crest. Unlike the other woodpeckers which forage in snags and dead wood, Lewis' woodpecker is an aerial forager that requires open forest or forest with nearby open areas for foraging.

8.4.1.2. Study Methods

Resource information for the pleated woodpecker was derived from literature cited in Section 11 - References, WDFW PHS database (2002) information and field observations of patches of suitable snags.

8.4.1.3. Discussion

Pileated woodpeckers are dependent upon availability of large snags for nest creation and large downed logs for foraging. Past timber harvests in the SPAMA and Snoqualmie Pass area, along with firewood collection, hazard tree removal and development of roads, ski trails and utility corridors have left the area deficient in both features (USFS and USFWS 1997). Random plot surveys of snags and CWD performed by Jones & Stokes (see Snags and Coarse Woody Debris) confirm a deficiency in large diameter snags and CWD, although areas of numerous large snags exist near Hyak Lake.

Jones & Stokes field biologists observed the characteristic rectangular excavations made by pileated woodpeckers in large snags in the upper elevation mature forests of Summit East and in the larger trees and snags in the Snowplay area. Pileated woodpeckers therefore appear to use the area but likely exist in low densities.

The hairy woodpecker would be expected to be common in the area but the downy woodpecker would be expected to be absent or rare because it specializes in hardwood forests that are not present in the area. The Lewis' woodpecker is now rare in Western Washington and present only Ponderosa pine/shrub steppe transition in eastern Washington (Larsen et al. 2004). The black-backed and three-toed woodpeckers would be expected to be rare but present in the Snoqualmie Pass area (Smith et al. 1997).

8.4.2. Elk

The elk is a MIS for both the MBSNF and OWNF, is regarded as a big game animal, and is managed as such by the WDFW. Currently, elk are restricted to the Rocky Mountain and Pacific Northwest regions, with two small populations of Tule elk in north-central California.

Two subspecies of elk occur in Washington. The Roosevelt elk occurs in the coastal areas of Washington, Oregon, and extreme northwestern California, while the Rocky Mountain elk occurs in eastern Washington (WDFW 2002a, WDFW 2002b). Several introductions of Rocky Mountain elk into the Cascade Range in Washington during the early part of this century have resulted in populations becoming established primarily east of the Cascade crest. Both subspecies occur on the MBSNF (WDFW 2002a, WDFW 2002b). Population density varies with hunting pressure, human density and habitat suitability.

8.4.2.1. Habitat Requirements

Elk within the Cascades typically begin migrating in June up-slope to summer range (Cooper 1987), following new plant growth as it becomes available. Calving areas are defined as the upper reaches of winter range which offer open brush and grassy areas near water and nearby forested areas for cover. The elevation of calving varies with the depth of the snow pack and the availability of forage and cover. Young are born in early June, and within a week or two, cow-calf herds are formed.

Mature bulls are solitary or occur in small groups during the spring and summer, and often seek out high, windy points where breezes grant some relief from flies and other insect pests. In early September, the rut begins with mature bulls gathering and attempting to maintain harems of up to 30 cows. In the SUP and surrounding areas, individuals begin to migrate downslope to winter ranges after the first heavy snowfall (typically mid-October to mid-November), where they typically stay from December through June (Cooper 1987).

Elk require a juxtaposition of forest for cover and open habitats for forage. Dispersal corridors between summer and winter ranges must provide these requirements, along with relative freedom from human disturbance. In the vicinity of the Study Area, river corridors are used as dispersal corridors (Cooper

1987). Calving areas must also be relatively free from disturbance. Grasses and sedges make up the bulk of elk diets, with forbs and browse utilized to a lesser extent (Boyd 1978, USFS 1998a).

Winter range is considered to be the limiting factor in many elk populations. Winter range typically occurs below 3,000 feet elevation and tends to be concentrated around drainages and their associated riparian areas, but may occur primarily below 2,200 feet during severe winters (USFS 1990). On the MBSNF, old growth forest is considered important for providing thermal cover as well as maintenance forage (USFS 1990).

8.4.2.2. Study Methods

Resource information for the elk was derived from the literature cited in 4.1.

8.4.2.3. Discussion

Within the Study Area, lands located in the Yakima watershed are within the range of the Yakima elk herd and lands located within the SFSW are within the range of the North Rainier elk herd. Since habitat is continuous across the Cascade Crest in the vicinity of The Summit, however, it is possible that individuals of both herds utilize the Study Area. The WDFW PHS Database (2002) contains two records of regular, large concentrations of elk between 1 and 5 miles south of The Summit-at-Snoqualmie, but none within the Study Area. Many observations of elk have been made in and immediately surrounding the Study Area and elk are known to occur during spring through fall within the Study Area.

Cleared ski trails at the Summit and Alpental would be expected to provide foraging habitat for elk, while remaining mature forest provides cover. The portion of the Study Area in the Mill Creek drainage is expected to be used as summer habitat, based on a high incidence of wetlands and associated plants of high forage value and dense shrubs that provide hiding cover. Outside of the Study Area but directly adjacent to it, the area around Hyak Lake contains potential elk calving habitat. Use of these areas may, however, be affected by the current level of human use, particularly mountain biking.

8.4.3. Mule Deer

In Washington there are two different subspecies of mule deer, the Rocky mountain mule deer (*Odocoileus hemionus hemionus*) and the Columbia black-tailed deer (*O.h. columbianus*), with the Rocky Mountain mule deer generally occurring east of the Cascade Crest and the Columbia black-tailed deer generally occurring west of the Cascade Crest. Both subspecies are known to occur in the vicinity of the Cascade Crest and there is “region of integration” along the Crest for these subspecies (Rodrick and Milner 1991). Because habitat use is expected to be comparable for the two subspecies in the Study Area, they will be discussed under the heading mule deer for this analysis.

8.4.3.1. Habitat Requirements

Mule deer are found in coniferous and hardwood forests with dense shrub or early successional stages containing small trees. They will also utilize meadows, grasslands, and wetland areas. Like elk, mule deer

is considered to be a “contrast” species that does best where differing vegetation communities come together (USFS 1998a). Three general principles concerning deer habitat have arisen out of human-induced habitat alterations interpreted to be beneficial to deer. These include the ideas that early stages of plant succession are more beneficial than climax vegetation; that a mixture of plant communities is better than any single plant community; and that more browse is better than less browse (Wallmo 1978). Thus, the effects of fire and logging have been interpreted as generally beneficial to deer. However, the effects of these disturbances are temporary, and habitats may become unsuitable 15 to 25 years after disturbance.

Dietary habits of mule deer are relatively broad. Although traditionally considered a browser, mule deer are actually intermediate between browsers and grazers, with grasses and forbs making up a high proportion of the diet during some years and seasons (Wallmo 1978). In Washington, browse consisting mainly of the tender new shoots of woody plants makes up approximately three-fourths of the diet annually. However, in spring and summer, the new green growth of forbs and grasses can make up over half the food eaten. The fruits, nuts, buds, shoots and leaves of a wide variety of trees, shrubs, and vines, as well as mushrooms, lichens, and other foods, are regularly consumed (WDFW 1999).

Migration patterns vary considerably throughout the range of the subspecies. Populations inhabiting higher elevations in summer migrate downslope to lower elevations when accumulations of snow make forage unavailable, while other populations move short distances to preferred food patches or do not migrate at all (Wallmo 1978).

Travel corridors between summer and winter range, freedom from human disturbance in fawning areas, and cover to escape harsh environmental conditions and predators are also important components of high-quality mule deer habitat (USFS 1998a). On the MBSNF, thermal cover, which is thought to be optimal in old-growth forest, is considered to be the most critical component of winter range habitat (USFS 1990).

8.4.3.2. Study Methods

Resource information for the mule deer was derived from the literature cited in Section 4.1 - Setting.

8.4.3.3. Discussion

Although not specifically documented within the Study Area, mule deer occur throughout the Study Area and based on observations and suitable habitat are expected to regularly occur.

8.4.4. Mountain Goat

The mountain goat (*Oreamnos americanus*) is adapted for rugged mountain terrain. The species is a MIS for the MBSNF, and is regarded as a big game animal and managed as such by the WDFW. Historically, mountain goats occurred in the coastal mountain ranges of Alaska and British Columbia, the Rocky Mountains from Alberta and British Columbia south through Montana and Idaho, and in the Cascade Mountains of Washington. However, populations have been successfully introduced in parts of Colorado, Utah, South Dakota, and the Olympic Mountains of Washington. The statewide population of mountain

goats is declining according to the State of Washington 1999 Game Status and Trend Report (WDFW 2000), due to encroachment of high elevation meadow habitat by conifers.

8.4.4.1. Habitat Requirements

Mountain goats are closely associated with physiographic features such as steep, rocky cliffs, pinnacles, ledges, and talus slopes that provide escape cover from predators. The species occupies a wide variety of vegetation types associated with these features. Distance between winter and summer ranges was found to vary from 1 to 6.8 miles in Montana (Rideout 1978, Nowak and Paradiso 1983).

In the fall, there is a general downslope movement to south- and east-facing slopes that tend to remain relatively snow free due to wind or aspect. Winter range is characterized by steep, rocky slopes in proximity to thermal cover and foraging habitat on south- and east-facing slopes where snow accumulations do not exceed 2 feet (WDFW 1999a). Dense conifer stands are used for thermal cover during winter, and mature and old-growth forest stands may be important in providing forage such as lichens and mosses, as well as thermal cover during harsh environmental conditions (USFS 1990).

Summer range is similar to winter range but usually occurs at higher elevations and covers a broader array of habitat types associated with steep, rocky habitats. Salt licks may be important during spring and summer, and goats have been observed traveling several miles to reach them (Nowak and Paradiso 1983). A narrow band of habitats near tree line seem to be preferred during summer.

Mountain goats have a relatively broad diet that varies seasonally and geographically. Browsing and grazing for a wide variety of items including grasses, mosses, lichens, woody plants, herbs, and even evergreen needles have been noted (Rideout 1978, Nowak and Paradiso 1983).

8.4.4.2. Study Methods

Resource information for the mountain goat was derived from literature cited in Section 4.1 - Setting, the 1999 Washington State Game Status report (WDFW 2000) and habitat surveys by Jones & Stokes field biologists.

8.4.4.3. Discussion

Mountain goats are described as present in the higher elevations of both the Yakima River and South Fork Snoqualmie River watersheds (USFS 1995, USFS 1997). The mountain goat may be an important prey/carrion species for some listed carnivore species that forage in high elevation wilderness areas, such as wolverine and grizzly bear.

The SPAMA FEIS estimates that there are 15,54 acres of cliff/bedrock habitat in the AMA, with 7976 acres of parkland or meadow foraging habitat within 0.25 mile of the cliff/bedrock areas (USFS and USFWS 1997).

The WDFW PHS Database (2002) contains four records of regular large concentrations of mountain goats within 10 miles of The Summit-at-Snoqualmie, but none within the Study Area. The 1999 Game Status

and Trend Report (WDFW 2000) concludes that mountain goat populations in WDFW Region 3, which includes the Upper Yakima River Basin, is stable, although population surveys have been limited because of lack of funds (WDFW 2000).

Although no mountain goats have been officially documented within the Study Area (PHS or the MBSNF database), the MBSNF sightings database contains several records of mountain goat sightings in the area between the southern boundary of the Study Area at Alpental and I-90, on the southern end of Denny Mountain. These sightings are clustered in the spring (April, May, and June) and fall (October) suggesting that this may be transitional habitat between summer and winter ranges. The presence of mountain goats during May and June also suggests that this area is likely used as kidding habitat, although all sightings that include young were recorded during fall.

Skiers have reported seeing mountain goats on the cliffs to the south of the Armstrong Express chairlift at Alpental during winter (DeRosier 2003 pers. comm.). Since the slopes of Denny Mountain where both spring and fall sightings have been reported fit the definition of winter habitat, and given sightings reported by skiers, this area may also be winter range, with summer range likely to occur higher up on Denny Mountain. These factors considered together provide sufficient evidence to conclude that mountain goats occur within the Study Area at Alpental.

8.4.5. American Marten

Martens are arboreal carnivores of the family Mustelidae, the weasels. They are about 1-3 pounds, between the size of the smaller true weasels and the larger fisher. The marten is a MIS for the MBSNF but is managed by the State of Washington as fur bearing game species. In 1999 there were reports to the WDFW of 140 martens trapped, 4 in Kittitas County and 8 in King County (WDFW 2000).

8.4.5.1. Habitat Requirements

The American marten is widely distributed in the conifer forests of North America. They generally prefer mature, mesic forests with complex physical structure near the ground, which can be created by large woody debris, large talus or low hanging branches. This combination of factors seems to provide martens with cover from predators, denning sites, and plentiful habitat for their main prey species, voles, mice and snowshoe hare. Large woody debris is especially important to martens in winter because it provides thermal cover and creates small openings to the subnivean habitat where they hunt small mammals.

Timber harvest and forest conversion directly reduces available habitat for the marten Although martens have been observed to cross openings of a few hundred feet or hunt in clearcuts, they rarely leave areas of overhead cover and may avoid regenerating clearcuts as long as 45 years (Buskirk and Ruggiero 1994).

8.4.5.2. Study Methods

Resource information for the American marten was derived from the literature cited in Section 4.1 - Setting and the wildlife sightings database of the Snoqualmie Ranger District of the MBSNF.

8.4.5.3. Discussion

Martens have been documented in the Study Area, in Section 16 and in the vicinity of Summit Central, Summit West, and Alpental (WDFW 2002). Marten were detected at six of the camera stations near I-90 at the Snoqualmie Pass area during the Linkage habitat study. One marten was detected passing under I-90 through a box culvert near Summit Central (Singleton and Lehmkuhl 2000). The Snoqualmie Ranger District sightings database also contains several records of sightings in the Snoqualmie Pass area. For these reason martens are expected to be present within the Study Area.

8.5. USFWS Species of Concern

The USFWS has identified 26 species as being of concern in the vicinity of the proposed project. Of these, 10 species are also listed as USFS Sensitive, Rare and Uncommon, or are included in the list of species from appendix J2 of the Northwest Forest Plan and so are included in previous sections of this document, with the exception of two species of bats which are listed in appendix J2 of the Northwest forest Plan (USDA and USDI 1994) but are included here in a section describing bats in the genus Myotis. Of the remaining species classified as USFWS species of concern, 7 may occur in the Study Area and are discussed below and 7 are not expected to occur in the Study Area, as described in Section 10 – Determination of Effect of this document.

8.5.1. American Peregrine Falcon

In August 1999 the peregrine falcon was de-listed by the USFWS and is no longer considered an endangered species (63 FR 45446-45463). USFS Policy requires that species removed from the federal list of threatened and endangered species be included on the USFS sensitive species list for five years following de-listing.

The American peregrine falcon is a cliff-nesting bird that feeds primarily on medium-sized to moderately large birds. Peregrines are distributed worldwide, with the exception of Antarctica. In Washington, peregrines now nest primarily along the coast in the Puget Sound area and are less common in the interior of the state.

Peregrine falcon populations declined as a result of the widespread use of organochlorine pesticides that caused eggshell thinning and subsequent reproductive failure. By 1976, no American peregrine falcons could be found at 14 historical sites in Washington. However, as a result of restrictions placed on the use of organochlorine pesticides in the early 1970s and the reintroduction of captive-reared birds, the population of peregrines in Washington has increased to at least 44 known pairs (63 FR 45446-45463).

8.5.1.1. Habitat Requirements

Peregrine falcons typically feed on highly mobile, flocking, and colonial nesting birds, such as shorebirds, waterfowl, and doves and pigeons (Johnsgard 1990). Beebe (1974) suggested that the distribution of peregrines is limited by the distribution of prey species of this type.

Peregrine falcons nest almost exclusively on cliff ledges, although a very small number of nests have been found on small outcrops and in trees. A number of reintroduced pairs also nest on tall buildings (Enderson et al. 1995). Cliffs that provide ledges, potholes, or small caves, usually with an overhang, and that are relatively inaccessible to mammalian predators are required components of nesting habitat. Nest sites usually provide a panoramic view of open country, are near water, and are associated with a local abundance of passerine, waterfowl, or shorebird prey (Johnsgard 1990).

8.5.1.2. Study Methods

Resource information for peregrine falcons was derived from the information cited in Section 4.1 - Setting, from incidental observation data from the North Bend and Cle Elum Ranger Districts, and from PHS data (WDFW 2002).

8.5.1.3. Discussion

There are no known peregrine falcon eyries in the SPAMA (USFS and USFWS 1997), the Yakima River Watershed (USFS 1997), or the South Fork Snoqualmie Watershed (USFS 1995). The closest known eyrie is on the Naches Ranger District to the south of the SPAMA (USFS and USFWS 1997). There are no reports of peregrine falcons in the PHS data for the Study Area (WDFW 2002). On the Snoqualmie Ranger District, there have been 5 reported sightings of peregrine falcons, none within the Study Area. Of these, 4 occurred in the early 1980's and one occurred in 1995.

Surveys conducted by the WDFW in 1987 to evaluate cliff suitability as peregrine falcon nesting habitat resulted in all cliffs in the South Fork Snoqualmie River watershed being rated as fair with the exception of Guye and Snoqualmie Peaks which were rated as good (USFS 1995). Guye Peak is located across the South Fork Snoqualmie River from the Alpental ski area.

Within the Study Area, cliff habitat is generally lacking, with the exception of cliffs within Alpental. These cliffs were, however, rated only fair as peregrine habitat, as mentioned above.

The species is not expected to be resident but may occasionally occur within the Study Area based on the following:

- Nesting or otherwise critical habitat is lacking.
- The SUP is within the historic range of the species.

8.5.2. Olive-Sided Flycatcher

The olive-sided flycatcher, a USFWS Species of Concern, is an aerial insectivore that breeds in upland forests and woodlands throughout most of the western U.S. Breeding occurs throughout the mountains of the Pacific Northwest. Olive-sided flycatchers are common in most forested areas of Washington.

Olive-sided flycatchers arrive from their South American wintering grounds in mid-April to early May, and peak nesting activity occurs in June. This flycatcher feeds on flying insects caught in the air and is usually observed on high, conspicuous perches (Erlich et al. 1988).

Information from the Breeding Bird Survey program indicates a 3.5 percent decline per year in olive-sided flycatcher populations in the western region of the survey area and a 2.5 percent decline per year on the North American continent since 1968 (Peterjohn and Sauer 1993). It has been suggested that declines are associated with habitat loss in the species' South American wintering grounds (Small 1994).

This species has been documented within the Study Area boundary, in Summit Central, and is expected to occur in other areas as well.

8.5.2.1. Habitat Requirements

Olive-sided flycatchers breed in a variety of forest and woodland habitats, including mixed conifer, montane conifer-hardwood, redwood, lodgepole, and red-fir forest types below elevations of 9,000 feet (USFS 1991). Preference is given to sites with large tree patches adjacent to cleared areas, burns, or water bodies (Smith et al. 1997). Nests are usually high in large trees on a branch well away from the bole of the tree. Dead branches and the uppermost branches of large trees are used as roosting and foraging perches (Ehrlich et al. 1988, Zeiner et al. 1990, Small 1994).

Abundance of olive-sided flycatchers has been positively correlated with the number of conifers and negatively correlated with the number of hardwoods in northwestern California and southwestern Oregon Douglas-fir forests (Ralph et al. 1991). Several studies indicate greater abundance in old-growth forests and less abundance in young and mature stands (Ralph et al. 1991, Carey et al. 1991, Gilbert and Allwine 1991). Olive-sided flycatchers were found to be significantly more abundant in old growth and were only rarely detected in young and mature stands (Carey et al. 1991). Carey et al. (1991) suggested that in the central Oregon Coast Range the taller trees and more broken canopy of old-growth forests provided better foraging habitat than the naturally regenerated, closed-canopy, young and mature forest stands studied. Gilbert and Allwine (1991) reported similar results from the Oregon Cascades.

8.5.2.2. Study Methods

Resource information for olive-sided flycatchers was derived from the information cited in Section 4.1 - Setting, from incidental observation data from the North Bend and Cle Elum Ranger Districts, and from PHS data (WDFW 2002).

8.5.2.3. Discussion

Olive sided flycatchers have been documented within the SPAMA (USFS and USFWS 1997), the Yakima River watershed (USFS 1997), and within the South Fork Snoqualmie watershed (USFS 1995). Olive sided flycatchers have been documented in the Olallie Creek drainage approximately 1 mile from the Study Area boundary (MBSNF sighting data). They were also documented within the Study Area during

field work associated with the project, specifically within the Summit Central area. Olive-sided flycatchers are expected to occur in other portions of the Study Area, given the presence of suitable habitat for them.

8.5.3. Harlequin Duck

The harlequin duck is a migratory waterfowl that breeds along torrential mountain streams and winters in coastal waters at sea. In western North America, harlequin ducks breed from the Aleutian Islands south and east through British Columbia and southwestern Alberta, south to central California along the Cascade and Sierra Nevada Mountains, and to northwestern Wyoming along the Rocky Mountains (Bellrose 1980).

Concern for harlequin duck populations has been expressed due to degradation of riparian breeding habitats, increased human disturbance, and alteration of the macroinvertebrate prey base due to aquatic pollution (USFS 1998a).

8.5.3.1. Habitat Requirements

Harlequin ducks typically arrive on the breeding grounds in mid to late April or May. Important components of nesting habitat for harlequin ducks include fast-flowing water with a dense shrub or timber-shrub mosaic along the bank, absence of human disturbance, mid-stream loafing sites, and an abundance of macroinvertebrate prey (WDFW 1999b). Nests are constructed of a thin layer of grass with a few dry twigs or leaves and lined with white down. They are typically placed on the ground in a recess between large boulders, or under woody debris, a shrub, or other overhanging vegetation or in snags (Bellrose 1980, Zeiner et al. 1990). Nests are typically within 7 feet of water but may be up to 66 feet away.

Broods apparently remain near nest sites for the first few weeks and then move downstream. Broods prefer low-gradient streams with abundant macroinvertebrate prey. One study noted that 90 percent of all brood observations were near mature or old-growth stands (WDFW 1999b).

8.5.3.2. Study Methods

Resource information for harlequin ducks was derived from the information cited in Section 4.1 - Setting, from incidental observation data from the North Bend and Cle Elum Ranger Districts, and from PHS data (WDFW 2002).

8.5.3.3. Discussion

Harlequin Ducks have been documented within the SPAMA, which contains an estimated 102 acres of potential nesting habitat, defined as low gradient (3-12 percent) streams within LSH (USFS and USFWS 1997). Within the Yakima River watershed, there are an estimated 76 miles of streams that contain suitable habitat for harlequin ducks, which have been documented in the watershed (USFS 1997). There

are an estimated 3,162 acres of potentially suitable nesting habitat in the South Fork Snoqualmie watershed, and 3 confirmed sightings (USFS 1995).

Potential harlequin duck habitat occurs within the Study Area along Hyak Creek and along the South Fork Snoqualmie River at Alpental. Use of potential habitat in Alpental may be precluded due to the proximity of the road, however. Based on incidental sighting information from the MBSNF and on PHS data (WDFW 2002), Harlequin ducks have not been observed within the Study Area. The closest reported observation occurred in May of 1992, when an individual was observed swimming in Gold Creek Pond.

8.5.4. Bats of the Genus Myotis

Western Washington is believed to support eight bat species of the genus Myotis, the mouse eared bats (Barbour and Davis 1969, Thomas and West 1991). Of these 8 species, 3 have both a special status and have the potential to occur within the Study Area; the long-legged and long-eared myotis are both listed in Appendix J2 of the Northwest Forest Plan (USDA and USDI 1994) and are USFWS species of concern, and the Yuma myotis is a USFWS species of concern.

Although bats are second only to rodents in the number of species, basic population information for many of these species such as distribution, seasonal occurrence and range is lacking. Bat call surveys usually cannot distinguish between the myotis species and often report results for the entire group.

8.5.4.1. Habitat Requirements

The primary habitat component for bats inhabiting forested landscapes is the presence of suitable roosting habitat. The use of rock crevices, caves, mines, buildings, large hollow trees, snags or loose bark for day roosts is a characteristic common to these bat species (see Table 8). Myotis species roost in maternity colonies that include their young, and typically use caves or mines for winter hibernacula (Barbour and Davis 1969, Brown and Pierson 1996). Freedom from human disturbance at maternity colonies and winter hibernacula is another important habitat component. Habitat components used by the three species of myotis included in this report are shown in Table 8 below.

Table 8:
Known Roost Site Characteristics of Bats (from Christy and West 1993).

Species	Buildings	Bridges	Bark	Rock Crevices	Caves and Mines	Snags
Long-eared Myotis	M,S,H		S	S	M,S,H	S
Long-legged Myotis	M,S	S	M,S	M,S	H	M
Yuma Myotis	M,S,C	M,S			M,H	

M= maternity roosts; S= solitary roosts; C= colonial roosts; H= winter hibernacula

The Yuma myotis forages primarily over open, still water along lakes, rivers, and streams, feeding on aquatic insects such as midges and caddisflies. Long-legged myotis are known to forage over open water, forest clearings, among trees, and above the forest canopy where they feed primarily on moths but also on termites, spiders, flies, beetles, leafhoppers, and lacewings. Long-eared myotis forage over small ponds, forest openings and under the forest canopy and feed on caddisflies, moths, beetles, flies and leafhoppers (Nagorsen and Brigham 1995).

In a bat call survey in the Cascade Mountains of western Washington, Thomas and West (1991) found that detection rates of all myotis species were dramatically higher in old growth than in mature or young stands. Although foraging activity was minimal within all forest stands, the evidence suggests that forest structures associated with old growth provide important habitat for bats (Thomas and West 1991). Another survey in managed forests of Western Washington concluded that most Myotis species roost in old growth or mature forest but forage in clearcuts or young thinned forests, avoiding dense young unthinned forests (Erickson and West 1996). A similar study in Southwest British Columbia also determined that bats commuted from roosting sites in forests to foraging areas around lakes or on the edges of clearcuts (Grindal 1996).

Removal of snags and decadent trees due to even-aged timber management, human disturbance, destruction of caves and mines, pesticide contamination, and the loss of wooden bridges and old buildings are the primary causes of concern for populations of these species (USFS 1998a, Brown and Pierson 1996).

8.5.4.2. Study Methods

Resource information for Myotis bats was derived from literature cited in Section 4.1 - Setting, WDFW PHS data (2002), and field searches for suitable caves and other roosting sites.

8.5.4.3. Discussion

In Washington, the Yuma myotis occurs throughout the state in suitable habitat (Ingles 1968). The long-legged and the long-eared myotis are widespread throughout the state (Johnson and Cassidy 1997). These species may occur in the Study Area.

8.5.5. Amphibians

The Cascades frog, the northern red-legged frog, the tailed frog, and the Western toad are USFWS Species of Concern. The Columbia Spotted frog and the Western toad are also candidate species for listing by the State of Washington.

8.5.5.1. Habitat Requirements

The Cascades frog is found in the Olympic and Cascade Mountains of Washington and Oregon above 2,600 feet in elevation, in montane meadows, slow-moving streams, lakes, and ponds. Populations of the

species have declined in the Oregon Cascades. Loss of wetlands and riparian habitats is the primary threat to the species (Leonard et al. 1993).

The northern red-legged frog is a common wetland and forest species west of the Cascade Mountains. They are the largest native frog of the region, although they are dwarfed and often consumed by adult bullfrogs, an introduced species. Loss of habitat and pollution of wetlands by pesticides and herbicides may also contribute to an apparent decline in this species (Blaustein et al. 1995). They have been found at elevations up to 4700 feet, but are rare above 3000 feet.

The tailed frog is a primitive amphibian endemic to the Pacific Northwest, occurring in Washington in fast flowing mountain streams on the west side of the Cascades. The tadpoles have unique sucker-like mouths with which they attach to rocks within streams and feed on periphyton. Metamorphosis takes two to four years, perhaps longer at high elevations. The adults generally stay in or near streams but may use nearby forests in wet weather (Leonard et al. 1993). The species appears to be associated with mature forest habitats that can produce cold streams free of fine sediment, and is considered susceptible to negative impacts from loss of old growth forests (Blaustein et al. 1995). Watershed alterations such as road building and timber harvest are suspected to have caused declines in some areas (Leonard et al. 1993).

The western toad is widely distributed over all but the most arid regions of the western United States, and can utilize a wide variety of habitats from sea level to over 7000 feet (Blaustein et al. 1995, Leonard et al. 1993). The adults can disperse through forest, grass and shrub habitats but are most common near lakes, ponds, and wetlands. They require open water for breeding, which may occur as late as July at high elevations. Tadpoles often congregate into large schools within a pond. Toads can be very abundant locally, but have appeared to decline in overall population, especially in the lowlands of Western Washington and some high elevation habitats (Leonard et al. 1993).

8.5.5.2. Study Methods

Resource information for these frogs was derived from existing information cited in Section 4.1 - Setting and field observations during amphibian, fish, and mollusk surveys.

8.5.5.3. Discussion

The Cascades frog is widespread and abundant in the Snoqualmie Summit area. Adults and tadpoles have been observed in summer in most bodies of water in the area, such as Hyak Lake, Divide Lake, Rockdale Lake, Hyak Creek, and many smaller ponds and roadside ditches.

The Tailed frog is expected to be common in the Snoqualmie pass area and has been found in the Study Area by Jones & Stokes field crews in Hyak Creek, Creek Run Stream A, the South Fork Snoqualmie River, and at the Alpental Cat-Track.

The northern red-legged frog would not be expected to be present at this elevation (Blaustein et la 1995, WDFW 1999) and none have been detected.

The Western toad has been observed in the Study Area using the same breeding sites as Cascades frogs.

8.5.6. Neotropical Migratory Birds

Neotropical migratory birds have been defined as those species that regularly breed in continental North America and winter south of the Tropic of Cancer, typically in Central and South America and the Caribbean. Widespread declines in populations of many neotropical migrants have intensified interest in avian conservation, resulting in policy direction to evaluate proposed activities on the nesting habitat of these species (USFS 1998a).

The North American Breeding Bird Survey Program found that 75 percent of forest-dwelling migrants in eastern North America declined in population during the 1980s (Robbins et al. 1989). Potential causes of these declines are numerous and diverse, and may involve environmental changes and habitat deterioration in breeding areas, winter habitats, migration corridors and stopover sites, or a combination of these factors (Sherry and Holmes 1992). Related to these potential causes is the problem of nest parasitism by the brown-headed cowbird, populations of which have expanded significantly in the last few decades due primarily to human-induced changes in the landscape (Ehrlich et al. 1988).

8.5.6.1. Habitat Requirements

Neotropical migrants occur in a wide variety of habitat types, including early and late successional stages, prairies, shrub-steppe habitats, and forests (Finch and Stangel 1992). However, in the relatively arid western United States, densities of neotropical migrants are highest in riparian areas, with coniferous forests being the second-most used habitat by this assemblage of species (Saab and Rich 1997).

8.5.6.2. Study Methods

Resource information on neotropical birds was derived from literature cited in Section 4.1 - Setting.

8.5.6.3. Discussion

Several species of neoptropical migrant birds are known to occur within the AMA (USDA and USDI 1997), the Yakima River watershed (USFS 1997), and the South Fork Snoqualmie watershed (USFS 1995), as shown in Table 9, which also identifies several species of neotropical migrants that have experienced population declines and are of special concern.

Table 9:
Habitat Associations of Neotropical Migratory Bird Species
Known or Suspected to Occur in the Vicinity of Crystal Mountain, Washington[1,2]

Species	Old-Growth	Clearcut	Young Forest	Broadleaf Forest	Riparian	Meadow	Marshes	Subalpine	Cliff
Late-Successional Forest Associates (eastside and westside)									
Sharp-shinned hawk[3]	X		X		X				
Cooper's hawk[3]	X		X	X	X				
Northern goshawk	X								
Red-tailed hawk[3]	X		X	X	X	X			X
Vaux's swift[3]	X				X				
Northern flicker	X	X	X		X				
Olive-sided flycatcher[3]	X	X	X		X				
Western wood-pewee[3]	X		X	X					
Hammond's flycatcher[3]	X		X	X	X				
Golden-crowned kinglet[4]	X		X						
Hermit thrush[3]	X		X						
American robin[3]	X	X	X	X	X	X			
Cassin's vireo[3,4]	X		X	X	X				
Yellow-rumped warbler[3]	X		X						
Townsend's warbler[3]	X		X						
Western tanager[3]	X		X	X	X				
Chipping sparrow[3,4]	X		X						
Dark-eyed junco	X	X	X	X					
Rufous hummingbird[3,4]	X	X	X	X	X	X			X
Red-breasted sapsucker	X		X	X					
Pacific-slope flycatcher[3]	X	X		X	X	X			
Swainson's thrush	X	X	X	X	X				
Wilson's warbler[3,4]	X		X	X	X				
Late-Successional Forest Associates (westside only)									
Merlin	X	X	X		X				
Band-tailed pigeon	X		X						
Hermit warbler	X	X	X						

Table 9:
Habitat Associations of Neotropical Migratory Bird Species
Known or Suspected to Occur in the Vicinity of Crystal Mountain, Washington[1,2]

Species	Old-Growth	Clearcut	Young Forest	Broadleaf Forest	Riparian	Meadow	Marshes	Subalpine	Cliff
Late-Successional Forest Associates (eastside only)									
Flammulated owl	X								
Red-naped sapsucker	X		X	X					
Williamson's sapsucker	X		X	X					
Dusky flycatcher	X		X	X				X	
Early to Mid-Seral Forest Associates									
Turkey vulture[3]		X							X
MacGillivray's warbler[3]		X			X				
Brown-headed cowbird[3]		X		X	X				
Willow flycatcher[3]		X			X				
Cedar waxwing[3]		X		X	X				
Warbling vireo[3]		X		X	X				
Fox sparrow		X			X				
Orange-crowned warbler[3,4]		X		X	X				
Black-throated gray warbler[3]			X	X	X	X			
Spotted towhee		X		X	X				
White-crowned sparrow[3]		X			X				
Meadow Associates									
Short-eared owl[3]						X			
Horned lark						X			
American pipit[3]						X			
Vesper sparrow[3]						X			
Savannah sparrow[3]						X			
Western meadowlark						X			
Common nighthawk[3]		X			X				
Marsh, Lake, and Pond Associates									
Osprey[3]					X		X		
Northern harrier[3]						X	X		

Table 9:
Habitat Associations of Neotropical Migratory Bird Species
Known or Suspected to Occur in the Vicinity of Crystal Mountain, Washington[1,2]

Species	Old-Growth	Clearcut	Young Forest	Broadleaf Forest	Riparian	Meadow	Marshes	Subalpine	Cliff
Killdeer[4]						X	X		
Black swift[3]					X		X		X
Belted kingfisher[3]					X	X			
Eastern kingbird[3]				X	X	X			
Purple martin							X		
Tree swallow[3]					X	X	X		
Violet-green swallow	X	X	X		X		X		
Northern rough-winged swallow[3]					X		X		
Bank swallow					X		X		
Cliff swallow[3]					X	X	X		X
Barn swallow[3,4]					X		X		
Marsh wren							X		
Common yellow-throat					X	X	X		
Red-winged blackbird					X		X		
Yellow-headed blackbird							X		
Cliff Associates									
Golden eagle	X	X						X	X
Peregrine falcon									X
Riparian Associates									
Swainson's hawk[3]					X				
Mourning dove[3]		X			X	X			
American kestrel[3]				X	X	X		X	X
Long-eared owl[3]	X				X	X			X
Anna's hummingbird					X				
Calliope hummingbird[3]		X	X		X	X		X	
Lewis= woodpecker	X				X				
Western kingbird[3]					X				
House wren[3]		X		X	X	X			

Table 9:
Habitat Associations of Neotropical Migratory Bird Species
Known or Suspected to Occur in the Vicinity of Crystal Mountain, Washington[1,2]

Species	Old-Growth	Clearcut	Young Forest	Broadleaf Forest	Riparian	Meadow	Marshes	Subalpine	Cliff
Red-eyed vireo[3]				X	X				
Nashville warbler[3]		X		X	X				
Yellow warbler[3,4]				X	X				
American redstart[3]				X	X				
Yellow-breasted chat[3]					X				
Black-headed grosbeak[3]				X	X				
Lazuli bunting[3]				X	X				
Brewer's blackbird[3]					X	X			
Northern oriole[3]				X	X				
American goldfinch[3]					X				
Subalpine Associates									
Cassin's finch[3]								X	
Ruby-crowned kinglet[3]								X	
Mountain bluebird[3]		X						X	
Townsend's solitaire		X						X	
Lincoln's sparrow[3]						X		X	

[1]From I-90 Land Exchange EIS (USFS 1998a)
[2]Table modified from USFS 1998a and Andelman and Stock 1994.
[3]Included in Sharp (1992) list of species found in MBSNF.
[4]Population trends declining based on data for species where population trends are known (Andelman and Stock 1994).

Within and adjacent to the Study Area there is potential habitat for species dependent upon late-successional forest, early/mid seral forests, meadows, cliffs, marshes, lakes and ponds, and riparian habitat. Since the Study Area is on the Cascade Crest, both west side and east side species are expected too occur.

9. Other Special-Status Species Likely to be Absent From the Snoqualmie Summit Study Area

There are 28 special status species with the potential to occur on either the MBSNF and/or the OWNF that are not expected to occur in the proposed Summit at Snoqualmie MDP Study Area, due to a lack of suitable habitat for these species in the Study Area. This section provides a brief description of the habitat that each of these species is associated with and an explanation of why they are not expected to occur in the Study Area.

9.1. Vertebrate Threatened and Candidate Species

The Canada lynx is listed as threatened and has the potential to occur on both the MBSNF and the OWNF. Habitat for Canada lynx was mapped on both Forests using guidelines provided in an August 22, 2000 memo from the Lynx Biology Team to the USFS, BLM and USFS in the western United States. This memo recommended that lynx habitat be mapped using the following criteria:

1. Areas below 4000 feet elevation should generally be excluded.
2. Primary vegetation habitat for lynx in the Cascades is mesic subalpine fir dominated by spruce, fir, Douglas-fir and lodgepole pine.
3. Other cool, moist vegetation types should only be included in lynx habitat if they are intermingled and adjacent to primary habitat. The Pacific silver fir and mountain hemlock vegetation types are not lynx habitat.

The Study Area and most of the immediately surrounding Snoqualmie Pass area are below 4,000 feet except on the very tops of the mountains, lack sub-alpine fir and lodgepole pine forests, and consist mainly of Pacific silver fir and mountain hemlock forest. No lynx habitat was mapped in the Study Area and lynx are not expected to regularly occur in this area. Lynx may travel through the Study Area, and habitat connectivity is addressed as a separate issue in this document.

The Oregon spotted frog is a candidate for listing under the ESA by the USFWS. The Oregon spotted frog and the Columbia spotted frog were considered a single species until 1996 (Mcallister and Leonard 1997). Both species are highly aquatic, breeding in shallow emergent wetlands and remaining in wetland and riparian areas as adults. The drastic decline in their populations is believed to be the result of several factors; the introduction of non-native predatory fish and bullfrogs, loss of wetland habitat to agriculture, development and river channeling, alteration of the hydrology of remaining wetland habitat, and changes in wetland plant communities by the invasions of exotic plant species. The Oregon spotted frog, which was once common in the lowlands of Western Washington, is now confined to four sites in the State. The

Oregon spotted frog would not be expected to be present at this elevation (Blaustein et la 1995, WDFW 1999) and none have been detected.

The western yellow-billed cuckoo is a candidate for listing under the ESA (66 FR 38611-38626). The western yellow-billed cuckoo is considered extirpated as a breeding bird in Washington but formerly occurred in lowland riparian habitats in the Puget Trough and in riparian habitats corridors in eastern Washington (Smith et al 1997). This species is not expected to occur in the Study Area due to its status in the State and due to the Study Area being outside of it's former range within the State.

9.2. Rare and Uncommon and Other ROD Species

Three species of mollusks formerly identified as survey and manage may occur on either the MBSNF and/or the OWNF, the Puget Oregonian (*Cryptomastix devia*) and the Chelan mountainsnail (*Oreohelix new sp. 1*), and Lyrogyrus n. sp. 2, all snails. The Puget Oregonian may occur on both forests, however its range is limited to areas below 1,500 feet in elevation (Duncan et al 2003) and so it is not expected to occur in the Study Area. The Chelan mountainsnail may occur on the OWNF, however the westernmost extent of its expected range is located to the east of the Study Area and it is also not expected to occur in the Study Area. Lyrogyrus n. sp. 2 has also been documented on the OWNF however the Study Area is outside of the range for this species. These three species are now included on the Regional Foresters Sensitive Species list.

There are three species of bats identified in appendix J2 of the Northwest Forest Plan as being of concern and occur within the area covered by the Northwest Forest Plan but are not expected to occur in the Study Area. The fringed myotis may occur in the eastern portion of the OWNF, and is associated with arid forest and grassland, and deserts (Johnson and Cassidy 1997). Keen's myotis is one of the least known bat species in the state and is believed to be restricted in range to the Puget Sound lowlands (Johnson and Cassidy 1997). The pallid bat inhabits eastern Washington and is associated with river canyons and cliffs in steppe or desert habitat and is occasionally found in association with xeric forest habitat (Johnson and Cassidy 1997).

9.3. Forest Service Sensitive Species

There are 10 species on the Regional Forests Sensitive Species List for either the MBSNF and/or the OWNF that are not expected to occur in the Study Area: three reptiles, one mammal, and six birds.

Common loons nest on large lakes (generally greater than 29 acres) with abundant fish populations and low levels of human disturbance (Lewis et al. 1999), which are lacking in the Study Area. Ferruginous hawks occur in the Columbia basin, in association with grassland and desert-shrub habitats (Richardson et al. 1999), which are lacking in the Study Area. Greater sandhill cranes occur primarily association with large tracts of open habitat, including large wetland complexes and agricultural fields (Bettinger and Milner 2000), habitats that do not occur in the Study Area. Upland sandpipers are considered very uncommon summer residents in Washington and are associated with wet meadow and grassland habitat

(Buchanan 2002), which is limited in the Study Area, making it unlikely that this species would occur. In addition, areas of concentrated use by shorebirds in Washington are along the coastal areas and in the Columbia Basin (Buchanan 2002), making a mountain pass area unlikely habitat. Sage grouse are associated with habitats containing sage brush (Schroeder et al. 2003), which does not occur in the Study Area. Eared grebes are associated with large bodies of water and may occur on Lake Keechelus but not within the Study Area (Stokes and Stokes 1996). The Study Area is not within the range of the sandhill crane or western gray squirrel (Rodrick and Milner 1991). Western gray squirrels are known to occur in both eastern and western Washington, in habitats containing broadleaf, nut bearing trees in either pure stands or mixed with conifers at low elevations (Johnson and Cassidy), a habitat type that is lacking in the Study Area.

The Study Area is outside of the current range for the western pond turtle, which occurs primarily in the Puget Sound lowlands and in areas along the Columbia River (Nordstrom and Milner 1997). The striped whipsnake occurs in eastern Washington, in association with native grassland, sagebrush, and dry, rocky habitats (Nordstrom and Whalen 1997), which are lacking in the Study Area. The Study Area is outside of the range of the sharptail snake (Storm and Leonard 1995).

9.4. Management Indicator Species

The beaver and the ruffed grouse are MIS identified in the OWNF Forest Plan as being associated with riparian deciduous habitat, a habitat type that does not occur in the Study Area. While each of these species may occur in the Study Area, the habitat that they were selected to represent does not, therefore these species were not included in the analysis for this project.

9.5. USFWS Species of Concern

There are 7species identified as being of concern to the USFWS that are not expected to occur in the Study Area, including 3 species of birds, 3 species of mammals, and one butterfly.

Black terns are most common in eastern Washington, also occurring at Conboy Lake National Wildlife Refuge, and are associated with freshwater wetlands in the Three-tip sage and ponderosa pine zones as defined in the Washington State Gap Analysis (Smith et al. 1997), habitats which are lacking in the Study Area. Both loggerhead shrikes and burrowing owls occur primarily within the shrub-steppe habitats of eastern Washington (Vander Haegen 2003, Nordstrom 2003) and are not expected to occur in the Study Area.

Habitat for bighorn sheep is defined as steep terrain including rocky slopes, ridges, cliffs, or canyons adjacent to foraging habitat containing grass or grass/shrub vegetation. This species is known to occur east of the Study Area (Johnson and Cassidy 1997) but is not expected to occur in the Study Area. Two species of bat were identified as being of concern, the small-footed myotis, which is associated with arid valleys and badlands in eastern Washington (Johnson and Cassidy 1997), and the fringed myotis, which is associated desert, arid grassland, and arid forest (Johnson and Cassidy 1997).

The range of the valley silverspot is restricted to the Puget Sound lowlands, Willapa Hills, and Olympic mountains where they utilize meadow habitats containing western blue violets (Larsen et al 1995). Since the Study Area is outside of the range for this species, it is not expected to occur in the Study Area.

10. Determination of Effect

This biological evaluation was prepared for use by the U.S. Forest Service in conducting Section 7 compliance and NEPA analysis for the proposed Summit-at-Snoqualmie MDP proposal. The analysis is based on the range of alternatives described in the Section 2.3 – Alternatives Considered of The Summit-at-Snoqualmie MDP FEIS. This report discuses potential occurrence of and impacts to species federally listed as threatened or endangered under the ESA, Rare and Uncommon species, U.S. Forest Service sensitive species, USFWS Species of Concern, and USFS MIS, USFS Species of Local Concern for the OWNF and the MBSNF. Potential effects and the method used to determine whether or not effects would occur are discussed in this section.

10.1. Threatened and Endangered Species

10.1.1. Alternative 1

Under Alternative 1, there would be no effects on Threatened and Endangered Species or their habitat resulting from the construction of new facilities; however existing impacts to wildlife and wildlife habitat would continue. Under the No Action Alternative, wildlife habitat conditions in the Study Area would continue with changes in vegetation being driven primarily by natural causes. Mature forest on public lands would continue to be managed for LSH and for habitat connectivity. Immature forest would continue to move toward mature forest, however over the life of the 10-year planning period, immature forest would remain in an immature stage.

Under Alternative 1, habitat within Riparian Buffers on public lands would continue to be managed according to the Standards and Guidelines for Riparian Buffers in the Forest Plan (USDA and USDI 1994) and habitat within Riparian Buffers on private lands would continue to be managed per King County or Kittitas County Code depending on location. There would be no increase in area included in Riparian Buffers under this Alternative and only previously approved restoration projects would occur under Alternative 1. Aquatic habitats would also remain largely unchanged under this Alternative. Parking lots would remain unpaved and the potential contribution of sediment to streams and wetlands in the Study Area would continue.

Habitat for generalist species like grizzly gear and grey wolf would also remain largely unchanged, with natural processes driving habitat changes. Potential disturbance from ongoing maintenance activities would continue in currently developed areas without seasonal restrictions, as would use of the current mountain bike trail system.

Under Alternative 1, existing habitat connectivity would be maintained, with no changes in the amount of connective habitat in Section 16 (Summit East) and no changes in either canopy cover or understory cover

in this area except those caused by natural processes. Potential disturbance impacts from night lighting and grooming activities would continue in areas currently affected. Interstate 90 would continue to bisect connectivity habitat and to limit north-south movement of animals in the Snoqualmie Pass area.

10.1.2. Alternative 2

10.1.2.1. Northern Spotted Owl

Under Alternative 2, habitat for **northern spotted owl** would be reduced from 828.50 acres to 788.98 acres for a net loss of approximately 39 acres, the most of all the Action Alternatives (see Table 10). Of the 39 acres of impact, 3 acres would occur on public land and less than 1 acre on private land in the S.F. Snoqualmie Watershed, and 28 acres would occur on public land and 8 acres would occur on private land in the U. Yakima Watershed. In addition, approximately 8 acres of mature pacific silver fir would be gladed on Public land in the U. Yakima Watershed.

Table 10:
Summary of Effect to Threatened and Endangered Species as a Result of The Summit-at-Snoqualmie MDP.

Species	Status	Alt 1	Alt 2	Alt 3	Alt 4	Mod. Alt 5	Determination of Effect – All Alternatives
Northern Spotted Owl *(Strix occidentalis caurina)*	Threatened	828.50	788.98	801.73	815.14	799.21	May Affect, Not Likely to Adversely Affect
Northern Spotted Owl Critical Habitat							No Effect
Marbled Murrelet *(Brachyrampus marmoratus)*	Threatened	828.50	788.98	801.73	815.14	799.21	No Effect
Marbled Murrelet Critical Habitat							No Effect
Grizzly Bear (*Ursus arctos horribilis*)	Threatened	2899.36	2702.22	2745.16	2751.08	2711.31	May Affect, Not Likely to Adversely Affect
Gray Wolf (*Canis lupus*)	Endangered	2899.36	2702.22	2745.16	2751.08	2711.31	May Affect, Not Likely to Adversely Affect
Canada Lynx (*Lynx canadensis*)[1]	Threatened	n/a	n/a	n/a	n/a	n/a	No Effect

[1] See Section 9.1 – Vertebrate Threatened and Candidate Species

Loss of habitat for spotted owl would occur primarily as a result of the permanent loss of mature forest in Section 16 (Summit East) from construction of the *Creek Run* and *Rampart* chairlifts and associated ski trails. Mature forest habitat would also be removed in the *Silver Fir* pod of Summit Central, and for the new *Internationale* chairlift and the realignment of the existing *Sessel* chairlift at Alpental. Construction treatments for these ski trails would include glading, clearing without grading, and clearing with grading.

Potential impacts to northern spotted owls would include a reduction in the amount of foraging and dispersal habitat available as a result of full clearing, and potential disturbance to foraging or dispersing individuals from construction, operations, and maintenance activities. Mature forest in Section 16 between Summit East and Summit Central, particularly the area north of the proposed *Creek Run* chairlift and south of the cleared *Silver Fir* ski trails, is a large patch of relatively contiguous forest and has been identified as important to habitat connectivity for spotted owls (USFS and USFWS 1997). As described in Section 8.1.1 – Northern Spotted Owl, this area represents foraging and dispersal habitat, and historically had been considered nesting habitat (MBSNF 1995). No spotted owls were found in Section 16 (Summit East) or the rest of the Study Area during surveys conducted during 1994, 1995, 2001, 2002 and 2007. The nearest known nesting pair was found south of Mt Catherine, approximately 1 mile from the Study Area boundary (WDFW 2002, Sovern 2004 Pers. Comm.).

Full clearing of ski trails would reduce the amount of foraging and dispersal habitat available in the area and would fragment existing habitat, creating increased edge habitat. This would occur in the U. Yakima Watershed in Section 16 (Summit East).

Clearing of mature forest at Summit Central and Alpental would remove portions of small islands of forest in areas that are currently highly fragmented. This clearing would reduce the overall amount of mature forest available, but not interior forest. While these islands of mature trees are not within the area of primary focus for habitat connectivity in the Study Area they do provide potential stepping stones for forest-dependent species to move through the Study Area. Reducing the size and increasing the distance between these islands may increase the risk of predation for species moving between the islands.

Construction of ski trails in this area would also reduce the amount of foraging habitat available and may reduce the effectiveness of foraging habitat by introducing increased amounts of human activity in the area. Night lighting on trails in the *Silver Fir* and *Rampart* pods, and the associated increase in human activity in these areas during times when owls are actively hunting, may reduce the amount of area suitable for spotted owl foraging in this area. Directional lighting would be employed to reduce impacts to nocturnal species in forested areas adjacent to ski trails with night lighting, as described in Other Management Provision OMP42 (see FEIS Table 2.4-2). Grooming of these and *Creek Run* trails may also disturb spotted owl foraging behavior in this area.

In order to avoid impacts to spotted owls potentially nesting in areas adjacent to the Study Area, all helicopter access and egress routes would be planned such that they avoid passing over known and historic nest sites outside of the Study Area at an altitude of less than 250 feet above the canopy, as described in Other Management Provision OMP41 (see FEIS Table 2.4-2).

Gladed areas are not expected to alter the suitability of foraging habitat since ski trail glading has been designed to retain either 70 percent canopy cover in areas where canopy cover currently exceeds this level or maintain existing levels of canopy cover. ***Therefore, Alternative 2 May Affect, but is Not Likely to Adversely Affect northern spotted owl.***

The Study Area is not located within designated critical habitat for the **northern spotted owl.** ***Therefore, there would be No Effect to northern spotted owl Designated Critical Habitat under Alternative 2.***

10.1.2.2. Marbled Murrelet

The potential habitat for **marbled murrelet** within the Study Area is defined as mature Pacific silver fir and mature western hemlock forest combined. Under Alternative 2, habitat for marbled murrelet would be reduced from 828.50 acres to 788.98 acres for a net loss of approximately 39 acres, the most of all the Action Alternatives (see Table 10).

Mature forest in the western hemlock and Pacific silver fir zone may technically provide nesting habitat for marbled murrelets but is highly unlikely to do so, as described in Section 2.1 – Surveys Conducted. Surveys conducted in potential nesting habitat for this species in 1994, 1995, 2001, 2002 and 2007 found no murrelets in the Study Area. As a result, potential habitat in the Study Area has a status of probable absence, with impacts to marbled murrelets unlikely. ***Therefore, there would be No Effect to marbled murrelet under Alternative 2 as there has been no documented occurrence of marbled murrelet within the Study Area.***

The Study Area is not located within designated critical habitat for the marbled murrelet. ***Therefore, there would be No Effect to Marbled Murrelet Designated Critical Habitat under Alternative 2.***

10.1.2.3. Grizzly Bear

No specific habitat types within the Study Area have been identified as providing habitat with which grizzly bears would have a primary association. **Grizzly bear** may use any or all of the habitat types within the Study Area, however documented sightings of all of these species are rare. The high level of human use in the Study Area, in part, limits the use of the Study Area by these species and therefore impacts are unlikely.

The portion of the Study Area north of Interstate 90 (Alpental) is within the North Cascades Ecosystem recovery zone for grizzly bear, however as described in Section 8.1.3 – Grizzly Bear, the Study Area is designated as Administratively Withdrawn and is not managed for grizzly bear habitat. It is possible, however unlikely, that grizzly bears may occur in the Study Area, however, utilizing herbaceous and shrub habitats for summer or fall foraging or that grizzly bears may pass through the Study Area. Under Alternative 2 an increase in the amount of potential foraging habitat for grizzly bears would occur as other habitat types were converted to herbaceous and shrub habitats as a result of Alternative 2.

The amount of human activity in the Study Area would also increase. Increases in wintertime activity would not impact grizzly bears as they would be in hibernation, mostly likely outside of the Study Area

since suitable habitat for hibernation is lacking in the Study Area. Based on elevation and the vegetation within the Study Area, the highest probability of grizzly bears occurring in the Study Area would be during summer and fall. A rise in recreational use during summer and fall may potentially cause increased avoidance of the area by grizzly bears. Construction of the *Pulse Gondola* would represent the largest contribution to additional summer and fall recreation use since it would operate on a year-round basis and would increase recreational use of the area. Activity-related impacts would be greatest in the vicinity of the mountain-top restaurant, however some gondola riders may choose to explore more remote areas along the top of Denny Mountain or to hike down from the top, thereby increasing human presence in areas that currently receive little human disturbance during summer and fall. Maintenance activities in newly developed areas would also increase disturbance.

Additional potential direct impacts to grizzly bears could include conflicts with humans. Such conflicts could lead to public safety control measures should bears become habituated to humans or garbage generated by humans in the Study Area. ***Therefore, Alternative 2 May Affect, but is Not Likely to Adversely Affect grizzly bear as no bears have been documented within the Study Area.***

10.1.2.4. Gray Wolf

Gray wolf may use any or all of the habitat types within the Study Area, however documented sightings of this species are rare. The high level of human use in the Study Area, in part, limits the use of the Study Area by these species and therefore impacts are unlikely.

The presence of gray wolves is expected to be rare and limited to occasional use of the Study Area as part of a larger home range territory, in part because the Study Area is lacking suitable denning habitat for this species. Wolves may hunt in the Study Area but the high level of human activity associated with the ski area activities is expected to limit use to travel habitat to and from more remote areas. An increase in human activity under all Action Alternatives would occur during winter. Under Alternative 2, there would be an increase in human activity year-round due to construction of the *Pulse Gondola* and mountain-top restaurant at Alpental.

Alternative 2 is not expected to impact individuals or populations of gray wolf as no sightings of wolves have been documented within the Study Area. Since wolves are habitat generalists, the removal of habitat through project activities (clearing) is not expected to impact wolf habitat within the Study Area. Potential impacts to wolf prey, ungulate populations, include an avoidance of the Study Area during summer construction activities. This could impact wolf foraging opportunities during the summer. Ungulates are known to avoid the Study Area during the winter as it does not contain suitable wintering grounds due to the high elevation and snowpack. ***Therefore, Alternative 2 May Affect, but is Not Likely to Adversely Affect gray wolf.***

10.1.3. Alternative 3

10.1.3.1. Northern Spotted Owl

As shown in Table 10, potential habitat for **northern spotted owl** within the Study Area is defined as mature Pacific silver fir and mature western hemlock forest combined. Under Alternative 3, the amount of this habitat type in the Study Area would be reduced from an existing amount of 828.50 acres to 801.73 acres, for a net loss of approximately 27 acres, as shown in Table 10. This reduction would occur entirely within the mature Pacific silver fir type. Of the approximate 27 acres, 3 acres would occur on public land and less than 1 acre would occur on private land in the upper S.F. Snoqualmie Watershed, and 23 acres would occur on private land in the U. Yakima Watershed, with no loss of this habitat type on public land in the U. Yakima Watershed. In addition to these acres of clearing, approximately 9 acres of mature Pacific silver fir forest and 20 acres of mature western hemlock forest would be converted from private ownership to public ownership in the U. Yakima Watershed as a result of the land donation. No glading of mature forest habitat would occur under Alternative 3.

The types of impacts on northern spotted owl habitat under Alternative 3 would be similar to Alternative 2, although the acreage of impact to potential habitat would be less than Alternative 2. Since the *Creek Run* chairlift and associated trails would not be built under Alternative 3 the amount of potential foraging and dispersal habitat for spotted owls that would be removed would be less than under Alternative 2, as previously described. Removal of this habitat type would occur primarily in conjunction with construction of the *Rampart* chairlift and associated trails. Because clearing associated with the *Creek Run* ski pod and with Trail 49 would not occur under this Alternative. The amount of forest fragmentation would be less than under Alternative 2, therefore reducing the increased risk of predation compared to Alternative 2. Reforestation of existing *Trails 55, 66,* and *67* would result in a long-term increase in foraging and dispersal habitat for this species in Section 16 (Summit East). In addition, the purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative.

The potential for disturbance to foraging or dispersing spotted owls would also be reduced compared to Alternative 2 because grooming and maintenance activities would not occur in the Creek Run area. Night lighting of the Silver Fir and Rampart ski pods would, however, result in an increase over existing conditions of potential disturbance to spotted owls potentially foraging or dispersing through this area. As under Alternative 2, implementation of Other Management Provisions OMP39-42 (see FEIS Table 2.4-2), would reduce potential impacts to northern spotted owls. ***Therefore, Alternative 3 may affect, but is not likely to adversely affect northern spotted owl.***

The Study Area is not located within designated critical habitat for the **northern spotted owl.** ***Therefore, there would be No Effect to northern spotted owl Designated Critical Habitat under Alternative 2.***

10.1.3.2. Marbled Murrelet

The potential habitat for **marbled murrelet** within the Study Area is defined as mature Pacific silver fir and mature western hemlock forest combined. Under Alternative 3, the marbled murrelet habitat in the Study Area would be reduced from an existing amount of 828.50 acres to 801.73 acres, for a net loss of approximately 27 acres, as shown in Table 10. Impacts to murrelets would be similar to but less than those described under Alternative 2 as the *Creek Run* lift and trails will not be constructed. ***Therefore, there would be No Effect to marbled murrelet under Alternative 3 as there has been no documented occurrence of marbled murrelet within the Study Area.***

The Study Area is not located within designated critical habitat for the marbled murrelet. ***Therefore, there would be No Effect to Marbled Murrelet Designated Critical Habitat under Alternative 3.***

10.1.3.3. Grizzly Bear

Under Alternative 3, the types of indirect impacts on grizzly bear would be similar to Alternative 2 except reduced since the *Pulse Gondola* and mountain-top restaurant would not be built. Potential direct impacts to grizzly bears resulting from habituation to humans would be reduced through implementation of Other Management Provisions OMP45-46 (see FEIS Table 2.4-2). Increases in wintertime activity would not impact grizzly bears as they would be in hibernation, most likely outside of The Summit-at-Snoqualmie Study Area since suitable habitat for hibernation is lacking within The Summit-at-Snoqualmie. Impacts to grizzly bear during the summer would be minimal to non-existent since no summertime recreation activities are proposed under Alternative 3. Occasional lift and trail maintenance, such as vegetation mowing or brushing, could potentially disturb bears that might pass through the area but this is expected to be rare. The addition of new ski trails within The Summit-at-Snoqualmie Study Area would not be expected to alter grizzly bear travel habitat as this species is a habitat generalist and will utilize a variety of habitats during its travels. ***Therefore, Alternative 3 May Affect, but is Not Likely to Adversely Affect grizzly bear as no bears have been documented within the Study Area.***

10.1.3.4. Gray Wolf

Under Alternative 3, the types of indirect impacts on **gray wolf** would be similar to Alternative 2 except reduced since the *Pulse Gondola* and mountain-top restaurant would not be built. Potential direct impacts to grey wolves resulting from habituation to humans would be reduced through implementation of Other Management Provisions OMP45-46 (see FEIS Table 2.4-2).

Alternative 3 is not expected to impact individuals or populations of gray wolf as no sightings of wolves have been documented within the Study Area. Since wolves are habitat generalists, the removal of habitat through project activities (clearing) is not expected to impact wolf habitat within the Study Area. Potential impacts to wolf prey, ungulate populations, include an avoidance of the Study area during summer construction activities. This could impact wolf foraging opportunities during the summer. Ungulates are known to avoid the Study Area during the winter as it does not contain suitable wintering grounds due to the high elevation and snowpack. The proximity of I-90, SR906, and year-round human disturbance at the

existing ski area would likely lead to an avoidance of the area by gray wolf. ***Therefore, Alternative 3 may affect, but is not likely to adversely affect gray wolf.***

10.1.4. Alternative 4

10.1.4.1. Northern Spotted Owl

Potential habitat for northern spotted owl within the Study Area is defined as mature Pacific silver fir and mature western hemlock forest combined (see Table 10). Under Alternative 4, the amount of this habitat type in the Study Area would be reduced from 828.50 acres of existing habitat to 815.14 acres, for a net loss of approximately 13 acres (see Table 10). This reduction would occur entirely within the mature Pacific Silver fir type.

Of the approximate reduction of 13 acres, 1 acre would occur on public land and less than 1 acre would occur on private land in the upper S.F. Snoqualmie Watershed, and 4 acres would occur on public land and 7 acres would occur on private land in the U. Yakima Watershed.

Under Alternative 4, impacts to foraging and dispersal habitat for the northern spotted owl would be less than would occur under the other Action Alternatives. Under Alternative 4, clearing of mature forest would include the removal of small areas on the edges of existing small patches of highly fragmented mature forest. These patches do not function as interior habitat, with edge effect affecting the entire stand (Crisifulli 1994), and the high level of fragmentation of this forest limits its value as spotted owl habitat (Thomas et al 1990). In addition, and have limited value as foraging habitat for spotted owls. Spotted owls may use these patches to move between larger patches of habitat in the surrounding area as described in Section 6 – Habitat Connectivity and Fragmentation. To minimize potential impacts to nocturnal species associated with mature forest there would be no new night lighting in the Silver fir pod under this Alternative. As under Alternative 2, implementation of Other Management Provisions OMP39-42 (see FEIS Table 2.4-2), would reduce potential impacts to northern spotted owls.

Northern spotted owls are not likely to be present during construction activities. ***Therefore, Alternative 4 may affect, but is not likely to adversely affect northern spotted owl.***

The Study Area is not located within designated critical habitat for the **northern spotted owl.** ***Therefore, there would be No Effect to northern spotted owl Designated Critical Habitat under Alternative 4.***

10.1.4.2. Marbled Murrelet

The potential habitat for **marbled murrelet** within the Study Area is defined as mature Pacific silver fir and mature western hemlock forest combined. Under Alternative 4, the amount of this habitat type in the Study Area would be reduced from 828.50 acres of existing habitat to 815.14 acres, for a net loss of approximately 13 acres (see Table 10). Impacts to murrelet habitat would be similar to but less than the other Action Alternatives due to the elimination of any new development in Section 16. ***Therefore, there***

would be No Effect to marbled murrelet under Alternative 3 as there has been no documented occurrence of marbled murrelet within the Study Area.

The Study Area is not located within designated critical habitat for the marbled murrelet. ***Therefore, there would be No Effect to Marbled Murrelet Designated Critical Habitat under Alternative 3.***

10.1.4.3. Grizzly Bear

Under Alternative 4, impacts to **grizzly bear** would be similar to Alternative 2, except with fewer acres (see Table 10). Grizzly bear are considered habitat generalists and the removal of habitat (clearing) within the Study Area is not expected to affect bears. Operational impacts under Alternative 4 would include increased noise and human activity; however, this activity would take place during the winter when these species are not expected to occur. ***Therefore, Alternative 4 May Affect, but is Not Likely to Adversely Affect grizzly bear as no bears have been documented within the Study Area.***

10.1.4.4. Gray Wolf

Under Alternative 4, impacts to **gray wolf** would be similar to Alternative 2, except with fewer acres (see Table 10). Alternative 4 is not expected to impact individuals or populations of gray wolf as no sightings of wolves have been documented within the Study Area. Since wolves are habitat generalists, the removal of habitat through project activities (clearing) is not expected to impact wolf habitat within the Study Area. Potential impacts to wolf prey, ungulate populations, include an avoidance of the Study Area during summer construction activities. This could impact wolf foraging opportunities during the summer. Ungulates are known to avoid the Study Area during the winter as it does not contain suitable wintering grounds due to the high elevation and snowpack. The proximity of I-90, SR906, and year-round human disturbance at the existing ski area would likely lead to an avoidance of the area by gray wolf. ***Therefore, Alternative 4 may affect, but is not likely to adversely affect gray wolf.***

10.1.5. Modified Alternative 5

10.1.5.1. Northern Spotted Owl

As shown in Table 10, potential habitat for northern spotted owl within the Study Area is defined as mature Pacific silver fir and mature western hemlock forest combined. Under Modified Alternative 5, the amount of this habitat type in the Study Area would be reduced from an existing amount of 828.50 acres to 799.21 acres, for a net loss of approximately 29 acres (see Table 10). This reduction would occur entirely within the mature Pacific Silver fir type.

Of the approximately 29 acres, 3 acres would occur on public land and less than 1 acre on private land in the upper S.F. Snoqualmie Watershed. In the U. Yakima Watershed, 17 acres would occur on public land and 8 acres on private land. In addition to these acres of clearing, approximately 9 acres of mature Pacific silver fir forest and 20 acres of mature western hemlock forest would be converted from private ownership to public ownership in the U. Yakima Watershed as a result of the land donation.

Impacts to northern spotted owls under Modified Alternative 5 would be similar to Alternative 2, except the amount of clearing would be reduced. In addition, the purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative.

The potential for disturbance to foraging or dispersing spotted owls would also be similar to Alternative 2 although reduced because grooming activities would not occur within gladed trails in the *Creek Run* ski pod. Night lighting of the *Silver Fir* and *Rampart* ski pods would result in an increase over existing conditions in potential disturbance to spotted owls potentially foraging or dispersing through this area. As under Alternative 2, implementation of Other Management Provisions OMP39-42 (see FEIS Table 2.4-2), would reduce potential impacts to northern spotted owls. ***Therefore, Modified Alternative 5 may affect, but is not likely to adversely affect northern spotted owl.***

The Study Area is not located within designated critical habitat for the **northern spotted owl.** ***Therefore, there would be No Effect to northern spotted owl Designated Critical Habitat under Modified Alternative 5.***

10.1.5.2. Marbled Murrelet

The potential habitat for marbled murrelet within the Study Area is defined as mature Pacific silver fir and mature western hemlock forest combined. Under Modified Alternative 5, the amount of this habitat type in the Study Area would be reduced from an existing amount of 828.50 acres to 799.21 acres, for a net loss of approximately 29 acres (see Table 10). Impacts to murrelets would be similar to but less than the other Action Alternatives due to the elimination of any new development in Section 16. ***Therefore, there would be No Effect to marbled murrelet under Modified Alternative 5 as there has been no documented occurrence of marbled murrelet within the Study Area.***

The Study Area is not located within designated critical habitat for the marbled murrelet. ***Therefore, there would be No Effect to Marbled Murrelet Designated Critical Habitat under Modified Alternative 5.***

10.1.5.3. Grizzly Bear

Under Modified Alternative 5, impacts to **grizzly bear** would be similar to Alternative 2, except with fewer acres (see Table 10). Grizzly bear are considered habitat generalists and the removal of habitat (clearing) within the Study Area is not expected to affect bears. Operational impacts under Modified Alternative 5 would include increased noise and human activity; however, this activity would take place during the winter when these species are not expected to occur. ***Therefore, Modified Alternative 5 May Affect, but is Not Likely to Adversely Affect grizzly bear as no bears have been documented within the Study Area.***

10.1.5.4. Gray Wolf

Under Modified Alternative 5, impacts to **gray wolf** would be similar to Alternative 2, except with fewer acres (see Table 10). Modified Alternative 5 is not expected to impact individuals or populations of gray

wolf as no sightings of wolves have been documented within the Study Area. Since wolves are habitat generalists, the removal of habitat through project activities (clearing) is not expected to impact wolf habitat within the Study Area. Potential impacts to wolf prey, ungulate populations, include an avoidance of the Study Area during summer construction activities. This could impact wolf foraging opportunities during the summer. Ungulates are known to avoid the Study Area during the winter as it does not contain suitable wintering grounds due to the high elevation and snowpack. The proximity of I-90, SR906, and year-round human disturbance at the existing ski area would likely lead to an avoidance of the area by gray wolf. ***Therefore, Modified Alternative 5 may affect, but is not likely to adversely affect gray wolf.***

10.2. Rare and Uncommon and Other ROD Species

10.2.1. Alternative 1

Under Alternative 1, there would be no effects on Rare and Uncommon and Other ROD Species or their habitat resulting from the construction of new facilities, however existing impacts to wildlife and wildlife habitat would continue. Under the No Action Alternative, wildlife habitat conditions in the Study Area would continue with changes in vegetation being driven primarily by natural causes. On public land, the amount and distribution of mature forest would continue but with occasional changes possible from wind-throw, avalanche, or wildfire. Mature forest on public lands would continue to be managed for LSH and for habitat connectivity. No new impacts would occur within the mature forest habitat in Section 16 (Summit East). Immature forest would continue to move toward mature forest, however over the life of the 10-year planning period, immature forest would remain in an immature stage.

Under Alternative 1, habitat within Riparian Buffers on public lands would continue to be managed according to the Standards and Guidelines for Riparian Buffers in the Forest Plan (USDA and USDI, 1994) and habitat within Riparian Buffers on private lands would continue to be managed per King County or Kittitas County Code depending on location. There would be no increase in area included in Riparian Buffers under this Alternative and only previously approved restoration projects would occur under Alternative 1. Aquatic habitats would also remain largely unchanged under this Alternative.

10.2.2. Alternative 2

10.2.2.1. Terrestrial Mollusks

No listed terrestrial mollusks (see Section 8.2.1 - Mollusks) have been documented within the Study Area, although suitable habitat exists. Under Alternative 2, approximately 45 acres of mollusks habitat would be impacted (see Table 11). The removal of mature forest would decrease canopy closure and reduce potential recruitment of downed woody material. The retention of downed woody material as described in Other Management Provision OMP40 would minimize habitat impacts to mollusks.

Table 11. Summary of Effect to Rare and Uncommon Species as a Result of The Summit-at-Snoqualmie MDP.

Species	Alt 1	Alt 2	Alt 3	Alt 4	Mod. Alt 5	Determination of Effect – All Alternatives
Terrestrial Mollusks	1,053.11	1,007.83	1,025.46	1,037.45	1,020.38	May impact individuals but would not likely contribute to a trend toward federal listing
Silver-Haired Bat	1053.11	1007.83	1025.46	1037.45	1020.38	May impact individuals but would not likely contribute to a trend toward federal listing
Hoary Bat	1053.11	1007.83	1025.46	1037.45	1020.38	May impact individuals but would not likely contribute to a trend toward federal listing

As discussed in Section 8.2.1 - Mollusks, surveys for **terrestrial mollusks** were conducted between fall of 1998 and spring of 2001 with none found. Therefore, these species have a status of "not detected" and although absence cannot absolutely be determined, these species are unlikely to within the Study Area. ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.2.2. Silver-Haired Bat

Under Alternative 2, approximately 45 acres of **silver-haired bat** habitat would be impacted. Silver-haired bat is known to roost under loose tree bark, a characteristic of mature forest (see Table 11). Silver-haired bat utilize snags as roosting sites. Areas of full clearing within mature forest habitat would result in a reduction in the amount of roosting habitat available for this species. Snags would also be removed from gladed areas and from mature forest stands along the edges of ski trails as a part of hazard tree management. Roosting habitat would therefore be reduced in these management areas. Loss of snags within the Study Area would be minimized through implementation of Other Management Provision OMP39 (see FEIS Table 2.4-2).

Although not known to occur, silver haired bats may occur in the Study Area. ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.2.3. Hoary Bat

Under Alternative 2, approximately 45 acres of **hoary bat** habitat would be cleared (see Table 11). Hoary bat also utilize snags as roosting sites. Areas of full clearing within mature forest habitat would result in a reduction in the amount of roosting habitat available for hoary bat. Snags would also be removed from gladed areas and from mature forest stands along the edges of ski trails as a part of hazard tree management. Roosting habitat would therefore be reduced in these management areas. Loss of snags within the Study Area would be minimized through implementation of Other Management Provision OMP39 (see FEIS Table 2.4-2). Although not known to occur, hoary bats may occur in the Study Area. ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.3. Alternative 3

10.2.3.1. Terrestrial Mollusks

Under Alternative 3, impacts to terrestrial mollusks habitat would be as described under Alternative 2 but with less impacted acreage. Since the *Creek Run* and associated trails would not be built there would be less habitat removed under this Alternative (see Table 11). The donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative.

As discussed in Section 8.2.1 - Mollusks, surveys for **terrestrial mollusks** were conducted between fall of 1998 and spring of 2001 with none found. Therefore, these species have a status of “not detected” and although absence cannot absolutely be determined, these species are unlikely to within the Study Area. ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.3.2. Silver-Haired Bat

Under Alternative 3, impacts to **silver-haired bat** habitat would be similar to Alternative 2 except there would be a smaller reduction of roosting habitat and a smaller increase in foraging habitat since the *Creek Run* chairlift and associated trails would not be constructed (see Table 11). In addition, the purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. Although not known to occur, silver haired bats may occur in the Study Area. ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.3.3. Hoary Bat

Under Alternative 3, impacts to **hoary bat** habitat would be similar to Alternative 2 except there would be a smaller reduction of roosting habitat and a smaller increase in foraging habitat since the *Creek Run*

chairlift and associated trails would not be constructed (see Table 11). In addition, the purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. Although not known to occur, hoary bats may occur in the Study Area**.** ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.4. Alternative 4

10.2.4.1. Terrestrial Mollusks

The types of impacts to terrestrial mollusk habitat would be similar to Alternative 2 except include less impacted acreage than all the other Action Alternatives since the *Creek Run* and *Rampart* chairlifts and associated trails would not be built. Under Alternative 4, approximately 16 acres of mollusk habitat would be impacted (see Table 11).

As discussed in Section 8.2.1 - Mollusks, surveys for **terrestrial mollusks** were conducted between fall of 1998 and spring of 2001 with none found. Therefore, these species have a status of “not detected” and although absence cannot absolutely be determined, these species are unlikely to within the Study Area. ***Therefore, Alternative 4 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.4.2. Silver-Haired Bat

Impacts to **silver-haired bat** habitat would be similar to Alternative 2 except there would be less loss of roosting habitat and a smaller increase in foraging habitat since the *Creek Run* and *Rampart* chairlifts and associated trails would not be constructed. Under Alternative 4, approximately 16 acres of silver-haired bat habitat would be impacted (see Table 11). Although not known to occur, silver-haired bats may occur in the Study Area. ***Therefore, Alternative 4 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.4.3. Hoary Bat

Impacts to **hoary bat** habitat would be similar to Alternative 2 except there would be less loss of roosting habitat and a smaller increase in foraging habitat since the *Creek Run* and *Rampart* chairlifts and associated trails would not be constructed. Under Alternative 4, approximately 16 acres of hoary bat habitat would be impacted (see Table 11). Although not known to occur, hoary bats may occur in the Study Area. ***Therefore, Alternative 4 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.5. Modified Alternative 5

10.2.5.1. Terrestrial Mollusks

Under Modified Alternative 5, the types of impacts to **terrestrial mollusk** habitat would be similar to Alternative 2 due to less clearing of mature forest (see Table 11). However, the amount of glading would be greater under this Alternative than the Alternative 2, which would result in less of a decrease in canopy coverage in Section 16. Additionally, the donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative.

As discussed in Section 8.2.1 - Mollusks, surveys for **terrestrial mollusks** were conducted between fall of 1998 and spring of 2001 with none found. Therefore, these species have a status of "not detected" and although absence cannot absolutely be determined, these species are unlikely to within the Study Area. ***Therefore, Modified Alternative 5 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.5.2. Silver-Haired Bat

Impacts to **silver-haired bat** habitat would be similar to Alternative 2 except there would be less reduction of roosting habitat and a smaller increase in foraging habitat (see Table 11). The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. Although not known to occur, silver-haired bat may occur in the Study Area. ***Therefore, Modified Alternative 5 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.2.5.3. Hoary Bat

Impacts to **hoary bat** would be similar to Alternative 2 except there would be less reduction of roosting habitat and a smaller increase in foraging habitat (see Table 11). The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. Although not known to occur, hoary bats may occur in the Study Area. ***Therefore, Modified Alternative 5 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3. Forest Service Sensitive Species

10.3.1. Alternative 1

Under Alternative 1, there would be no effects on OWNF and GPNF Sensitive Species or their habitat resulting from the construction of new facilities, however existing impacts to wildlife and wildlife habitat would continue. Under Alternative 1, existing habitat connectivity would be maintained, with no changes in the amount of connective habitat in Section 16 (Summit East) and no changes in either canopy cover or understory cover in this area except those caused by natural processes. Potential disturbance impacts from night lighting and grooming activities would continue in areas currently affected. Interstate 90 would

continue to bisect connectivity habitat and to limit north-south movement of animals in the Snoqualmie Pass area.

Under the No Action Alternative, wildlife habitat conditions in the Study Area would continue as described in Section 7 – Key Wildlife Habitats and Associated Species, with changes in vegetation being driven primarily by natural causes. On public land, the amount and distribution of mature forest would continue but with occasional changes possible from wind-throw, avalanche, or wildfire. Mature forest on public lands would continue to be managed for LSH and for habitat connectivity. No new impacts would occur within the mature forest habitat in Section 16 (Summit East). Immature forest would continue to move toward mature forest, however over the life of the 10-year planning period, immature forest would remain in an immature stage.

Under Alternative 1, habitat within Riparian Buffers on public lands would continue to be managed according to the Standards and Guidelines for Riparian Buffers in the Forest Plan (USDA and USDI, 1994) and habitat within Riparian Buffers on private lands would continue to be managed per King County or Kittitas County Code depending on location. There would be no increase in area included in Riparian Buffers under this Alternative and only previously approved restoration projects would occur under Alternative 1. Aquatic habitats would also remain largely unchanged under this Alternative. Parking lots would remain unpaved and the potential contribution of sediment to streams and wetlands in the Study Area would continue.

Habitat for Larch mountain salamander would remain unchanged under Alternative 1. Any increase in disturbance to this species would occur as a result of increased use of existing facilities. There would be no change in herbaceous and shrub habitats under this Alternative.

Habitat for generalist species such as the wolverine would also remain largely unchanged, with natural processes driving habitat changes. Potential disturbance from ongoing maintenance activities would continue in currently developed areas without seasonal restrictions, as would use of the current mountain bike trail system.

10.3.2. Alternative 2

10.3.2.1. Townsend's Bat

Clearing of mature forest would impact approximately 45 acres of **Pacific Western** (**Townsend's**) **big-eared bat** habitat (see Table 12). Construction of chairlifts and ski trails would increase the amount of edge habitat in the Study Area, thereby increasing the amount of potential foraging habitat for the Pacific western (Townsend's) big-eared bat. Habitat surveys conducted at Alpental in 1994 did not detect this species. The large amount of forest edge and the numerous lakes in and adjacent to the Study Area provide suitable foraging habitat. Although not documented within the Study Area, Townsend's big-eared bat may occur in the Study Area. ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

Table 12. Summary of Effect to Forest Service Sensitive Species as a Result of The Summit-at-Snoqualmie MDP.

Species	Alt 1	Alt 2	Alt 3	Alt 4	Mod. Alt 5	Determination of Effect – All Alternatives
Townsend's Bat	1053.11	1007.83	1025.46	1037.45	1020.38	May impact individuals but would not likely contribute to a trend toward federal listing
Fisher	828.50	788.98	801.73	815.14	799.21	May impact individuals but would not likely contribute to a trend toward federal listing
Wolverine	2899.36	2702.22	2745.16	2751.08	2711.31	May impact individuals but would not likely contribute to a trend toward federal listing
Northern Goshawk	1053.11	1007.83	1025.46	1037.45	1020.38	May impact individuals but would not likely contribute to a trend toward federal listing
Great Gray Owl	1053.11	1007.83	1025.46	1037.45	1020.38	May impact individuals but would not likely contribute to a trend toward federal listing
Van Dyke's Salamander	319.57	298.06	321.01	311.44	320.84	May impact individuals but would not likely contribute to a trend toward federal listing

Table 12. Summary of Effect to Forest Service Sensitive Species as a Result of The Summit-at-Snoqualmie MDP.

Species	Alt 1	Alt 2	Alt 3	Alt 4	Mod. Alt 5	Determination of Effect – All Alternatives
Larch Mountain Salamander	235.26	234.67	235.26	234.68	234.69	May impact individuals but would not likely contribute to a trend toward federal listing

10.3.2.2. Fisher

Under Alternative 2, **fisher** habitat would be reduced from 828.50 acres to 788.98 acres for a net loss of approximately 39 acres, the most of all the Action Alternatives (see Table 12).

Under Alternative 2 clearing of mature western hemlock and Pacific silver fir forest would also reduce the amount of habitat available in the Study Area for fisher. Fishers are considered to be rare in Washington, and may be extirpated. The width of I-90 and the road density (2.77 miles/mile^2) in the Snoqualmie Pass area were considered an almost complete barrier to fisher dispersal. ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.2.3. Wolverine

Of the species listed in Table 3 **wolverine** may use any or all of the habitat types within the Study Area, however documented sightings of all of these species are rare. The high level of human use in the Study Area, in part, limits the use of the Study Area by this species and therefore impacts are unlikely. The primary potential impact to wolverine could be the increase in human activity within The Summit-at-Snoqualmie Study Area, as wolverines do not tolerate land use activities that permanently alter or fragment habitat and provide human access (Banci 1994). Short-term direct impacts include noise and activity associated with ski lift construction and ski trail clearing and grading. Noise and human presence associated with these activities may cause wolverine to avoid moving through the area. Wolverines are known to have large home range territories and tend to avoid areas of high human use. Use of the Study Area by this species is limited to occasionally traveling through the area. ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.2.4. Northern Goshawk

Although no **northern goshawks** were detected during surveys conducted in 1995, it is possible that goshawks may have moved into the area since that time or may occupy habitat in the Study Area in the future. As a result, there is potential for nesting and foraging habitat to be removed, particularly in Section

16 (Summit East), from chairlift, ski trail and parking lot construction. Ski trail glading may result in a further reduction in nesting habitat since goshawks typically nest in the densest areas of a forest (Johnsgard, 1990). Ski trail glading may provide an advantage for foraging goshawks, however, by removing under-story trees and shrubs used as cover by potential prey species. Goshawks have a relatively long nesting season, incubating eggs for up to 41 days and requiring 45 days for young to fledge. To avoid direct impacts to nesting goshawks, clearing or glading in mature forest habitat would occur after August 1, after the end of the nesting season, as described in Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.2.5. Great Gray Owl

Under Alternative 2 habitat for the **great gray owl** would be reduced by approximately 45 acres (see Table 12). However, surveys for great gray owls were conducted within suitable habitat in the Study Area in 1999 and 2000 with none found. For this reason, great gray owls are not expected to occur in the Study Area and there would be no impacts to this species. ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.2.6. Van Dyke's Salamander

Under Alternative 2, the amount of habitat available for **Van Dyke's salamander** within the Study Area would be reduced from 319.57 acres to 298.06 acres for a net loss of approximately 22 acres, primarily associated with clearing of mature Pacific silver fir forest within Riparian Buffers (see Table 12).

Of the approximately 22 acres, 2 acres of clearing would occur on public land and less than 1 acre on private land in the S.F. Snoqualmie Watershed. In the U. Yakima Watershed, approximately 16 acres of clearing would occur on public land and 4 acres would occur on private land. In addition, there would also be approximately 2 acres of glading in mature Pacific silver fir forest within Riparian Buffers on public land in the U. Yakima Watershed.

Clearing of habitat would reduce the amount of habitat available for this species and would fragment existing habitat, creating additional edge and reducing the amount of interior forest habitat. Forest clearing can affect salamander habitat in adjacent stands by changing moisture and temperature regimes, changing hydrological and geomorphological processes, and reducing the recruitment potential for large down wood (Crisafulli, 1999). Glading of mature forest may also alter habitat conditions for Van Dyke's salamander, by reducing canopy cover and reducing the potential for CWD recruitment. Impacts to Van Dyke's salamanders are unlikely since the species has a status of "not detected" within the areas surveyed. ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.2.7. Larch Mountain Salamander

Table 12 indicates a decline of 0.59 acre in potential habitat for **Larch Mountain salamander**. The majority of this impact would occur in a rock outcrop habitat type not associated with mature forest and therefore marginally suitable as habitat for this species. All mature forest habitat proposed for clearing or glading and its adjacent forest habitat was surveyed for this species. Since no Larch Mountain salamanders were found during these surveys, this species has a status of "not detected" within the areas surveyed (Crisafulli, 1999). ***Therefore, Alternative 2 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.3. Alternative 3

10.3.3.1. Townsend's Bat

Under Alternative 3 **Pacific Western** (**Townsend's**) **big-eared bat** would be similar to Alternative 2 except there would be a smaller reduction of roosting habitat and a smaller increase in foraging habitat since the *Creek Run* chairlift and associated trails would not be constructed (see Table 12). In addition, the purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.3.2. Fisher

The potential habitat for **fisher** within the Study Area is defined as mature Pacific silver fir and mature western hemlock forest combined and would be to travel habitat. Under Alternative 3, the fisher habitat in the Study Area would be reduced from an existing amount of 828.50 acres to 801.73 acres, for a net loss of approximately 27 acres, as shown in Table 12. Impacts to fisher would be similar to but less than those described under Alternative 2 as the *Creek Run* lift and trails will not be constructed. ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.3.3. Wolverine

Under Alternative 3, the types of indirect impacts on **wolverine** would be similar to Alternative 2 except reduced since the *Pulse Gondola* and mountain-top restaurant would not be built (see Table 12). ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.3.4. Northern Goshawk

Under Alternative 3, the type of impacts to **northern goshawk** habitat would be similar to Alternative 2 but with less impacted acreage since the *Creek Run* chairlift and associated trails would not be built (see Table 12). Since the total amount of clearing would be less, the amount of forest fragmentation would be less and the risk of increased nest predation for olive-sided flycatchers would be less. In addition, reforestation of Trails 55, 66, and 67 would reduce the amount of edge habitat from current conditions,

and would potentially offset some of the impact of clearing for trails 60 and 61 under Alternative 3. The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. Since no glading would occur under this Alternative, impacts to goshawk nesting habitat would be reduced. Under this Alternative, clearing of forested habitat would occur after August 1 to reduce potential direct impacts to nesting individuals of these species, as described in Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.3.5. Great Gray Owl

Under Alternative 3, **great gray owl** habitat would be reduced from 1,053.11 acres to 1,025.46 for a net loss of approximately 27 acres (see Table 12). Surveys for great gray owls were conducted within suitable habitat in the Study Area in 1999 and 2000 with none found. For this reason, great gray owls are not expected to occur in the Study Area and there would be no impacts to this species. ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.3.6. Van Dyke's Salamander

Under Alternative 3, impacts to **Van Dyke's salamander** habitat would be similar to but fewer than Alternative 2. This reduction in the amount of clearing would occur because under Alternative 3 the *Creek Run* chairlift and associated trails would not be built. Impacts from glading would not occur because no glading is proposed under Alternative 3. As shown in Table 12, habitat for Van Dyke's salamander would increase from 319.57 acres to 321.01 acres for a net gain of approximately 1.44 acres compared to existing conditions. This would occur as a result of the loss of habitat from clearing of mature forest in Riparian Buffers being offset by the increase in the amount of mature forest contained within Riparian Buffers as Riparian Reserve standards and guidelines are applied to lands donated to the Forest Service under this Alternative. The amount of mature forest in the Study Area would not change but the amount within an area receiving protection or consideration as a Riparian Buffer would.

Under this Alternative, there would be approximately 10 acres of mature forest clearing in Riparian Buffers of which 2 acres would occur on public land and less than 1 acre would occur on private land in the S.F. Snoqualmie Watershed and 4 acres would occur on public land and 4 acres would occur on private land within the U. Yakima Watershed. Under Alternative 3, there would be approximately 23 acres more potential habitat available for this species in the Study Area compared to Alternative 2. This net gain is due to the loss of habitat from clearing of mature forest in Riparian Buffers being offset by the increase in the amount of mature forest. ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.3.7. Larch Mountain Salamander

Alternative 3 includes the mountain-top restaurant and *Pulse Gondola*, as a result under Alternative 3 impacts to Larch mountain salamander would be similar to Alternative 2 (see Table 12). ***Therefore, Alternative 3 may impact individuals but would not likely contribute to a trend toward federal listing.***

10.3.4. Alternative 4

10.3.4.1. Townsend's Bat

Under Modified Alternative 4, impacts to **Pacific Western (Townsend's) big-eared bat** would be similar to, but less than Alternative 2 resulting from less loss of roosting habitat and a smaller increase in foraging habitat since the *Creek Run* and *Rampart* chairlifts and associated trails would not be constructed (see Table 12). ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend towards federal listing for the Pacific Western (Townsend's) big-eared bat.***

10.3.4.2. Fisher

Under Alternative 4, the amount of fisher habitat type in the Study Area would be reduced from 828.50 acres of existing habitat to 815.14 acres, for a net loss of approximately 13 acres (see Table 12). Removal of small areas of mature forest in areas that are currently highly fragmented is not expected to impact the ability of fishers to move through the area. Discussed in 8.3.2 the width of I-90 and the road density (2.77 mile/mile^2) in the Snoqualmie Pass area were considered an almost complete barrier to fisher dispersal. ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend towards federal listing for the fisher.***

10.3.4.3. Wolverine

Under Alternative 4, the potential impacts to **wolverine** due to construction and ski area operations would be similar to, but fewer than, those described for Alternative 2. Wolverines are considered habitat generalists, therefore of the species listed in Table 12 wolverine may use any or all of the habitat types within the Study Area***. Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the wolverine.***

10.3.4.4. Northern Goshawk

Under Alternative 4, potential impacts to **northern goshawk** habitat would also be similar to Alternative 2 except reduced since the *Creek Run* and *Rampart* chairlifts and associated trails would not be built. Since the total amount of clearing would be less, the amount of forest fragmentation would be less compared to Alternative 2. Since no glading would occur under this Alternative, there would be no impacts to goshawk nesting or foraging habitat. Under this Alternative, clearing of forested habitat would be restricted to after August 1 to reduce potential direct impacts to nesting birds, as described in Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the northern goshawk.***

10.3.4.5. Great Gray Owl

Alternative 4 would result in the lowest amount of **great grey owl** habitat removal (see Table 12). However, surveys for great gray owls were conducted within suitable habitat in the Study Area in 1999 and 2000 with none found. For this reason, great gray owls are not expected to occur in the Study Area and there would be no impacts to this species. ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the Great Gray Owl.***

10.3.4.6. Van Dyke's Salamander

Impacts to **Van Dyke's salamander** would be similar to Alternative 2 but with fewer acres of potential habitat cleared for construction of lifts and trails. Under Alternative 4, the amount of potential Van Dyke's salamander habitat removed would be approximately 13 acres less than Alternative 2 (see Table 12). Less clearing would occur because the *Creek Run* and *Rampart* chairlifts and associated trails would not be built, and no glading is proposed. As shown in Table 12, potential habitat for Van Dyke's salamander would decrease from 319.57 acres to 311.44 acres for a net loss of approximately 8 acres. ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the Van Dyke's salamander.***

10.3.4.7. Larch Mountain Salamander

Since the *Pulse Gondola*, mountain-top restaurant, and *Internationale* chairlift would all be constructed under Alternative 4, impacts to **Larch Mountain salamander** habitat under Alternative 4 would be similar to Alternative 2 (see Table 12). The majority of this impact would occur in a rock outcrop habitat type not associated with mature forest and therefore marginally suitable as habitat for this species. ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the Larch Mountain salamander.***

10.3.5. Modified Alternative 5

10.3.5.1. Townsend's Bat

Impacts to **Pacific western (Townsend's) big-eared bat** habitat under Modified Alternative 5 would be similar to Alternative 2 except there would be less reduction of roosting habitat and a smaller increase in foraging habitat (see Table 12). The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. ***Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend towards federal listing for the Pacific Western (Townsend's) big-eared bat.***

10.3.5.2. Fisher

Under Modified Alternative 5, the amount of **fisher** habitat in the Study Area would be reduced from an existing amount of 828.50 acres to 799.21 acres, for a net loss of approximately 29 acres (see Table 12). Fishers are considered to be rare in Washington, and may be extirpated. Because of the relatively high

elevation, the Snoqualmie Pass area would most likely be used as travel habitat for fishers, the impacts to fisher would be primarily related to travel through the Study Area. ***Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend toward federal listing for the fisher.***

10.3.5.3. Wolverine

Potentially suitable foraging and dispersal habitat for the **wolverine** is present within The Summit-at-Snoqualmie Study Area. Under Modified Alternative 5, the potential impacts to **wolverine** due to construction and ski area operations would be similar to, but slightly less than, Alternative 2 resulting in a 6 percent reduction in available habitat (see Table 12). Because wolverine have such large home ranges, the habitat disturbance at The Summit-at-Snoqualmie would not be significant. ***Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend towards federal listing for the wolverine.***

10.3.5.4. Northern Goshawk

Impacts resulting from Modified Alternative 5 to **northern goshawk habitat** would also be similar to Alternative 2, but with less clearing and less forest fragmentation (see Table 12). Impacts from forest glading would be greater than Alternative 2 since more glading would be required under Modified Alternative 5. The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. Clearing of forested habitat would occur after August 1 to reduce potential direct impacts to nesting birds, as described in Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend towards federal listing for the northern goshawk.***

10.3.5.5. Great Gray Owl

Under Modified Alternative 5 impacts to **great gray owl** habitat will amount to approximately 33 acres of that available within The Summit-at-Snoqualmie Study Area (see Table 12). However, Surveys for great gray owls were conducted within suitable habitat in the Study Area in 1999 and 2000 with none found. For this reason, great gray owls are not expected to occur in the Study Area and there would be no impacts to this species. ***Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend towards federal listing for the great gray owl.***

10.3.5.6. Van Dyke's Salamander

Under Modified Alternative 5, habitat for **Van Dyke's salamander** would increase slightly from 319.57 acres to 320.84 acres for a net increase of approximately 1.27 acres (see Table 12). This increase would occur as a result of the loss of habitat from clearing of mature forest in Riparian Buffers being offset by the increase in the amount of mature forest contained within Riparian Buffers on lands donated to the Forest Service under this Alternative. The amount of mature forest in the Study Area would not change but the amount within an area receiving protection or consideration as Riparian Reserve would increase.

Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend towards federal listing for the Van Dyke's salamander.

10.3.5.7. Larch Mountain Salamander

Since the *Pulse Gondola*, mountain-top restaurant, and *Internationale* chairlift would all be constructed under Modified Alternative 5, impacts to **Larch Mountain salamander** habitat under Modified Alternative 5 would be similar to Alternative 2 (see Table 12). The majority of this impact would occur in a rock outcrop habitat type not associated with mature forest and therefore marginally suitable as habitat for this species. ***Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend toward federal listing for the Larch Mountain salamander.***

10.4. Management Indicator Species

10.4.1. Alternative 1

Under Alternative 1, there would be no effects on MIS or their habitat resulting from the construction of new facilities, however existing impacts to wildlife and wildlife habitat would continue. Under Alternative 1, existing habitat connectivity would be maintained, with no changes in the amount of connective habitat in Section 16 (Summit East) and no changes in either canopy cover or understory cover in this area except those caused by natural processes. Potential disturbance impacts from night lighting and grooming activities would continue in areas currently affected. Interstate 90 would continue to bisect connectivity habitat and to limit north-south movement of animals in the Snoqualmie Pass area.

Under the No Action Alternative, wildlife habitat conditions in the Study Area would continue as described in Section 7 – Key Wildlife Habitats and Associated Species, with changes in vegetation being driven primarily by natural causes. On public land, the amount and distribution of mature forest would continue but with occasional changes possible from wind-throw, avalanche, or wildfire. Mature forest on public lands would continue to be managed for LSH and for habitat connectivity. No new impacts would occur within the mature forest habitat in Section 16 (Summit East). Any potential increases in disturbance to wildlife would be limited to increased use of existing facilities. Immature forest would continue to move toward mature forest, however over the life of the 10-year planning period, immature forest would remain in an immature stage.

Under Alternative 1, habitat within Riparian Buffers on public lands would continue to be managed according to the Standards and Guidelines for Riparian Buffers in the Forest Plan (USDA and USDI 1994) and habitat within Riparian Buffers on private lands would continue to be managed per King County or Kittitas County Code depending on location. There would be no increase in area included in Riparian Buffers under this Alternative and only previously approved restoration projects would occur under Alternative 1. Aquatic habitats would also remain largely unchanged under Alternative 1.

Cliff and talus habitat would remain unchanged under Alternative 1. The potential for disturbance impacts to species, particularly mountain goats, associated with this habitat type would continue. Any increase in disturbance to these species would occur as a result of increased use of existing facilities. There would be no change in herbaceous and shrub habitats under Alternative 1.

10.4.2. Alternative 2

Under Alternative 2, long-term impacts to **pileated woodpecker** would include the permanent removal of approximately 45.28 acres of mature forest, which would reduce the amount of current habitat available for these species (see Table 13). This would result in a long-term reduction in the availability of snags both through the reduction in the amount of recruitment habitat for snags and from increasing the amount of area subject to hazard tree management. Habitat would be permanently lost within areas of full clearing with or without grading. Gladed areas would retain some habitat characteristics, particularly connective habitat between ungladed areas, however since these areas would be managed as gladed ski trails, hazard tree management would be required with snags removed on a regular basis. Snags that are felled and left in place would lose value as nesting habitat for primary cavity excavators and for secondary cavity nesters, but they would retain value as foraging habitat for pileated woodpeckers and contribute to CWD in the area. Implementation of Other Management Provision OMP40 (see FEIS Table 2.4-2) would reduce impacts to snags and CWD.

Table 13. Summary of Effect to Management Indicator Species as a Result of The Summit-at-Snoqualmie MDP.

Species	Alt 1	Alt 2	Alt 3	Alt 4	Mod. Alt 5	Determination of Effect – All Alternatives
Pileated Woodpecker	1,053.11	1,007.83	1,025.46	1,037.45	1,020.38	May impact individuals, but would not affect species viability in the project area
Elk - Foraging Habitat	1,514.41	1,548.12	1,532.63	1,521.01	1,536.52	May impact individuals, but would not affect species viability in the project area
Cover Habitat	1,052.67	1,007.83	1,025.46	1,037.45	1,020.38	
Mule Deer- Foraging Habitat	1,514.41	1,548.12	1,532.63	1,521.01	1,536.52	May impact individuals, but would not affect species viability in the project area
Cover Habitat	1,052.67	1,007.83	1,025.46	1,037.45	1,020.38	

Table 13. Summary of Effect to Management Indicator Species as a Result of The Summit-at-Snoqualmie MDP.

Species	Alt 1	Alt 2	Alt 3	Alt 4	Mod. Alt 5	Determination of Effect – All Alternatives
Mountain Goat	235.26	234.67	235.76	234.68	234.69	May impact individuals, but would not affect species viability in the project area
American Marten	1,053.11	1,007.83	1,025.46	1,037.45	1,020.38	May impact individuals, but would not affect species viability in the project area

Direct impacts to nesting woodpeckers may occur if clearing were to occur during the nesting season. To avoid these impacts, clearing of potential nesting habitat for primary cavity excavators would occur in the late summer or fall, after the nesting season for these species, as described in Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for the pileated woodpecker.***

Impacts to **mule deer** and **elk** under Alternative 2 would be similar; therefore, they will be discussed together. Potential direct impacts to these species would include loss or conversion of cover habitat, an increase in foraging habitat, and disturbance due to construction and increased human activity. Under Alternative 2, the amount of foraging habitat for these species would increase by 33.71 acres from an existing 1,514.41 acres to 1,548.12 acres (see Table 13). This would occur as a result of converting mature forest habitat (cover) to a modified herbaceous condition (foraging) through ski trail construction, clearing for chairlift construction, and reforestation. Under Alternative 2 there would be a loss of 44.84 acres of cover habitat for both species (see Table 13). Within the Study Area all mature forest types are considered potential cover habitat for these species. In addition to the clearing of cover habitat shown in Table 13, there would be an additional 9.10 acres of glading under Alternative 2. Glading would remove under-story trees and shrubs and would reduce thermal cover and the effectiveness of this habitat as hiding cover for both elk and mule deer by increasing sight distances.

Direct short-term impacts to both elk and mule deer would include temporary displacement from specific areas during construction of MDP components and the temporary loss of foraging habitat in areas disturbed by trenching for utility line installation. These impacts would occur over a several-year timeframe and would affect small portions and elk and deer habitat of the Study Area at any one time. Direct long-term impacts to elk and deer may also occur as a result of disturbance from ski trail or lift

maintenance, increased summer recreation, and the continued operation of the existing mountain biking program.

Disturbance from construction or maintenance could occur within calving or fawning areas during the period when elk calves and mule deer fawns are not yet mobile enough to follow adults to safety or are left alone to hide while adults forage. Disturbance impacts during these times would be avoided through implementation of Management Requirement MR35 (see FEIS Table 2.4-2), which would limit clearing of potential hiding cover or lift and trail maintenance from occurring until after June 15, the end of both elk calving and deer fawning seasons.

Increases in winter recreation would not impact elk or deer since the Study Area is not within winter range for either species. Increases in summer recreation could, however, result in increased disturbance to these species. The greatest increase in summer recreation would occur from construction and operation of the Pulse Gondola and mountain-top restaurant. While most of the activity associated with these project components would occur within the immediate area of the top terminal of the gondola, in the vicinity of the restaurant, or in the base area of Alpental, some gondola users may choose to explore more remote areas along the top of Denny Mountain or to hike down from the top and so may increase human presence in areas that currently receive little or none during summer, potentially increasing disturbance to elk and deer in the area. To minimize these impacts, visitors using the gondola would be encouraged through public education methods to avoid disturbing elk or deer, particularly if calves or fawns are observed, as described under Other Management Provision OMP45 (see FEIS Table 2.4-2). ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for mule deer and elk.***

Mountain goats are known to utilize cliff habitat at the southern end of Denny Mountain. While not documented within the Study Area, the area of known use is contiguous with habitat within the Study Area and it is assumed that mountain goats occur within suitable habitat in the Study Area. Table 13 indicates that the amount of habitat available for mountain goats would decline from 235.26 acres to 234.67 acres, primarily in association construction of the top terminal of the *Pulse Gondola* and the mountain-top restaurant and construction of the top terminal of the proposed new *Internationale* chairlift at Alpental. Noise and activity of construction of these facilities may cause disturbance to mountain goats, potentially causing short-term avoidance of these areas.

The *Pulse Gondola* would provide year-round access to the top of Denny Mountain, increasing the number of people present in the area during all seasons. The *Internationale* chairlift would operate only during wintertime, however maintenance activities would occur during summer. During winter mountain goats primarily utilize the area to the south of the existing *Armstrong Express* chairlift outside of the area used by skiers. As a result, increased human activity in the winter is not expected to change wintertime use of the area by mountain goats. During spring and summer mountain goats utilize a broader range, including the area of the proposed upper terminal of the *Pulse Gondola*, the mountain-top restaurant, and the top terminal of the proposed new *Internationale* chairlift. Increased human activity during spring and summer may alter use of the area by mountain goats, potentially causing them to avoid the area

altogether. This long-term impact, and the increased human activity associated with the gondola and restaurant, could lead to the permanent displacement of mountain goats from that part of the Study Area. Maintenance activities associated with the *Internationale* chairlift would also occur annually over the long-term, resulting in the potential temporary displacement of mountain goats from the vicinity of the *Internationale* chairlift during maintenance activities.

The greatest potential impacts to mountain goat habitat would occur during the kidding season (May and June). Increased human disturbance during spring and summer may result in displacement of mountain goats from preferred kidding and summer habitats. To minimize the potential for these types of impacts, construction of the *Pulse Gondola* and mountain-top restaurant and construction and subsequent maintenance of the *Internationale* chairlift would be scheduled to occur after the kidding season as described in Management Requirement MR35 (see FEIS Table 2.4-2). In addition, visitors using the gondola would be encouraged through public education methods to avoid disturbing mountain goats occurring in adjacent habitats (see Other Management Provision OMP45, Table 2.4-2). ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for the mountain goat.***

American marten are known to use mature forest in the Study Area as described in Section 8.4.5 – American Marten. Clearing of mature forest would result in a loss of approximately 45.28 acres of denning, foraging, and travel habitat available for this species (see Table 13). Removal of snags in cleared areas, gladed areas, and in forested areas adjacent to new ski trails, roads, and parking lots would also reduce the amount of denning habitat. Impacts to travel habitat are discussed under Section 6 – Habitat Connectivity and Fragmentation. Loss of snags within the Study Area would be minimized through implementation of Other Management Provision OMP39 (see FEIS Table 2.4-2).

Ski trail glading may alter the use of the area by species that utilize CWD and understory vegetation as cover while traveling, such as American marten. Glading of the forest would result in a more open ground cover and understory condition, potentially causing avoidance of these areas, with animals selecting areas of ungladed forest to travel through.

Increases in human activity associated with chairlift and ski trail development may also reduce the effectiveness of the area as travel habitat, particularly for species sensitive to human activity. Short-term direct impacts include noise and activity associated with ski lift construction and ski trail clearing, grading, and glading. Noise associated with these activities and human presence may cause animals to avoid moving through the area. Potential long-term direct impacts would result from increased winter recreational use of the area associated with the *Creek Run* and *Rampart* chairlifts and associated trails. Under Alternative 2, night lighting would be added to the new *Rampart* pod and the existing *Silver Fir* pod, to allow recreation to occur from mid-morning through to the evening during ski area operations. Many wildlife species are crepuscular, meaning they are most active at dawn and dusk, and increased activity, noise, and light during these times may alter use of the area by such species. In addition, ski trail grooming is often accomplished at night, and noise and light from these activities, particularly in the

newly created ski trails in the Rampart and Creek Run pods, may alter use of the area of nocturnal species. ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for American marten.***

10.4.3. Alternative 3

Under Alternative 3, impacts to **pileated woodpeckers** would be as described under Alternative 2 except the amount of habitat for these species that would be removed would be less under this Alternative since the *Creek Run* chairlift and associated trails would not be constructed. Habitat removal would occur primarily for construction of the *Rampart* chairlift and associated trails. Impacts to both current and future snag availability would be reduced under this Alternative compared to Alternative 2 because the total amount of clearing would be less and there would be less area of hazard tree management. Since there would be no glading under Alternative 3, impacts from glading would not occur. In addition, the purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. Implementation of Other Management Provision OMP40 (see FEIS Table 2.4-2), would reduce impacts to snags and CWD and implementation of Other Management Provision OMP43 (see FEIS Table 2.4-2), would reduce potential direct impacts to these species. ***Therefore, Alternative 3 May impact individuals, but would not affect species viability in the project area for the pileated woodpecker.***

Impacts to **elk** and **mule deer** under Alternative 3 would be similar to Alternative 2. Differences between Alternative 3 and Alternative 2 include the following: a smaller increase in foraging habitat, and more retention of cover habitat. In addition, there would be a reduced probability of disturbance from increased human activity. Under Alternative 3, the amount of foraging habitat available for these species would increase from an existing 1,514.41 acres to 1,532.63 acres for a net increase of 18.22 acres, as shown in Table 13. This would occur as a result of a combination of clearing of mature forest (cover) and converting these areas to modified herbaceous habitat (foraging), generally for ski trail and lift construction, and reforestation. Alternative 3 would have the greatest amount of reforestation. Under Alternative 3, the amount of cover habitat would decrease from an existing 1,052.67 acres to 1,025.46 acres for a net loss of 27.21 acres. This would be less than under Alternative 2 primarily because the *Creek Run* chairlift and associated trails would not be constructed and there would be no glading under this Alternative.

Potential disturbance impacts from increased summer time recreational use would be less under Alternative 3 than Alternative 2 because the *Pulse Gondola* would not be built. Potential disturbance from construction and maintenance activities and the continued operation of the existing mountain biking program would be similar to Alternative 2 and would be minimized or avoided through implementation of Management Requirement MR35 and Other Management Provision OMP45 (see FEIS Table 2.4-2). ***Therefore, Alternative 3 May impact individuals, but would not affect species viability in the project area for mule deer and elk.***

Under Alternative 3, the type of impacts to **mountain goats** would be as described under Alternative 2 but of less magnitude since the *Pulse Gondola* and mountain-top restaurant would not be constructed and associated increases in year-round recreation would not occur. Increased disturbance to mountain goats would be associated with construction and maintenance of the proposed new Internationale chairlift. Impacts from construction activities could include the temporary displacement of mountain goats from construction areas. Annual routine maintenance could result in short-term displacement and disturbance during maintenance activities. Potential disturbance to mountain goats would be minimized through implementation of Management Requirement MR35 (see FEIS Table 2.4-2). ***Therefore, Alternative 3 May impact individuals, but would not affect species viability in the project area for the mountain goat.***

Under Alternative 3, impacts to **American marten** would be as described under Alternative 2 but with less impacted acreage. Since the *Creek Run* and associated trails would not be built there would be less habitat removed under this Alternative. Also, since there would be less area cleared for ski trails, lift alignments, and roads there would be less area managed for hazard trees and therefore a reduction in potential loss of denning habitat in areas adjacent to new development. Impacts to travel habitat are described under Section 6 – Habitat Connectivity and Fragmentation. In addition, reforestation of *Trails 55, 66,* and *67* would potentially offset some of the impact of clearing for *Trails 60* and *61* under Alternative 3 and the purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. ***Therefore, Alternative 3 May impact individuals, but would not affect species viability in the project area for American marten.***

10.4.4. Alternative 4

Under Alternative 4, impacts to **pileated woodpeckers** would be similar to Alternative 2 except the amount of habitat for these species that would be removed would be less because the *Creek Run* and *Rampart* chairlifts and associated trails would not be constructed (see Table 13). Habitat removal would occur primarily from construction of the proposed new *Internationale* chairlift and the realignment of the existing *Sessel* chairlift at Alpental and at the base of *Easy Street* chairlift and in the area of the expanded Silver Fir parking lot 2 at Summit Central. Impacts to both current and future snag availability would be reduced compared to Alternative 2 because the total amount of clearing would be less and there would be less area in which hazard trees would be managed. Since there would be no glading under Alternative 4, impacts from glading would not occur. As described Under Alternative 2, implementation of Other Management Provision OMP40 (see FEIS Table 2.4-2), would reduce impacts to snags and CWD and implementation of Other Management Provision OMP43 (see FEIS Table 2.4-2), would reduce potential direct impacts to these species. ***Therefore, Alternative 4 may impact individuals, but would not affect species viability in the project area for the pileated woodpecker.***

Impacts to **elk** and **mule deer** under Alternative 4 would be similar to Alternative 2 except there would be less of an increase in foraging habitat and less loss of cover habitat. The amount of foraging habitat available for these species would increase from an existing 1,514.41 acres to 1,521.01 acres for a net increase of 6.60 acres, as shown in Table 13. This would occur as a result of a combination of clearing of

mature forest (cover) and converting these areas to modified herbaceous habitat (foraging), generally for ski trail and lift construction and reforestation. Under Alternative 4, the amount of cover habitat would decrease from an existing 1,052.67 acres to 1,037.45 acres for a net loss of 15.22 acres. This would be less than under Alternative 2 primarily because neither the *Creek Run* or *Rampart* chairlifts and associated trails would be constructed under this Alternative. Alternative 4 would have the least amount of impact on cover habitat for these species because it would have the least amount of clearing of mature forest and no glading would occur.

Potential disturbance impacts from increased summer time recreational use would be similar to Alternative 2, because the *Pulse Gondola* would be built under this Alternative. Potential disturbance from construction and maintenance activities and the continued operation of the existing mountain biking program would also be similar to Alternative 2. These impacts would be minimized or avoided through implementation of Management Requirements MR35 and MR45 (see FEIS Table 2.4-2), as described under Alternative 2. ***Therefore, Alternative 4 may impact individuals, but would not affect species viability in the project area for mule deer and elk.***

Since the *Pulse Gondola*, mountain-top restaurant, and *Internationale* chairlift would all be constructed under Alternative 4, impacts to **mountain goat** under Alternative 4 would be similar to Alternative 2. ***Therefore, Alternative 4 may impact individuals, but would not affect species viability in the project area for the mountain goat.***

The types of impacts to **American marten** would be similar to Alternative 2 except reduced since the *Creek Run* and *Rampart* chairlifts and associated trails would not be built. Also, since there would be less area cleared for ski trails, lift alignments, and roads than under Alternative 2, there would be less area managed for hazard trees thus less potential loss of denning habitat in areas adjacent to new development. ***Therefore, Alternative 4 may impact individuals, but would not affect species viability in the project area for American marten.***

10.4.5. Modified Alternative 5

Impacts to **pileated woodpeckers** would be similar to Alternative 2 except that fewer acres of habitat would be cleared (see Table 13). Habitat removal would occur primarily from construction of the *Rampart* and *Creek Run* chairlifts and associated trails. Impacts to both current and future snag availability would be less than Alternative 2 because there would be fewer acres of clearing. The types of impacts from forest glading would be similar to Alternative 2 except that the amount of glading would be greater under Modified Alternative 5. The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. As described under Alternative 2, implementation of Other Management Provision OMP40 (see FEIS Table 2.4-2), would reduce impacts to snags and CWD, and implementation of Other Management Provision OMP43 (see FEIS Table 2.4-2) would reduce potential impacts to these species. ***Therefore, Modified Alternative***

5 may impact individuals, but would not affect species viability in the project area for the pileated woodpecker.

Impacts to **elk** and **mule deer** would include the following: a smaller increase in foraging habitat, and greater retention of cover habitat as compared to Alternative 2. Under Modified Alternative 5, the amount of foraging habitat available for these species would increase from an existing 1,514.41 acres to 1,536.52 acres for a net increase of 22.11 acres (see Table 13). This would result from a combination of clearing of mature forest (cover) and converting these areas to modified herbaceous habitat (foraging), generally for ski trail and lift construction, and reforestation. Under Modified Alternative 5, the amount of cover habitat would decrease from an existing 1,052.67 acres to 1,020.38 acres for a net loss of 32.29 acres. This would be less than under Alternative 2 primarily because the there would be less clearing in conjunction with the *Creek Run* chairlift and associated trails. There would, however, be an increase in the amount of glading under this Alternative, with 13.87 acres of glading proposed, the most of all action Alternatives which would result in a reduction in the quality and effectiveness of thermal and hiding cover.

Potential disturbance impacts from increased summer time recreational use would be similar to Alternative 2, because the Pulse Gondola would be built under this Alternative. Potential disturbance from construction and maintenance activities and the continued operation of the existing mountain biking program would also be similar to Alternative 2. These impacts would be minimized or avoided through implementation of Management Requirements MR35 and MR45 (see FEIS Table 2.4-2), as described under Alternative 2.***Therefore, Modified Alternative 5 may impact individuals, but would not affect species viability in the project area for mule deer and elk.***

Since the *Pulse Gondola*, mountain-top restaurant, and *Internationale* chairlift would all be constructed under Modified Alternative 5, impacts to **mountain goat** habitat under Alternative 4 would be similar to Alternative 2. ***Therefore, Modified Alternative 5 may impact individuals, but would not affect species viability in the project area for the mountain goat.***

Under Modified Alternative 5, the types of impacts to American marten would be similar to Alternative 2 but with less clearing of mature forest. Since there would be less area cleared for ski trails, lift alignments, and roads, there would be less area managed for hazard trees as well as a reduction in the potential loss of denning habitat in areas adjacent to new development. However, the amount of glading would be greater under this Alternative than Alternative 2 however, and both glading and hazard tree management in gladed areas would decrease potential denning habitat in the Study Area. The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. ***Therefore, Modified Alternative 5 may impact individuals, but would not affect species viability in the project area for American marten.***

10.5. USFWS Species of Concern

10.5.1. Alternative 1

Under Alternative 1, there would be no effects on habitat for USFWS Species of Concern resulting from the construction of new facilities, however existing impacts to wildlife and wildlife habitat would continue. Under Alternative 1, existing habitat connectivity would be maintained, with no changes in the amount of connective habitat in Section 16 (Summit East) and no changes in either canopy cover or understory cover in this area except those caused by natural processes. Potential disturbance impacts from night lighting and grooming activities would continue in areas currently affected. Interstate 90 would continue to bisect connectivity habitat and to limit north-south movement of animals in the Snoqualmie Pass area.

Under the No Action Alternative, wildlife habitat conditions in the Study Area would continue with changes in vegetation being driven primarily by natural causes. On public land, the amount and distribution of mature forest would continue but with occasional changes possible from wind-throw, avalanche, or wildfire. Mature forest on public lands would continue to be managed for LSH and for habitat connectivity. No new impacts would occur within the mature forest habitat in Section 16 (Summit East). Any potential increases in disturbance to wildlife would be limited to increased use of existing facilities. Immature forest would continue to move toward mature forest, however over the life of the 10-year planning period, immature forest would remain in an immature stage.

Under Alternative 1, habitat within Riparian Buffers on public lands would continue to be managed according to the Standards and Guidelines for Riparian Buffers in the Forest Plan (USDA and USDI 1994) and habitat within Riparian Buffers on private lands would continue to be managed per King County or Kittitas County Code depending on location. There would be no increase in area included in Riparian Buffers under this Alternative and only previously approved restoration projects would occur under Alternative 1. Aquatic habitats would also remain largely unchanged under this Alternative. Parking lots would remain unpaved and the potential contribution of sediment to streams and wetlands in the Study Area would continue.

Cliff and talus habitat would remain unchanged under Alternative 1. The potential for disturbance impacts to species associated with this habitat type would continue. Any increase in disturbance to these species would occur as a result of increased use of existing facilities. There would be no change in herbaceous and shrub habitats under this Alternative.

10.5.2. Alternative 2

Table 14 shows that Alternative 2 would cause a reduction in habitat for **peregrine falcons**. Although the GIS database analysis indicates a reduction in habitat, Alternative 2 would not result in the direct loss of any cliff habitat. Potential disturbance to cliff habitat would occur under Alternative 2 from construction of the *Pulse Gondola* at Alpental. Disturbance impacts are not expected because peregrine falcons have

not been reported in the area, and habitat in this area has a rating of fair (a relatively low ranking), making it unlikely that it would be occupied (USFS 1995). ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend toward federal listing for the peregrine falcons.***

Table14:
Summary of Effect to USFWS Species of Concern as a Result of The Summit-at-Snoqualmie MDP.

Species	Alt 1	Alt 2	Alt 3	Alt 4	Mod. Alt 5	Determination of Effect – All Alternatives
American Peregrine Falcon	235.26	234.67	235.26	234.68	234.69	May impact individuals but would not likely contribute to a trend toward federal listing
Olive-Sided Flycatcher	1,053.11	1,007.83	1,025.46	1,037.45	1,020.38	May impact individuals but would not likely contribute to a trend toward federal listing
Harlequin Duck	68.82	62.70	63.25	63.37	62.75	May impact individuals but would not likely contribute to a trend toward federal listing
Long-eared Myotis	1,053.11	1,007.83	1,025.46	1,037.45	1,020.38	May impact individuals but would not likely contribute to a trend toward federal listing
Long-legged Myotis	1,053.11	1,007.83	1,025.46	1,037.45	1,020.38	May impact individuals but would not likely contribute to a trend toward federal listing

Table14:
Summary of Effect to USFWS Species of Concern as a Result of The Summit-at-Snoqualmie MDP.

Species	Alt 1	Alt 2	Alt 3	Alt 4	Mod. Alt 5	Determination of Effect – All Alternatives
Yuma Myotis	1,053.11	1,007.83	1,025.46	1,037.45	1,020.38	May impact individuals but would not likely contribute to a trend toward federal listing
Cascade Frog	73.63	72.23	72.19	72.3	72.21	May impact individuals but would not likely contribute to a trend toward federal listing
Neotropical Migratory Birds[1]	1,514.66	1,548.11	1,532.63	1,521.01	1,536.52	May impact individuals but would not likely contribute to a trend toward federal listing

[1] Includes multiple species with different habitat associations

Under Alternative 2, removal of mature forest habitat would also reduce the amount of nesting habitat available for **olive-sided flycatchers** in the Study Area (see Table 14). Potential direct impacts to olive-sided flycatchers include loss of nesting habitat and a localized reduction in the population. Loss of individual birds could occur during construction if vegetation was removed in suitable nesting habitat during the nesting season. Potential indirect impacts to olive-sided flycatchers may occur as a result of forest fragmentation, particularly in Section 16 (Summit East). Increased fragmentation may contribute to increased nest predation by jays attracted to the edge habitat. Olive-sided flycatchers generally produce eggs by mid-June; incubate eggs for 16 to 17 days, with the young fledging within 15 to19 days of hatching (Baicich and Harrison 1997). Other Management Provision OMP43 (see FEIS Table 2.4-2) requires clearing of forested habitat after August 1, to minimize potential impacts to nesting olive-sided flycatchers. ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend toward federal listing for the olive-sided flycatcher.***

Potential **harlequin duck** habitat in the Riparian Buffers is located approximately 50 feet either side of perennial streams, since foraging and nesting of this species is closely tied to the aquatic zone. Under

Alternative 2 the amount of potential nesting habitat for harlequin duck within the Study Area would be reduced from 68.82 acres to 62.70 acres for a net loss of approximately 6 acres, primarily within mature Pacific silver fir forest on public land in the upper Yakima River subwatershed (see Table 14). Clearing of this forest type would reduce the amount of nesting habitat available for this species and clearing during the nesting season could lead to nest failure or mortality of individuals. Direct impacts to nesting harlequin ducks would be avoided through implementation of Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend toward federal listing for the harlequin duck.***

Under Alternative 2 approximately 44.28 acres of habitat for **long-eared myotis, long-legged myotis** and **Yuma myotis** will be removed. Clearing of mature forest would impact habitat long-eared myotis, long-legged myotis, and Yuma myotis. Of these species, the long-eared myotis and long-legged myotis are known to roost under loose tree bark, a characteristic of mature forest. These species also utilize snags as roosting sites. Areas of full clearing within mature forest habitat would result in a reduction in the amount of roosting habitat available for these species. Snags would also be removed from gladed areas and from mature forest stands along the edges of ski trails as a part of hazard tree management. Roosting habitat would therefore be reduced in these management areas. Clearing of mature forest may also reduce roosting but increase foraging habitat for Yuma myotis. Loss of snags within the Study Area would be minimized through implementation of Other Management Provision OMP39 (see FEIS Table 2.4-2). ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend toward federal listing long-eared myotis, long-legged myotis and Yuma myotis.***

As explained in Section 8.5.5 - Amphibians, **Cascades frogs** are widespread and abundant in the Snoqualmie Summit area. Adults and tadpoles have been observed in summer in most bodies of water in the area, such as Hyak Lake, Divide Lake, Rockdale Lake, Hyak Creek, and many smaller ponds and roadside ditches.

Under Alternative 2, habitat for species dependent on lakes and wetlands would decrease from an existing 73.63 acres to 72.23 acres, a net loss of approximately 1.40 acres (see Table 14). This would occur as a result of loss of wetland habitat. This would reduce the amount of breeding habitat available for Cascades frog.

The greatest potential impact to this species would result from alteration of breeding habitat either through direct loss of habitat or changes in habitat quality from increased sedimentation or reduced vegetative cover. Impacts from sedimentation could occur from road building, utility trenching, and ski trail construction in Riparian Buffers. Impacts from increased sedimentation would be minimized through implementation of an approved stormwater management plan to be developed prior to specific project implementation.

Lakes, ponds, and wetlands could also be affected by changes in hydrologic regimes as a result of alterations to vegetation. Modification of surrounding vegetation could reduce breeding success through lowered survival of eggs, tadpoles, and dispersing frogs. Clearing of riparian vegetation and culverting of

streams could also reduce habitat connectivity for these species. Loss of habitat connectivity would be minimized through implementation of Other Management Provision OMP44 (see FEIS Table 2.4-2), which states that where new culverts are installed or old culverts replaced, bottomless arch culverts or bridges would be used to maintain habitat connectivity for low-mobility, riparian-dependent species.

Potential short-term impacts to wetland habitats have been identified as occurring in buffer areas adjacent to buildings, parking lots, roads, and lift terminals and in areas proposed for utility trenching. Site-specific project design may reduce these impacts by avoiding impacts to wetlands, as described in Other Management Provision OMP39, (see FEIS Table 2.4-2), therefore the impact may be less. ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend toward federal listing for the Cascade frog.***

Thirty species of **neotropical migratory birds** may occur in the mature forest habitat in the Study Area. Removal of forested habitat in the Study Area would result in a decrease in the amount of nesting habitat available for these species (see Table 14). Forest fragmentation may also result in an increase in nest predation since nest predators such as jays are attracted to edge habitat. Five of these species (golden-crowned kinglet, Cassin's vireo, chipping sparrow, rufous hummingbird, and Wilson's warbler) have been identified as having declining populations (Andelman and Stock 1994). Decreases in nesting habitat availability and increases in nest predation in the Study Area may incrementally contribute to these trends. Potential direct impacts to these species may occur as a result of clearing and construction activities during the nesting season, potentially resulting in nestling mortality. ***However, while Alternative 2 may impact individuals, but would not likely lead to a trend toward federal listing for neotropical migratory birds.***

10.5.3. Alternative 3

Under Alternative 3, there would be no impacts to **peregrine falcon** habitat since the *Pulse Gondola* would not be constructed and disturbance impacts to cliff habitat would not occur (see Table 14). ***Therefore, Alternative 3 may impact individuals but would not likely lead to a trend toward federal listing for the peregrine falcons.***

Under Alternative 3, the type of impacts **to olive-sided flycatchers** would be similar to Alternative 2 but with less impacted acreage since the *Creek Run* chairlift and associated trails would not be built. Since the total amount of clearing would be less, the amount of forest fragmentation would be less and the risk of increased nest predation for olive-sided flycatchers would be less. In addition, reforestation of *Trails 55, 66, and 67* would reduce the amount of edge habitat from current conditions, and would potentially offset some of the impact of clearing for *Trails 60 and 61* under Alternative 3. The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. ***Therefore, Alternative 3 may impact individuals, but would not likely lead to a trend toward federal listing for the olive-sided flycatcher.***

Under Alternative 3, impacts to **harlequin duck** would be similar to Alternative 2 although there would be less clearing of mature forest in the Riparian Buffers of perennial streams. Under Alternative 3, the amount of habitat available for harlequin duck would decrease from an existing 68.82 acres to 63.25 acres for a net loss of approximately 5.57 acres (see Table 14). Direct impacts to nesting harlequin ducks would be avoided through implementation of Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Alternative 3 may impact individuals but would not likely lead to a trend toward federal listing for the harlequin duck.***

Under Alternative 3, impacts to **long-eared myotis, long-legged myotis**, and **Yuma myotis** would be similar to Alternative 2 except there would be a smaller reduction of roosting habitat and a smaller increase in foraging habitat since the *Creek Run* chairlift and associated trails would not be constructed. In addition, the purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. ***Therefore, Alternative 3 may impact individuals but would not likely lead to a trend toward federal listing for long-eared myotis, long-legged myotis and Yuma myotis.***

Under Alternative 3, habitat for **Cascade frog** would decrease from an existing 73.63 acres to 72.19 acres, a net loss of approximately 1.44 acres (see Table 14). This would occur as a result of loss of wetland habitat. This would reduce the amount of breeding habitat available for Cascades frog. Under Alternative 3, restoration projects that would reduce sedimentation impacts and wetland restoration would be similar to Alternative 2, with additional wetland restoration in the reforested *Trails 55, 56,* and *57*. ***Therefore, Alternative 3 may impact individuals but would not likely lead to a trend toward federal listing for the Cascade frog.***

Impacts to **Neotropical migratory birds** under Alternative 3 would be similar to, but fewer than, those described under Alternative 2. Alternative 3 would have less impacted acreage since the *Creek Run* chairlift and associated trails would not be built (see Table 14); therefore, there would be fewer disturbances to these species as a result of increased noise and human activity within The Summit-at-Snoqualmie. Clearing for lift terminals and ski trails could potentially result in nest abandonment and nestling mortality. Impacts from ski area operations would most likely be limited to an avoidance of the area due to increased noise and human activity. Direct impacts to neotropical migratory birds potentially nesting in the Study Area may include nest failure and nestling mortality caused by construction. To minimize the potential for this to occur, clearing of potential nesting habitat would occur following the nesting season (after August 1), as described in Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Alternative 3 may impact individuals, but would not affect species viability in the project area for Neotropical migratory birds.***

10.5.4. Alternative 4

Since the *Pulse Gondola*, mountain-top restaurant, and *Internationale* chairlift would all be constructed under Alternative 4, impacts to **peregrine falcon** habitat under Alternative 4 would be similar to

Alternative 2 (see Table 14). ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the peregrine falcons.***

Under Alternative 4, potential impacts to **olive-sided flycatchers** would also be similar to Alternative 2 except reduced since the *Creek Run* and *Rampart* chairlifts and associated trails would not be built (see Table 14). Since the total amount of clearing would be less, the amount of forest fragmentation would be less and the risk of increased nest predation for olive-sided flycatchers would be reduced compared to Alternative 2. Under this Alternative, clearing of forested habitat would be restricted to after August 1 to reduce potential direct impacts to nesting birds, as described in Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Alternative 4 may impact individuals, but would not likely lead to a trend toward federal listing for the olive-sided flycatcher.***

Under Alternative 4, impacts to **harlequin duck** habitat would be similar to but less than Alternative 2 due to a reduction in the amount of clearing of mature riparian forest. Under this Alternative the amount of habitat available for harlequin ducks would decrease from 68.82 acres to 63.37 acres for a net loss of approximately 5.45 acres (see Table 14). Direct impacts to nesting harlequin ducks would be avoided through implementation of Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the harlequin duck.***

Impacts to **long-eared myotis**, **long-legged myotis**, and **Yuma myotis** habitat would be similar to Alternative 2 except there would be less loss of roosting habitat and a smaller increase in foraging habitat since the *Creek Run* and *Rampart* chairlifts and associated trails would not be constructed (see Table 14). ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for long-eared myotis, long-legged myotis and Yuma myotis.***

Under Alternative 4, impacts to habitat for **Cascade frog** would be similar to Alternative 2 resulting in a decrease from existing 73.63 acres to 72.3 acres for a net loss of 1.33 acres (see Table 14). In addition, restoration projects that would reduce sedimentation impacts and wetland restoration would be similar to Alternative 2. ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the Cascade frog.***

Under Alternative 4, the types of impacts to **neotropical migratory bird** habitat would be similar to Alternative 2 for Summit West, Silver Fir parking lot 4 construction, and clearing with and without grading in the Mill Creek pod. The *Creek Run* and *Rampart* chairlifts would not be constructed. Since less clearing would occur, there would be less forest fragmentation, resulting in a decreased risk of nest predation when compared to Alternative 2. Under this Alternative, small patches of reforestation would occur throughout the Study Area similar to Alternative 2, resulting in an overall increase of approximately 6 acres of this habitat type within the Study Area (see Table 14). Potential direct impacts to individuals of these species may occur as a result of clearing and construction activities during the nesting season, potentially resulting in nestling mortality. To minimize the potential for this impact, clearing would not occur until after August 1, as described in Other Management Provision OMP43 (see FEIS Table 2.4-2).

Therefore, Alternative 3 may impact individuals, but would not affect species viability in the project area for Neotropical migratory birds.

10.5.5. Modified Alternative 5

Since the Pulse Gondola, mountain-top restaurant, and *Internationale* chairlift would all be constructed under Modified Alternative 5, impacts to **peregrine falcon** habitat under Modified Alternative 5 would be similar to Alternative 2 (see Table 14). ***Therefore, Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the peregrine falcons.***

Impacts resulting from Modified Alternative 5 to **olive-sided flycatcher** habitat would also be similar to Alternative 2, but with less clearing, less forest fragmentation, and reduced risk of nest predation for olive-sided flycatchers (see Table 14). Impacts from forest glading would be greater than Alternative 2 since more glading would be required under Modified Alternative 5. The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. Clearing of forested habitat would occur after August 1 to reduce potential direct impacts to nesting birds, as described in Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Modified Alternative 5 may impact individuals, but would not likely lead to a trend toward federal listing for the olive-sided flycatcher.***

Impacts to **harlequin duck** habitat would be similar to but less than Alternative 2 because there would be fewer acres of mature forest cleared in Riparian Buffers of perennial streams. Under this Alternative, the amount of habitat available for harlequin duck would decrease from an existing 68.82 acres to 62.75 acres, for a net loss of approximately 6.07 acres (see Table 14). Direct impacts to nesting harlequin ducks would be avoided through implementation of Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend toward federal listing for the harlequin duck.***

Impacts to **long-eared myotis, long-legged myotis**, and **Yuma myotis** habitat would be similar to Alternative 2 except there would be less reduction of roosting habitat and a smaller increase in foraging habitat (see Table 14). The purchase and donation of land in the Mill Creek area would provide long-term replacement habitat for mature forest removed under this Alternative. ***Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend toward federal listing for long-eared myotis, long-legged myotis and Yuma myotis.***

Under Modified Alternative 5, impacts to habitat for Cascade frog would be similar to Alternative 2 resulting in a decrease from existing 73.63 acres to 72.21acres for a net loss of 1.42 acres (see Table 14). Restoration projects that would reduce sedimentation impacts and wetland restoration would be similar to Alternative 2. ***Therefore, Modified Alternative 5 may impact individuals but would not likely lead to a trend toward federal listing for the Cascade frog.***

Under Modified Alternative 5, impacts to **neotropical migratory bird** habitat would be similar to Alternative 2 but approximately 11.59 acres less of potential habitat would be affected since there would be less clearing of forest (see Table 14). Modified Alternative 5 would, however, have the greatest amount of glading. The amount of mature riparian forest and modified herbaceous riparian habitat would increase under Modified Alternative 5. Direct impacts to neotropical migratory birds potentially nesting in the Study Area may occur as a result of construction activities. To minimize the potential for this to occur, clearing would not occur until after August 1, as described in Other Management Provision OMP43 (see FEIS Table 2.4-2). ***Therefore, Modified Alternative 5 may impact individuals, but would not affect species viability in the project area for Neotropical migratory birds.***

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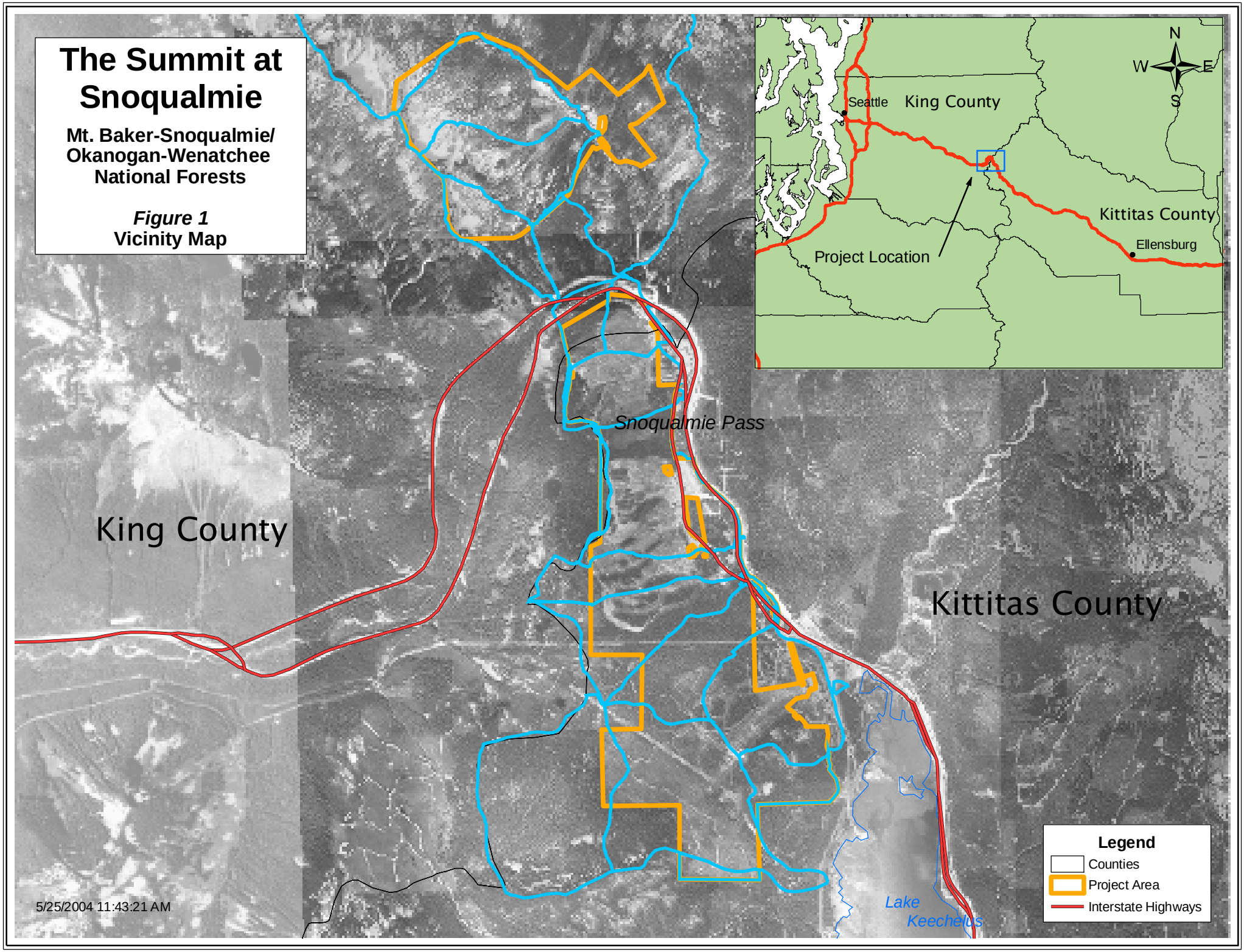
The Summit at Snoqualmie
Mt. Baker-Snoqualmie/ Okanogan-Wenatchee National Forests
Figure 1
Vicinity Map
Seattle
King County
Kittitas County
Ellensburg
Project Location
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Snoqualmie Pass
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Lake Keechelus
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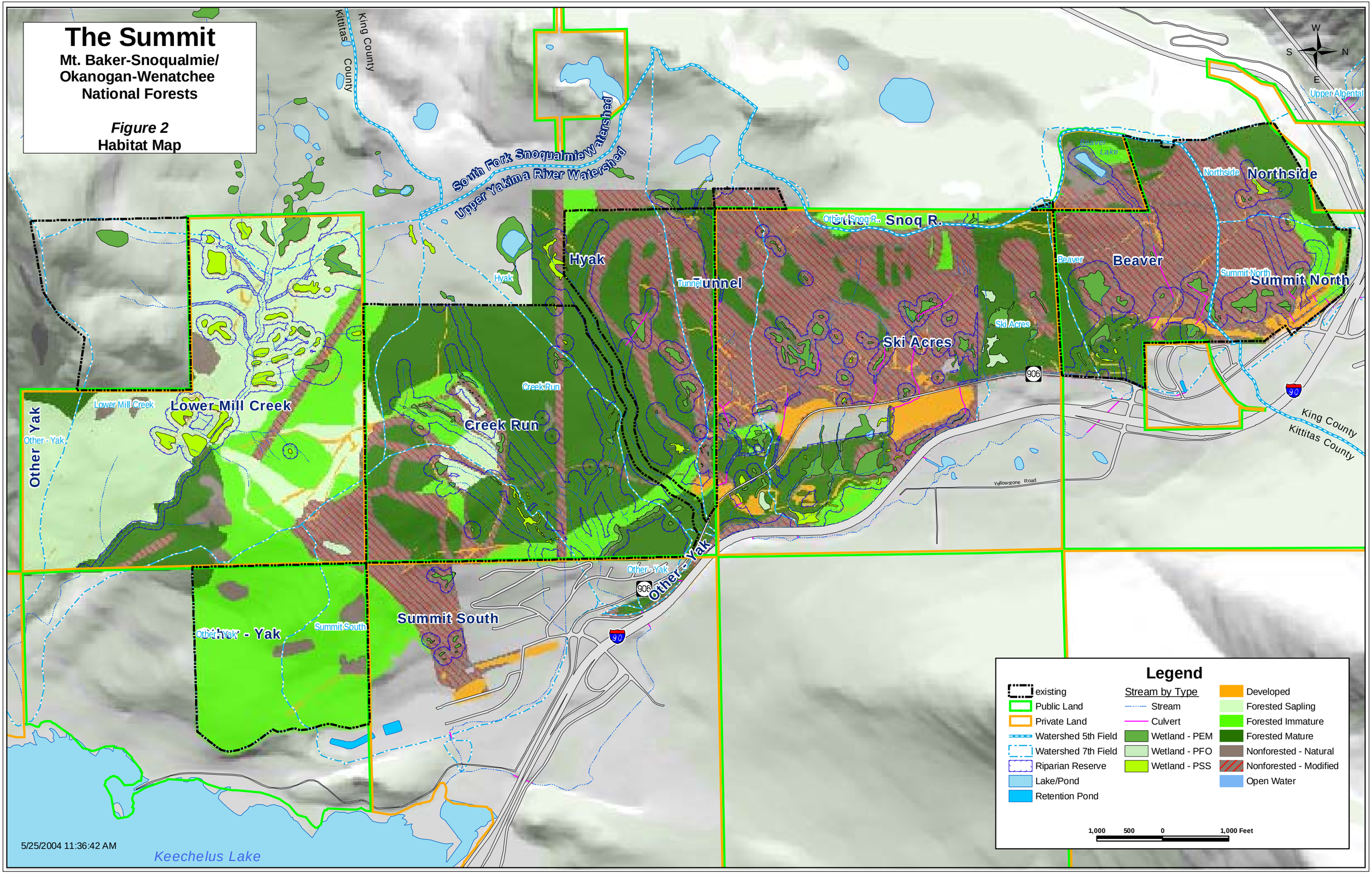
The Summit

Mt. Baker-Snoqualmie/ Okanogan-Wenatchee National Forests

Figure 2
Habitat Map



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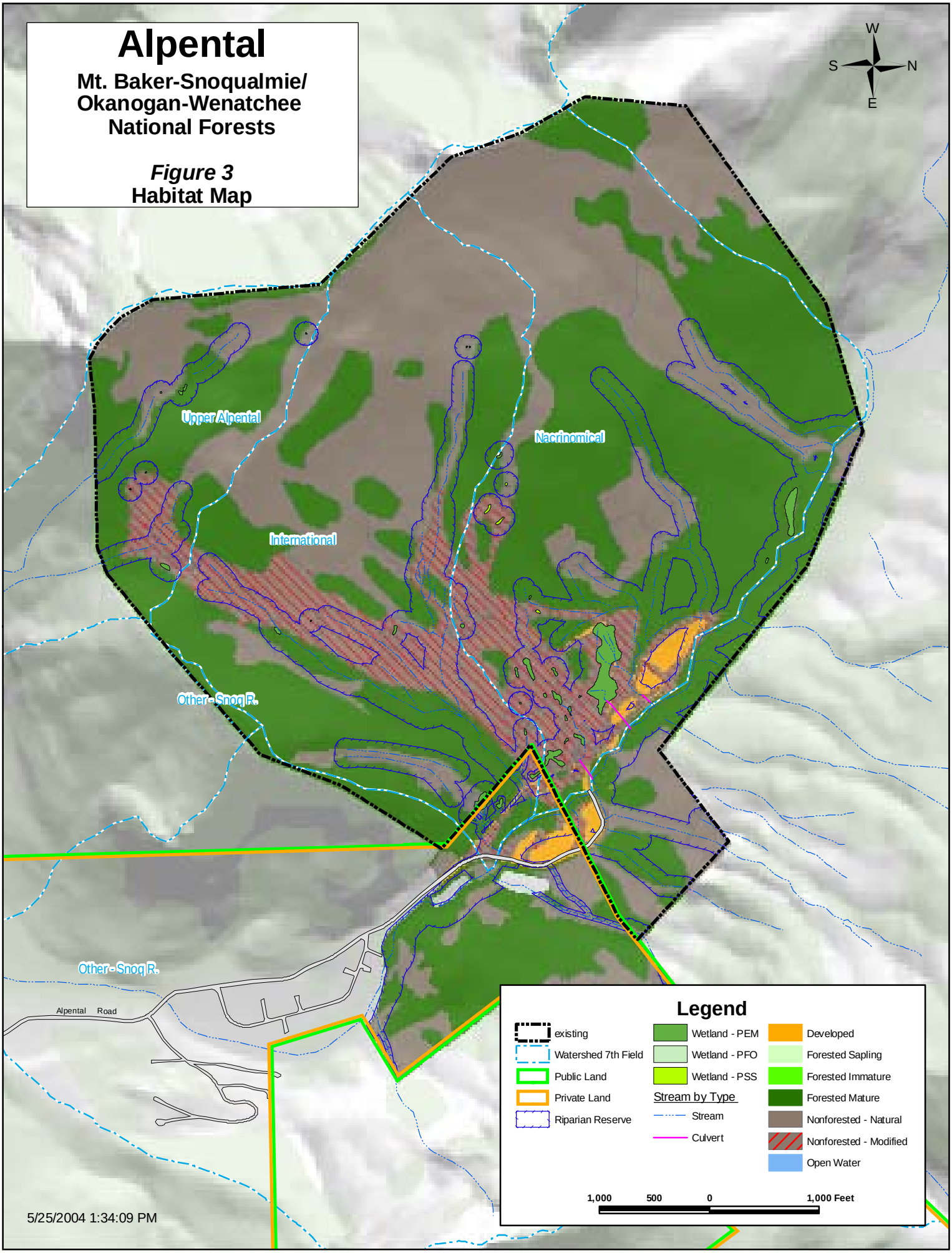
Figure 3
Habitat Map