DRAFT HABITAT MANAGEMENT PLAN
MOUNT SPOKANE SKI AND SNOWBOARD PARK
PROPOSED EXPANSION AREA

PREPARED FOR:

Mount Spokane 2000
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Acronyms and Abbreviations

BA **Biological Assessment**
CAO **Critical Areas Ordinance**
CFR **Code of Federal Regulations**
dbh **Diameter at Breast Height**
Department **Spokane County Building and Planning Department**
DHS **Lynx diurnal security habitat**
EA **Environmental Assessment**
ESA **U.S. Endangered Species Act**
HMP **Habitat Management Plan**
FEIS **Final Environmental Impact Statement**
ICF **ICF International**
IPM **Integrated Pest Management Plan**
LCS **Land Classification System**
MFP **Master Facilities Plan**
MSSSP **Mount Spokane Ski and Snowboard Park**
NEPA **National Environmental Policy Act**
PASEA **Potential Alpine Ski Expansion Area**
PHS **Washington State Priority Habitats and Species**
SCC **Spokane County Code**
SEIS **Supplemental Environmental Impact Statement**
SEPA **Washington State Environmental Policy Act**
SWPPP **Stormwater Pollution Prevention Plans**
TES **Towey Ecological Services**
TWS **The Wildlife Society**
U.S. **United States**
USFWS **U.S. Fish and Wildlife Service**
USGS **U.S. Geological Survey**
WDFW **Washington Department of Fish and Wildlife**
Washington State Parks **Washington State Parks and Recreation Commission**

1.0 Introduction

ICF International (ICF) was retained by Mount Spokane 2000 (MS 2000) to prepare a habitat management plan (HMP) for a proposed ski area expansion site (expansion area) at Mount Spokane State Park in Spokane County, Washington (Figure 1). The purpose of the HMP is provide baseline environmental data to support regulatory agencies (e.g., Spokane County) with their evaluation of the proposed project's impacts on Washington State Priority Habitats and Species (PHS), and identify where there is a need for mitigation to protect these sensitive state resources. An HMP is prepared for regulated uses considered within fish and wildlife conservations areas, or within ¼ mile of a non-game priority species, if the regulatory agency determines the proposed action is likely to have a significant on priority habitats or species. This HMP is also intended to address questions raised by the Spokane County Hearing Examiner during the April 9, 2013 appeal hearing that led to the revocation of the project's Timber Harvest Permit and Administrative Decision under the Spokane County Critical Areas Ordinance (CAO).

This report addresses the Spokane County CAO requirements for a HMP, as detailed in Spokane County Code (SCC) Section 11.20.060(D), *Fish and Wildlife Habitat and Species Conservation Areas*. It provides the professional qualifications of the HMP preparers; presents a brief overview of the project background; describes the existing site conditions (i.e., project setting) and the proposed action in sufficient detail to support an assessment of impacts; summarizes field studies conducted by ICF to inform the HMP process; analyzes the effects of the proposed action on sensitive wildlife species and their habitats; summarizes how Mount Spokane 2000 will avoid, minimize or mitigate significant adverse impacts to these species and their habitats; and provides a map consistent with SCC Section 11.20.060(D) that is certified by a qualified biologist.

2.0 Professional Qualifications

This habitat management plan was prepared by Daniel W. (Bill) Baber, Ph.D., of ICF. Mr. Pablo Herrera and Ms. Lori Anderson, both also with ICF, assisted in the collection of field data to support the HMP. The professional qualifications of each of these individuals are summarized below; resumes are provided in Appendix A.

Dr. Baber has a Bachelor's Degree in Biology; Master's Degree in Biology (Wildlife thesis); a PhD in Wildlife Sciences; and is certified as a Wildlife Biologist by The Wildlife Society. He has over 25 years of experience in wildlife and wetlands ecology, natural resource assessment, design and implementation of mitigation, and National Environmental Policy Act (NEPA) and Endangered Species Act (ESA) compliance. His experience includes projects related to aviation, transportation, hydroelectric, landfill, water storage, mining, ski resort development, nuclear energy, residential development, ROW, forest management and habitat restoration throughout the Pacific West. Bill has conducted surveys, inventories, habitat assessments, and monitoring for wildlife and their habitats; evaluated wildlife aviation risk in compliance with FAA requirements, including preparation of Wildlife Hazard Assessments and Wildlife Hazard management Plans; prepared NEPA compliance documents such as Environmental Assessments (EAs) and Environmental Impact Statements (EISs); assessed impacts to threatened and endangered plants and animals by means of Biological Assessments (BAs), Biological Evaluations (BEs), and no-effect letters; designed and implemented comprehensive mitigation plans to meet permitting and license requirements; and prepared local

permitting/compliance documents. His wetland experience includes wetland delineations, functions and values assessments, Section 404 permit applications, wetland mitigation design, wetland monitoring, and wetland mitigation banking.

Mr. Herrera has a Bachelor's Degree in Wildlife Biology. He has more than 10 years of experience as a wildlife biologist specializing in endangered species and landbird research, including protocol-level surveys for northern goshawk, spotted owl, great gray owl, marbled murrelet, and burrowing owl. Pablo is skilled with varied bird survey techniques including mist-net capture stations, variable radius point counts, area search censuses, migration counts, spot mapping, activity budgets, and raptor nest monitoring (e.g., golden eagle, bald eagle, peregrine falcon, red-tailed hawk, Swainson's hawk and great horned owl, among others). His capabilities include the identification of most northwest bird species by song and call. He also has practical experience with a variety of other organisms including rare plants, fungi, bryophytes, amphibians, and small mammals. Pablo is proficient with project management, database management, and GIS. He also has extensive experience working with landowners, non-profit organizations, and public agencies toward mutually agreeable and biologically meaningful project results. Prior to ICF, Pablo worked for the U.S. Forest Service.

Ms. Anderson has a Bachelor's Degree in Environmental Studies/Biology and a Master's Degree in Environmental Science/Terrestrial Ecology. She has more than 20 years of experience as a wildlife biologist conducting habitat and species surveys in the Pacific Northwest. Her expertise includes species specific surveys for avian and mammal species, preparing habitat assessments and wildlife habitat mapping, and analyzing potential impacts on wildlife from a variety of infrastructure projects. Lori is experienced in reviewing projects and associated wildlife reports for compliance with federal/state/local regulations, including preparation of NEPA and SEPA wildlife sections. She has designed and implemented habitat enhancement programs and is experienced in assessing and managing wildlife species in compliance with the ESA. Lori has worked in both consulting and for the U.S. Forest Service, and is very experienced in ensuring projects meet the expectation of all local/state/federal agencies.

3.0 Project Location and Description

The Mount Spokane Ski and Snowboard Park (MSSSP) is located in the northern portion of Mount Spokane State Park[1] and consists of a 1,425 acre area that is managed and operated by MS 2000, a community-based non-profit organization, under a long-term concession agreement with the Washington State Parks and Recreation Commission (Washington State Parks). Of this 1,425 acre area, approximately 575 acres on the southeastern exposure of the mountain accommodates the existing developed ski area, which includes 32 established ski trails, 5 chairlifts, 2 lodges (including restaurant, lounge, ski school, and equipment rental facility), a ski patrol building, and various administrative support structures (Figure 2). The remaining 850 acres of the MSSSP are undeveloped for alpine ski use and designated by Washington State Parksas the Potential Alpine Ski Expansion Area (PASEA).

The 279-acre expansion area addressed in this report is located in the southern portion of the PASEA on the northwestern exposure of Mount Spokane (Figure 2). This portion of the PASEA is

[1] Mount Spokane State Park is the largest state park in Washington at approximately 13,919 acres (Washington State Parks and Recreation Commission 2013a).

easily accessed from the summit and is known for its higher snow quality and excellent tree and glade skiing. It is currently used by skiers seeking a "backcountry" skiing experience. Although specific counts for backcountry users are unavailable, it is estimated that on any given weekend or powder day approximately 200 visitors a day use this area for backcountry skiing or other dispersed recreational activities (Washington State Parks and Recreation Commission 2012). When MSSSP does not provide lift access to the summit of Mount Spokane from the existing base area, or during the weekdays, the number of backcountry users in the PASEA is generally less than 30. When the ski area is operating, backcountry users are required to skate the uphill grade on the Chair 4 road in order to return to the developed alpine ski area.

Specific location information for the expansion area is as follows:

- City/County/State: Approximately 25 miles northeast of Spokane in Spokane County, Washington
- General Location: Northeastern portion of Mount Spokane State Park on the northwestern face of Mount Spokane
- PLSS: Portions of Section 16 of Township 28 North, Range 45 East, Willamette Meridian
- Tax Parcel(s): Spokane County Tax Parcels 58160.9001 and 58090.9001
- Latitude/Longitude: 47.925308° N / -117.121048° W (approximate center of site)
- Approximate Area: 279 acres
- Zoning: Rural Conservation (RCV)

The proposed project involves the expansion of alpine ski facilities into a 279-acre portion of the 850-acre PASEA (Figure 3). Proposed project work includes installation of a new chairlift, including the upper and lower terminal structures and approximately 20 lift towers; construction of seven new ski trails; and installation of associated infrastructure (e.g., utility lines). Construction of these features would require approximately 59.04 acres of clearing and 15.24 acres of grading, interpreted as follows:

Full Clearing: To the extent practical, after felling, downed logs would be retained on site. Trees presenting a safety concern if left in formal ski trails would be removed and stored in an existing off site disturbed area. Trees would be cut flush to the ground and stumps would not be removed. The surface would not be graded and the natural ground cover would be maintained. Tree removal would be accomplished by hand, or with mechanical equipment.

Full Clearing with Grading: All trees would be removed within the construction limits, stumps would be removed, and the surface would be graded and re-vegetated, where appropriate. Grading would occur at all locations where structures are proposed (e.g., lift towers, terminal locations) and along key trails where a smooth surface is necessary. Grading may include the use of heavy equipment (e.g., excavators, bulldozers, etc.) for earthmoving. The removal of trees would be accomplished by hand, or with mechanical equipment. After felling, all trees would be removed and stored in an existing disturbed area or a site designated by Washington State Park staff.

Tree Island Retention: Tree islands resulting from implementation of the proposed action would be retained between the ski trails/lift corridor. Per the Washington State Parks' decision, a limited number of informal skiing routes would be permitted through the treed islands. Limited hand clearing of trees, snags, understory vegetation, and downed woody debris would be allowed to the

extent necessary to provide a travel route through the tree islands. Tree removal would be accomplished by hand. No grading would occur.

The lower loading terminal of the proposed chairlift would be located at about 4,420 feet in elevation and would require approximately 0.75 acre of excavation and grading. The new top terminal near the summit of Mount Spokane would be located about 250 feet in distance from the top terminal of existing Chair 1 at an elevation of approximately 5,850 feet, and would require about 0.5 acre of excavation and grading.

In addition to the clearing and grading activities, ski trail construction would include edge treatments in the adjacent forest to reduce the visual and biological effects of trail clearing. These prescriptions include (Washington State Parks and Recreation Commission 2012):

Forest Edge Scalloping: Flagging a separate limit of clearing boundary outside of the trail edge so the boundary is non-linear, in order to reduce visual impacts associated with straight trail edges. The limit of clearing would meander, or undulate, outside of, but adjacent to, the flagged trail edge, giving a more natural, irregular scalloped edge to the tree line. The limit of clearing would not exceed a maximum distance of 30 feet from the original flagged trail edge.

Forest Edge Feathering: Selectively removing trees along the limit of clearing, where appropriate, so that a hard line in the new trail-to-forest transition is not evident. The area to be thinned for forest edge feathering would be approximately 10 feet wide. Large trees (i.e., greater than 8 inches dbh) would be selectively removed starting at the limit of clearing, so that the tree density would get progressively lower toward the interior of the trail and within the 10-foot feathering area.

Standard construction techniques using a small crane or boom truck would be used for erecting lift terminal structures. Equipment impacts would be minimized by making one entry and exit, where practical. Access to the terminal and tower locations would not require construction or reconstruction of a road. Terminals would be constructed onsite and the footings would be excavated by machine. Lift tower footings would be excavated by hand or with small, low impact excavators or backhoe. Concrete for footings and lift towers would be pumped from a concrete truck. Once construction is completed, any disturbed areas created by equipment accessing the site would be reseeded and the temporary travel way vacated. Grading for lift terminals and towers would be limited by construction envelopes as shown in Table 1.

The proposed action would also include operational and maintenance practices similar to existing alpine ski area operations on Mount Spokane. This would be consistent with a Recreation land classification designating the formal ski terrain. Following implementation, vegetation on formal ski trails would be annually mowed to approximately 18 inches in height. Formal ski trails would also be groomed during the winter to ensure a consistent snow surface.

Table 1. Clearing and Other Assumptions for the Ski Lift, Utility Lines and Ski Trails.

Ski Area Component	Clearing Requirement[a]
Ski Lift	
Alignment Clearing	60-foot corridor
Upper Terminal Ground Disturbance	0.50 acre
Lower Terminal Ground Disturbance	0.75 acre
Tower Ground Disturbance (each)	100 square feet
Utility Lines	
Power	15-foot corridor
Communications	15-foot corridor
Ski Trail	Average Width (ft.)[b]
Proposed Trail 1	122
Proposed Trail 2	158
Proposed Trail 3	169
Proposed Trail 4	191
Proposed Trail 5	60
Proposed Trail 6	104
Proposed Trail 7	170

Source: Mt Spokane SEIS (Washington State Parks and Recreation Commission 2012)

[a] "Worst case" estimate of clearing, grading, machinery operation, storage of spoils, etc.

[b] Trail widths are determined primarily by slope gradients, but also by other factors (e.g., planned usage, ability level goals). Formalization of each trail would not require the complete clearing and/or grading of the entire run length due to existing conditions (e.g., unvegetated, blowdown, meadow).

4.0 Project Background

This section provides a brief overview of the project-related actions to date, including previous HMP actions prepared for the site.

In August 2010, Washington State Parksadopted a Master Facilities Plan (MFP) for the Mount Spokane State Park, following a multi-year planning process that included the preparation of a Final Environmental Impact Statement (FEIS) under the Washington State Environmental Policy Act (SEPA). The adopted MFP called for additional work on the west side of the mountain in the PASEA to expand existing alpine ski facilities. MS 2000 subsequently submitted technical data regarding its proposed ski area expansion in November 2010 and provided Washington State Parks with a conceptual expansion proposal in December 2010. After evaluation of the technical data and proposal, and following a public comment period, Washington State Parks made a land classification decision for the PASEA in May 2011, allowing for potential expansion pending completion of environmental review pursuant to SEPA. (Washington State Parks and Recreation Commission 2013)

On April 26, 2012, Washington State Parksreleased the *Mount Spokane Ski and Snowboard Park Draft Supplemental Environment Impact Statement* (SEIS), which tiered off the analysis presented in the 2010 FEIS. Following a public review and comment period, the Final SEIS was issued on October 5, 2012. Based on the completion of SEPA review, a final plan of development – identified as

Alternate 3 in the Final SEIS – was selected and a detailed development plan was submitted to the Director for review and approval. Alternative 3 called for the construction of a new chairlift, seven new ski trails, and supporting infrastructure, with total ground footprint of approximately 80 acres. The Director approved the final development plan in November 2012 through a formal amendment to the concession agreement between Washington State Parksand MS 2000, pending receipt of all necessary local, state, and federal permits. (Washington State Parks and Recreation Commission 2013)

On December 26, 2012, MS 2000 filed a timber harvest permit application with the Spokane County Building and Planning Department (Department) to proceed with the tree removal required for implementation of the approved development plan. Among other documents, this application included the submittal of a Habitat Management Plan (HMP) and wetland/streams report prepared by Towey Ecological Services. The application was circulated to pertinent public agencies and department for a 15-day comment period, which included the performance of an Environmental Review based on the SEIS. Following this review period, the Department issued a timber harvest permit for the project on January 15, 2013. This decision was subsequently appealed by The Lands Council on January 17, 2013, who contended that issuance of the permit violated the Spokane County CAO and that the Department failed to adequately document compliance with the timber harvest permit review and approval standards. (Spokane County Hearing Examiner 2013)

On January 18, 2013, Division II of the State Court of Appeals issued a temporary restraining order that prohibited MS 2000 from engaging in any logging or other ground disturbance within the proposed expansion site. This order was followed by the issuance of an injunction enjoining MS 2000 from engaging in such activities pending the consideration of oral arguments by the court at an April 9, 2013 hearing. (Spokane County Hearing Examiner 2013)

Based on testimony presented during the April 9, 2013 hearing, the Spokane County Hearing Examiner affirmed the appeal brought by The Lands Council and reversed the Department's issuance of the timber harvest permit and its related decisions on the requirements of the CAO. Specifically, the Hearing Examiner found that the timber harvest permit issued by the Department did not comply with Spokane County Code (SCC) section 11.20.060 (Wetlands) or 11.20.070 (Fish & Wildlife Habitat & Species Conservation Areas), and should not have been issued to MS 2000 without significant revisions to the previously submitted HMP and wetland/stream report. Specific criticisms of the Towey Ecological Services HMP included Mr. Towey's failure to meet the CAO criteria for a "qualified biologist"; the lack of adequate field surveys to evaluate potential use of the expansion area by northern goshawk; failure to quantify impacts to the 21 focal wildlife species and to priority habitats; failure to consider management guidance as presented in WDFW's *Management Recommendations for Washington's Priority Habitats and Species*; and failure to seek US Fish and Wildlife Service review of the draft HMP (Spokane County Hearing Examiner 2013). The preparation of this HMP is intended to correct the previous issues identified by the Hearing Examiner.

Finally, on September 17, 2013 the Court of Appeals ruled that an EIS should have been performed on the land classification issue prior to any decision related to an expansion of the ski area. This procedural error in effect reversed Washington State Parks 'earlier decision related to the classification of lands within the PASEA and nullified the decision of the Director to approve the ski area expansion. In essence, the lands in the PASEA are now again considered "unclassified" and are in practice managed as Natural Forest Area (NFA). Therefore, on November 12, 2013 Washington State Parks began scoping an EIS that would correct the aforementioned procedural error by preparing an EIS that addresses the land classification issue (i.e., non-project action) as well as the

ski area expansion (i.e., project action) in conjunction with one another. It is intended that this HMP, and the previously released SEIS related to the project action, would inform the environmental analysis contained within the abovementioned EIS.

5.0 Existing Conditions

Mount Spokane is a conical-shaped mountain located at the southern end of the Selkirk Mountain range near the Washington-Idaho border. With a summit of approximately 5,900 feet above mean sea level, Mount Spokane is the highest point in Spokane County and much of the surrounding area (Spokane County Hearing Examiner 2013). It is located within the Western Selkirk Maritime Forest Level IV ecoregion, which is part of the Northern Rockies Level III ecoregion (U.S. Environmental Protection Agency 2010a). The Northern Rockies ecoregion is mountainous and rugged, with a marine-influenced climate and vegetation despite its inland position (U.S. Environmental Protection Agency 2010b). According McGrath et al. (2002), the Western Selkirk Maritime Forest Level IV ecosystem is an unglaciated area composed primarily of mountain slopes, crests, and ridge tops interspersed with narrow valleys. Elevations typically range from 2,100 to 5,000 feet above mean sea level, with local relief (i.e., difference in elevation) typically varying between 600 and 2,800 feet. The surficial geology is characterized by Quaternary volcanic ash, loess, and colluvium overlying Cretaceous and Precambrian gneiss, granite, and schist bedrock. Soils are typically classified as Andisols. Mean annual precipitation is 22.5 inches and mean temperatures range from 22 to 35° F in January and 50 to 86° F in July. Average annual snowfall accumulation on Mount Spokane is about 150 inches.

The expansion area is situated on the northwest facing slope of Mount Spokane and has elevations ranging from approximately 5,900 feet above mean sea level near the summit to approximately 4,418 feet above mean sea level at the western edge near the proposed bottom terminal site (Washington State Parks and Recreation Commission 2012). Slopes range from 40 to 60% on higher elevations to relatively flat (<5%) on benched areas. USGS topographic maps (1973a and 1973b) show little to no existing development within the study area and vicinity other than the paved summit road and the existing ski area to the east. Most of the drainage from the study area flows west to Blanchard Creek, with a small portion of the site draining to the south to Burping Brook. Blanchard Creek flows toward the northeast, eventually draining into the Middle Spokane River. Burping Brook flows south to Deadman Creek. ICF field surveys conducted in late July/early August 2013 identified 11 non-fish perennial (Type Np) stream segments and 4 wetlands within the expansion area (see Section 6.3 Wetland Delineation for further discussion). The primary sources of hydrology to ephemeral and perennial stream channels within the expansion area includes runoff from snow melt, subsurface seepage, and seasonal storm events.

5.1 Habitat

Land cover in the Western Selkirk Maritime Forest Level IV ecoregion is primarily coniferous forest dominated by Douglas-fir (*Pseudotsuga menziesii*), with co- or sub-dominants of grand fir (*Abies grandis*), western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), western larch (*Larix occidentalis*), ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), and subalpine fir (*Abies lasiocarpa*) (McGrath et al. 2002). Of these species, grand fir, western redcedar, western hemlock, and western larch are more common on moist sites, with drier sites occupied by ponderosa pine. Subalpine fir and lodgepole pine are typical at colder, higher elevation sites. More

specific vegetation information was collected for a larger Biological Survey Area[2] that included the entire expansion area by the Pacific Biodiversity Institute (PBI) in summer 2010 The PBI report identified and mapped a series of habitat polygons based on the plant associations present. In addition, data on 35 quantitative or descriptive habitat attributes were collected for each polygon and compiled into a spatial database for evaluation (e.g., tree species composition, tree canopy closure, tree diameter distribution, snag size and density, shrub layer cover and composition). The study identified 15 plant association (also referred to as cover types and wildlife habitats in this report) and 2 non-vegetative cover types (i.e., talus and developed) areas within the expansion area (Figure 4, Table 2). These plant associations and measured habitat attributes were used to help assess the availability of suitable habitat for wildlife during the development of the HMP.

Table 2. Primary Plant Associations Identified within the Expansion Area.

Common Name	Scientific Name	Map Code	Acreage
Forest/Woodland			**262.35**
Subalpine fir/Lady fern	*Abies lasiocarpa/Athyrium filix-femina*	ABLA/ATFI	2.12
Subalpine fir/Hitchcock's woodrush	*Abies lasiocarpa/Luzula glabrata ssp. hitchcockii*	ABLA/LUGLH	2.40
Subalpine fir/Fools huckleberry	*Abies lasiocarpa/Menziesia ferruginea*	ABLA/MEFE	15.93
Subalpine fir/Carolina bugbane	*Abies lasiocarpa/Trautvetteria caroliniensis*	ABLA/TRCA	<0.01
Subalpine fir/Thinleaf huckleberry	*Abies lasiocarpa/Vaccinium membranaceum*	ABLA/VAME	8.38
Subalpine fir/Bear-grass	*Abies lasiocarpa/Xerophyllum tenax*	ABLA/XETE	200.38
Western hemlock/Lady fern	*Tsuga heterophylla/Athyrium filix-femina*	TSHE/ATFI	0.25
Western hemlock/Oak fern	*Tsuga heterophylla/Gymnocarpium dryopteris*	TSHE/GYDR	9.98
Western hemlock/Fool's huckleberry	*Tsuga heterophylla/Menziesia ferruginea*	TSHE/MEFE	15.65
Western hemlock/Bear-grass	*Tsuga heterophylla/Xerophyllum tenax*	TSHE/XETE	7.26
Shrub			**4.52**
Sitka alder/Mesic forb	*Alnus viridis ssp. sinuata*/Mesic forb	ALVIS/Mesic Forb	1.23
Sitka alder/Triangle-leaf groundsel	*Alnus viridis ssp. sinuata/Senecio triangularis*	ALVIS/SETR	3.29

[2] The Biological Survey Area is a subset of the SEIS Analysis Area that includes most of the PASEA and the entire HMP project site addressed in this report.

Herbaceous/Meadow			**8.24**
Sulfur-flower buckwheat–Green fescue	*Eriogonum umbellatum var. majus–Festuca viridula*	ERUMM–FEVI	4.43
Green fescue–Idaho fescue	*Festuca viridula–Festuca idahoensis*	FEVI–FEID	3.37
Spreading phlox/green fescue–Hound's tongue hawkweed	*Phlox diffusa/Festuca viridula–Hieracium cynoglossoides*	PHDI3/FEVI–HICY	0.44
Non-vegetated			**3.64**
Talus	Talus	Talus	1.93
Developed	Developed	Developed	1.71
Total			**278.75**

Source: Morrison and Wooten 2010.

Forests and open woodlands dominated by subalpine fir comprise the majority of wildlife habitats in the expansion area (Figure 4 and Table 2). These habitats support a mosaic of vegetation rich in structure, diversity, age (spanning early to late successional) and biological functions (including coarse woody debris and snags). The largest trees in the expansion area occur in the lower elevation western hemlock and mixed conifer plant associations along the northwest boundary of the expansion area, while above about 5,100 feet, average tree diameters become progressively smaller as forested stands approach the summit of Mount Spokane where growing conditions are more extreme. Woodlands within the central and southern portions of the expansion area have been significantly impacted by blowdown during windstorms, or have suffered extensive damage from ice storms and perhaps root rot fungal infection. Some stands in these areas support less than 60 live trees per acre(Morrison and Wooten 2010). An examination of historic aerial photographs for the years 1992, 1995, 2005, 2006, 2009, and 2011 using Google Earth Pro indicate this forest stand mortality event occurred sometime between 1995 and 2005. Prior to this time, most of the expansion area was covered by dense coniferous forest except for the southern portion where alpine/subalpine meadows and shrublands occurred. The forest openings associated with the dieback contain scattered patches of mature trees while supporting an abundance of downed logs and woody debris, snags, early successional shrub and herbaceous vegetation, and young regenerating conifer trees. Canopy closure remains high within forest stands along the northern project boundary, with a concurrent decrease in understory vegetation owing to diminished sunlight striking the forest floor.

Several of the cover types within the expansion area (Table 2) are locally uncommon or possibly unique. These include:

- Sitka alder-dominated wetlands (ALVIS/ATFI, ALVIS/Mesic Forb and ALVIS/SETR).
- Dry, open, alpine meadows (ERUMM-FEVI, FEVI-FEID, PHDI3/FEVI-HICY). Located near the summit of Mount Spokane, these habitats appear to be globally rare, but are locally common in this area.
- Talus (Talus). Patches of sparsely vegetated boulder and loose rock debris located near the summit of Mount Spokane.

As a whole, the landscape of the expansion area is characterized by native vegetation and natural processes.

5.2 Rare Plants

Surveys for rare plant were conducted in the expansion area during 2010 (Morrison and Wooten 2010). Rare plant survey methods were based on the USDA rare plant survey handbook (Range Management Staff 2008). The purpose of the surveys was to locate any rare vascular plants occurring within the Study Area. Rare plants include federally endangered or threatened species or Washington State sensitive, threatened or endangered vascular plants tracked by the Washington Natural Heritage Program (WNHP).

No rare or threatened vascular plant species were observed during the 2010 rare plant surveys. No state or federally listed vascular plant species are known to occur within the expansion area.

5.3 Wildlife

Mount Spokane State Park is home to a diversity of wildlife species. Cougar, coyote, bobcat, deer, moose, elk, black bear, bats, squirrels, small mammals, western toads, butterflies, and a large variety of bird species are all occupants the Park. A total of 110 species of birds have been documented in the Park, with 78 species confirmed as breeders and 17 species listed as possible breeders (Dexter 2003). The 279-acre expansion area and surrounding landscape is comprised of a mosaic of wildlife habitats and habitat conditions that have been influenced by past natural and human-caused modifications, including timber harvest, windstorms, wildfire, ice storms, road construction, ski area development, and numerous other recreational activities (e.g., hiking, horseback riding, biking snowmobiling, berry gathering).

In consultation with WDFW, Washington State Parks has identified 21 focal wildlife species of special concern that may potentially occur at Mount Spokane State Park and in the expansion area (Table 3). These include state game and non-game species, state and federal listed species, and state priority species from a wide range of taxa. These species may use a variety of habitats including mature and old-growth forest; talus slopes; recent burns; meadows; wetland, riparian and aquatic areas; and alpine/subalpine zones, among others. Romain-Bondi et al. (2009) developed a wildlife habitat element and life stage matrix to address focal species use of Mount Spokane State Park. Key habitat attributes for each of the 21 focal species were described, based upon extensive literature review and interviews with local wildlife experts. Selected habitat elements for each species, refined using additional literature search as needed, were cross referenced with habitat data collected by Morrison and Wooten (2010) from the expansion area to model and estimate area of suitable habitat present for each species.

Table 4 summarizes the habitats used by the 21 focal species, their likely occurrence in the expansion area, and provides estimates of suitable habitat available in the expansion area. Refer to Romain-Bondi et al. (2009) for a detailed description of each of these species, their potential distribution in Mount Spokane State Park, and important habitat elements and their associated life–stage relationships. Maps prepared by ICF depicting the distribution of modeled suitable habitat for each species in the expansion area are provided in Appendix C. Morrison and Wooten (2010) provide a detailed description of the habitat data collected from the expansion area. Where existing

Table 3. Conservation Status of the 21 Focal Species Identified for Mount Spokane State Park.

Species	Scientific Name	WDFW Status	Federal Status
CARNIVORES			
1 Gray wolf	*Canis lupus*	State Endangered; Priority Species	None
2 Canadian lynx	*Lynx canadensis*	State Threatened; Priority Species	Federal Threatened
3 Wolverine	*Gulo gulo*	State Candidate; Priority Species	Federal Candidate Species
4 American marten	*Martes americana*	Game Species – Furbearer; Priority Species	None
UNGULATES			
5 Rocky Mountain elk	*Cervus elaphus*	Game Species; Priority Species	None
6 White-tailed deer	*Odocoileus virginianus ochrourus*	Game Species; Priority Species	None
7 Moose	*Alces alces*	Game Species; Priority Species	None
BIRDS			
8 Northern goshawk	*Accipiter gentilis*	State Candidate; Priority Species	Federal Species of Concern
9 Boreal owl	*Aegolius funereus richardoni*	State Monitor	None
10 Pileated woodpecker	*Dryocopus pileatus*	State Candidate; Priority Species	None
11 Black-backed woodpecker	*Picoides arcticus*	State Candidate; Priority Species	None
12 Dusky grouse	*Dendragapus obscurus pallidus*	Game Species; Priority Species	None
13 Brown creeper	*Certhia americana*	None	None
14 Pacific (winter) wren	*Troglodytes troglodytes*	None	None
15 Olive-sided flycatcher	*Contopus cooperi*	None	None
SMALL MAMMALS			
16 Pika	*Ochotona princeps*	None	None
17 Pygmy shrew	*Sorex hoyi*	State Monitor	None
18 Silver-haired bat	*Lasionycteris noctivagans*	None	None
19 Hoary bat	*Lasiurus cinereus*	None	None
OTHER SPECIES			
20 Western toad	*Bufo boreas*	State Candidate; Priority Species	Federal Species of Concern
21 Compton tortoiseshell butterfly	*Nymphalis vaualbum*	State Monitor	None

Source: USFWS 2013; WDFW 2008; WDFW 2013a.

Table 4. Suitable Habitat Estimates for the 21 Focal Species in the Expansion Area.

Species	Habitat Associations	Potential Species Presence	Key Habitat Elements Used to Model Suitable Habitat	Estimated Habitat (acres): Existing Conditions
Canada lynx (*Lynx canadensis*)	Northern boreal forests and closed canopy montane forests. Requires early-successional forest for primary prey (snowshoe hare) and late-successional forest for denning (Rodrick and Milner 1991, Ruediger et al. 2000). Forest types considered to be primary habitat are lodgepole pine and subalpine fir.	Multiple sightings documented for Mount Spokane State Park between 1988 and 2002; but none in the expansion area. Forest conditions within the park provide adequate habitat for denning, foraging and dispersal. However, no evidence of denning has been documented (Romain-Bondi et al. 2009).	Breeding/denning: Forest stands with tree canopy closure ≥40% and coarse woody debris ≥15%. Summer foraging: Forest and shrub stands with shrub cover >10%. Winter foraging: Forest stands with ≤ 30% slope and shrub cover ≥20%. Dispersal: All forest and shrub stands, plus any herbaceous/nonvegetated cover types < 300 ft from forest or shrub stands. Source: Romain-Bondi et al. 2009; Morrison et. al 2007	0 260 83 275
Gray wolf (*Canis lupis*)	Vast areas of remote, undisturbed habitat; isolation from human disturbance for denning (Paradiso and Nowak 1982).	Development, such as highways, trails, campgrounds and the ski area, have reduced the extent of undisturbed habitat in Mount Spokane State Park. Gray wolves mayoccur as lone individuals that use the park for dispersal and foraging habitat. No verified sightings have been documented. Gray wolves are not currently known to use the park for breeding, denning or pack establishment (Romain-Bondi et al. 2009).	Summer foraging: Deer, elk and moose habitat >1/4 mile from the Summit Road and Kit Carson Trail. Winter foraging: Deer, elk and moose habitat < 3500 ft in elevation. Source: Romain-Bondi et al. 2009	138 0

Wolverine (*Gulo gulo*)	High elevation alpine tundra, subalpine forest, and montane forest (Banci 1994; Copeland et al. 2007).	Multiple sightings documented for Mount Spokane State Park. Foraging and dispersal habitat is present within the park, but conditions are unsuitable for denning (Romain-Bondi et al. 2009).	Summer foraging: Any habitats >5000 ft in elevation. Winter foraging: Any habitats >3500 ft in elevation. Source: Romain-Bondi et al. 2009	191 279
American marten (*Martes americana*)	Boreal coniferous forests, as well as mixed coniferous and deciduous habitats (Rodrick and Milner 1991, Thompson and Harestad 1994). Strongly associated with older forests and coarse woody debris	A regular occupant of Mount Spokane State Park. Existing forest structures likely provides denning, foraging and security habitat (Romain-Bondi et al. 2009).	Non-winter cover and foraging: All habitats except developed. Winter cover and foraging: Forest stands with tree canopy cover >37% and either a) 8 largest trees/ac ≥19 in dbh; b) more than 4 snags/ac with a quadratic mean diameter ≥12 in; or c) coarse woody debris between 20% and 50%. Non-forest areas <165 ft from suitable forest stands. Source: Romain-Bondi et al. 2009; Allen 1982; Morrison et. al 2007.	277 140
Rocky Mountain elk (*Cervus elaphus*)	Coniferous forests associated with mountains, foothills, or canyon rangelands (Rodrick and Milner 1991, Skovlin et al. 2002). Prefer a mosaic of forested and open habitat patches to meet cover and foraging needs.	Year-round, regular concentrations in Mount Spokane State Park. Suitable habitats for breeding, calving, and foraging are known to be present (Romain-Bondi et al. 2009). Use of the expansion area during the winter months is limited due to high snow depths and a general lack of available forage.	Cover: Forest stands >1/4 mile from Summit Road and tree canopy cover >50%. Summer/fall foraging: Any habitat [<5000 ft in elevation, <60% slope or >200 feet from the Summit Road] with tree canopy cover ≤ 40% and within 900 ft of elk cover. Winter foraging: Habitats <3500 ft in elevation. Source: Romain-Bondi et al. 2009	74 2.2 0

White-tailed deer *(Odocoileus virginianus ochrourus*)	Forested and open habitats, feeding on grasses, forbs, and shrubby browse (Rodrick and Milner 1991, NatureServe 2013).	Year-round, regular concentrations in Mount Spokane State Park. Suitable habitats for breeding, fawning and foraging are known to be present (Romain-Bondi et al. 2009). Use of the expansion area during the winter months is limited due to high snow depths and a general lack of available forage. Documented within the expansion area (see Figure 6, Section 6.0).	Summer /fall foraging: Any habitat with herbaceous cover >15% or shrub cover >22%. Summer/fall cover: Forest stands with canopy cover >50%, or Any habitat with shrub/sapling tree cover >52%. Winter foraging/cover: Habitats <3000 ft in elevation. Source: Romain-Bondi et al. 2009; Kieffer et al. 1999	276 172 0
Moose (*Alces alces*)	Boreal forest and wetland habitats (Rodrick and Milner 1991).	Year-round occupant of Mount Spokane State Park, with forests and wetlands providing breeding, calving and foraging habitat. Use of the expansion area during the winter months is limited due to high snow depths and a general lack of available forage.	Breeding/calving: Forest and shrub stands with gentle slopes (0-10%) and southerly exposures Summer/fall foraging: Forest and shrub stands with slopes <50% and shrub cover between 5% and 95%. Summer cover: Forest stands with canopy cover >70% and canopy height > 33 ft Winter foraging/cover: Snow depths <35 in. Source: Romain-Bondi et al. 2009;	0 274 42 0

Northern goshawk (*Accipiter gentiles*)	Montane and boreal forests (Desimone and Hays 2003). Forages in the open understory of dense forests and within small forest openings. Nesting occurs in large intact blocks of mature and late successional conifer forest where prey densities are high.	Year-round residents of Mount Spokane State Park (Romain-Bondi et al. 2009). Several primary and alternate nest sites have been documented in the Park. No evidence of goshawk nesting was detected in the expansion area or an adjacent buffer by ICF in 2013 (see Section 6.1).	Breeding/nesting: Forest stands with slopes <70%, tree canopy cover >40%, 8 largest trees/ac >19 in dbh, and avg tree height >65 ft. Foraging: Forest stands with slopes <70%, tree canopy cover >32%, and avg tree height >65 ft, or Nonforest stands <4 acres interspersed with suitable forest. Source: Romain-Bondi et al. 2009; Morrison et. al 2007	44 93
Boreal owl (*Aegolius funereus richardsoni*)	High elevation mature and old growth coniferous forests.	Uncommon, year-round resident in the mountains of northeastern Washington (BirdWeb 2013). Potentially breeds and forages in Mount Spokane State Park.	Breeding/nesting: Forest stands >4000 ft in elevation with combined trees and snags/ac >23, and 8 largest trees/ac >14 in dbh. Foraging/roosting: Forest stands >3500 ft with tree canopy cover >35%. Source: Romain-Bondi et al. 2009; Heinrich et. al 1999	209 209
Pileated woodpecker (*Dryocopus pileatus*)	Prefer tall, closed-canopy, coniferous forests containing large snags, large decaying live trees and abundant downed woody debris (Lewis and Azerrad 2003).	Utilizes large diameter trees and snags as preferred habitat for nesting and foraging (Romain-Bondi et al. 2009). Documented within Mount Spokane State Park and the expansion area (see Figure 6, Section 6.0). No evidence of foraging by pileated woodpeckers was observed above 4,808 feet elevation in the expansion area.	Breeding/nesting: Forest stands with tree canopy cover >50%, and 8 largest trees/ac >20 in dbh. Foraging: Forest stands with tree canopy cover >50%, and quadratic mean diameter of snags >9.8 in or cover of coarse woody debris >10%. Roosting: Forest stands with tree canopy cover >50%, and 8 largest trees/ac >16 in dbh. Source: Romain-Bondi et al. 2009; Schroeder 1983; Lewis and Azerrad 2003.	33 178 169

Black-backed woodpecker (*Picoides articus*)	Coniferous forests-habitat specialists associated with recent fires or large scale natural disturbances that create abundant standing snags dead for 5 years or less (Hutto 1995, Saab et al. 2002). Often associated with lodgepole pine forests (Altman 2000)	Potentially breeds and forages in Mount Spokane State Park (Romain-Bondi et al. 2009).	Breeding/nesting: Forest stands with quadratic mean diameter of snags >10 in, or # snags/ac >30. Foraging/roosting: Forest stands with # snags/ac >26. Source: Romain-Bondi et al. 2009	264 264
Dusky grouse (*Dendragapus obscurus pallidus*)	Inter-mountain coniferous forests mixed with deciduous trees and shrubs, as well as sagebrush-grassland areas (Ware 1998). Prefer open brushy habitat during the spring and summer, and high elevation conifer forests in winter. Aspen stands provide important food and cover	Mount Spokane State Park provides potential breeding and foraging habitat (Romain-Bondi et al. 2009). Documented within the expansion area (see Figure 6, Section 6.0).	Breeding/nesting: Any habitat with tree canopy cover between 10 and 65%, and shrub cover between 5% and 53% or herbaceous cover between 20% and 80%. Summer foraging: Any habitat with shrub cover between 5% and 53% or herbaceous cover between 20% and 80%. Winter foraging and roosting: Dense conifer forest (assume tree canopy cover >50%. Source: Romain-Bondi et al. 2009; Schroeder 1984.	196 276 155
Brown creeper (*Certhia americana*)	Prefer closed canopy forests with abundant large dead/dying trees for nesting and large live trees for foraging. Are significantly more common in old forests with multi-layered structure (Adams and Morrison 1993; Johnson and O'Neil 2001).	Mount Spokane State Park provides potential breeding and foraging habitat (Romain-Bondi et al. 2009). Documented within the expansion area (see Figure 6, Section 6.0).	Breeding/nesting/foraging: Forest stands with [quadratic mean diameter of trees >7.5 in or quadratic mean diameter of snags >7.5 in], or 8 largest trees/ac >20 in dbh. Source: Romain-Bondi et al. 2009.	264

Pacific (winter) wren (*Troglodytes troglodytes*)	Prefer dense tangles and thickets in coniferous and mixed forests. Coarse woody debris and shrub cover are key habitat elements associated with nesting and foraging. Breeding territories, nests, and foraging areas frequently are associated with streams, bogs, swamps and lakes (Romain-Bondi et al. 2009).	Mount Spokane State Park provides potential breeding and foraging habitat (Romain-Bondi et al. 2009). Documented within the expansion area (see Figure 6, Section 6.0).	Breeding/nesting/summer foraging: Forest stands with tree canopy cover >35% and cover of coarse woody debris >7.5%, or Any habitat within 25 ft of a stream. Source: Romain-Bondi et al. 2009; Gould et al. 1999.	187
Olive-sided flycatcher (*Contopus cooperi*)	Highly associated with coniferous forest stands throughout North America (NatureServe 2013). Breeds in higher elevation forests and woodlands, especially burned areas with standing dead trees. Their primary needs including perching posts (snags and live trees), adjacent to open air foraging, and conifer forest edges for breeding (Altman and Sallabanks 2000).	Mount Spokane State Park provides potential breeding and foraging habitat (Romain-Bondi et al. 2009). Documented within the expansion area (see Figure 6, Section 6.0).	Breeding/nesting: Forest stands with tree canopy cover <50%, and a tree density between 25 and 53 trees per acre or snag density between 6 and 17 trees per acre. Source: Romain-Bondi et al. 2009; Vesley et al. 2007.	12
American pika (*Ochotona princes*)	Common resident of rock and talus slopes of mountainous regions. In Washington, occupy the talus-meadow interface within alpine and subalpine habitats.	Potential year-round inhabitant of alpine/subalpine talus on Mount Spokane. Documented within the expansion area (Morrison and Wooten 2010).	Breeding/nesting/foraging: Talus, and adjacent upland meadow within 5 ft, that are above 5000 ft in elevation. Source: Romain-Bondi et al. 2009.	2
American pygmy shrew (*Sorex hoyi*)	Distributed throughout the boreal regions of North America, within a wide variety of habitats. Potentially occupy all structural stages of upland conifer forests. Coarse woody debris and leaf litter/duff are important habitat elements (Romain-Bondi et al. 2009).	Mount Spokane State Park provides potential breeding and foraging habitat for the pygmy shrew (Romain-Bondi et al. 2009). Very little specific information exists for the species in the Pacific Northwest.	Breeding/parturition/foraging: All habitats except talus and developed. Source: Romain-Bondi et al. 2009.	275

Silver - haired bat (*Lasionycteris noctivagans*)	Secondary cavity roosters, using cracks and fissures in tree bark, cavities in live and dead trees, and rock crevices for roosting and rearing young.	Summer resident known to forage and roost, and perhaps breeding, in and around Mount Spokane State Park (Romain-Bondi et al. 2009). Thought to migrate out of the Columbia Basin in September and return in July (a three-month residency) (Shump and Shump 1982).	Foraging/roosting/breeding: All habitats except developed. Source: Romain-Bondi et al. 2009.	277
Hoary bat (*Lasiurus cinereus*)	Foliage roosters (roosting on branches of trees) documented to use a variety of conifer and riparian habitats. Forage within meadows, forest edges, forest openings and roads (Romain-Bondi et al. 2009).	Summer resident known to forage and roost, but not breed, in and around Mount Spokane State Park (Romain-Bondi et al. 2009). Thought to migrate out of the Columbia Basin in September and return in July (a three-month residency) (Shump and Shump 1982).	Foraging/roosting: All habitats except developed. Source: Romain-Bondi et al. 2009.	277
Western toad (*Bufo boreas*)	Breeds in shallow ponds and lake margins. Forages in a wide variety of upland habitats after breeding is complete. Winters in burrows or under logs and rocks.	A regular occupant of Mount Spokane State Park that hibernates for 3 to 6 months during winter (Wind and Dupuis 2002).	Breeding/metamorphosis: Warm, shallow water bodies. Foraging/migration: Stream corridors, and forest stands with <75% tree canopy cover, that lie within 3280 ft of breeding ponds. Source: Romain-Bondi et al. 2009.	0 0
Compton's tortoiseshell butterfly (*Nymphalis vau-album*)	Prefers coniferous and deciduous forests. Lays its eggs on the leaves of birch, willow and poplar trees. Forages in open habitats such as meadows, forest openings and riparian areas.	Thought to occur within Mount Spokane State Park. One documented sighting fromMount Spokane near the expansion area.	Breeding/metamorphosis: Habitats containing willow, birch or aspen. Foraging: All habitats, except talus, with tree canopy closure <30%, or All habitats within 30 m of streams. Source: Romain-Bondi et al. 2009.	0 109

Source: Mt Spokane SEIS (Washington State Parks and Recreation Commission 2012), Romain-Bondi et al. (2009), Rodrick and Milner 1991, and ICF field observations in 2013.

quantitative habitat models were available for a species, a habitat suitability index (HSI) value of 0.5 (i.e., the transition between low and moderate habitat suitability) was chosen as the threshold used to screen habitat element variables for species suitability. When quantitative models were lacking, word models provided by Romain-Bondi et al. (2009) were used to evaluate habitat elements for suitability. Additional information on many these species is also available from WDFW in their series, *Management Recommendations for Washington's Priority Species* (Rodrick and Milner 1991, Larsen 1997, and Larsen et al. 2004), which summarizes habitat requirements, limiting factors and management recommendations for priority species.

5.4 Priority Habitats and Species

WDFW (2008) maintains a list of habitats and species considered to be priorities for conservation and management in the state. *Priority species* require protective measures for their survival due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance. Priority species include State endangered, threatened, sensitive, and candidate species; vulnerable animal aggregations (e.g., heron colonies, bat colonies); and species of recreational, commercial, or tribal importance that are vulnerable. *Priority habitats* are habitat types or elements with unique or significant value to a diverse assemblage of species. A priority habitat may consist of a unique vegetation type (e.g., shrub-steppe) or dominant plant species (e.g., juniper savannah), a described successional stage (e.g., old-growth forest), or a specific habitat feature (e.g., cliffs, talus).

A list of priority species and priority habitats that may occur in the expansion area is provided below. This list was derived from the following sources: 1) a review of the WDFW PHS database (2013) for records of priority species and habitats from the expansion area, and within a 1-mile radius of the expansion area (Figure 5); 2) additional records for northern goshawk and Canada lynx provided by WDFW (2013b, 2014) that have only recently been added to the PHS database (Figure 5); 3) biological and habitat surveys conducted by PBI in the expansion area (Morrison and Wooten 2010); 4) a review of the Romain-Bondi et al. (2009) assessment of habitat suitability and potential distribution for 21 sensitive focal species within Mount Spokane State Park; and 5) observations or evidence supporting presence of priority species and habitats collected by ICF as part of field studied completed in summer of 2013 to inform the HCP (Figure 6; see Section 6.0 HCP Field Studies).

Priority Species

Eleven priority species may potentially occur within the expansion area:

- Gray wolf - State endangered
- Canada lynx - State threatened
- Wolverine - State candidate
- American marten – Game species
- Rocky mountain elk– Game species
- White-tailed deer– Game species
- Moose– Game species

- Northern goshawk- State candidate
- Pileated woodpecker- State candidate
- Black-backed woodpecker- State candidate
- Dusky grouse– Game species

Observations and records for priority wildlife species are compiled in Figure 5 (PHS database and other records vetted and provided by WDFW) and Figure 6 (ICF field observations during summer of 2013 – see Section 6). The location for a single PHS wolverine record mapped west of the expansion area is not disclosed in Figure 5 because this location is considered sensitive under WDFW Policy 5210. All of the priority species noted above are included on the WDFW list of 21 focal wildlife species of special concern that may occur in Mount Spokane State Park (see Table 3).Refer to Table 4 for a description of potentially suitable habitat that may occur for each species within the expansion area. The boreal toad (State candidate) is also a priority species included on the WDFW focal wildlife species list for Mount Spokane State Park. However, it is unlikely this species would occur in the expansion area because suitable breeding habitat (warm, shallow ponds and lakes) is not present, and extreme slopes and distances to potentially suitable habitat likely preclude migrating adults from using upland habitats in the expansion area.

Although PHS records identify 2 streams located northwest and southeast of the expansion area (0.56 and 0.61 mile, respectively; Figure 5) as supporting rainbow trout, also a priority species, no evidence of fish presence has been documented within the high gradient, headwater tributaries of the expansion area. Streams within the expansion area are typed as non-fish perennial (Np) based upon longitudinal gradients that exceed 20% and hydrology, consistent with the Washington Water Typing System (WAC-222-16-031). Consequently, rainbow trout are not included in the priority species list.

Priority Habitats

Two priority habitats are mapped by WDFW in the expansion area (Figure 5):

- Moose Habitat – Regular Concentration; encompasses the entire expansion area and 1-mile radius around the expansion area.
- Elk Habitat – Regular Concentration; encompasses the entire expansion area and 1-mile radius around the expansion area.

Other priority habitats not mapped by WDFW may occur within and in the vicinity of the proposed expansion area. Their likely presence is indicated by WDFW in testimony and various correspondences submitted during review of potential wildlife impacts from proposed ski area expansion (see Spokane County Hearing Examiner 2013 for a synopsis of these). Where sufficient information is available, ICF presents preliminary mapping for these priority habitats in the expansion area (Figure 7), as described below:

- Freshwater Wetlands – Based upon wetlands as delineated by ICF (2013), Appendix D.
- Old-growth/Mature Forests – Based upon plant association data collected by PBI (Morrison and Wooten 2010) and tree coring conducted by ICF (see Section 6.2, Tree Coring). Forests were considered to be those stands supporting at least 30% canopy cover of trees (Cowardin et al. 1979).

- Riparian – Based upon stream and wetland buffers as mapped by ICF (2013), Appendix D. Riparian habitats, representing the transitional zone between terrestrial and aquatic ecosystems, are assumed to be encompassed by the protective buffers established around streams and wetlands under the CAO.
- Snags and Logs – Not mapped; assumed to be represented by mapping for Old-growth/Mature Forests and Riparian.
- Talus – Based upon habitats mapped by PBI (Morrison and Wooten 2010).
- Wildlife Corridors – Not mapped. Defined in the CAO as "a landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions". These corridors are considered transitional habitats that need not provide all of the life requisites of the animals that travel along them. Wildlife corridors are addressed by Spokane County in their Open Space Corridors map, which illustrates open space corridors for wildlife habitat, recreation, and connections with critical resource areas near Mount Spokane State Park. Lands surrounding the Park primarily consist of private forestland and rural farmland. The Open Space Corridors map incorporates wildlife corridors & landscape linkage; DNR type 1 streams (250' buffer), DNR type 2 - 3 streams (100' buffer)' wetlands (75' buffer); conservation easements; natural drainage ways; flood hazard areas; and PHS riparian habitats. No specific wildlife corridors have been mapped within Mount Spokane State Park by WDFW. Monitoring of moose fitted with radio telemetry transmitters from the Mount Spokane area indicate some movement to the north along a travel corridor that links Mount Spokane with the rest of the Selkirk Mountains of Idaho, northeast Washington, and southeastern British Columbia (WDFW 2013c). This route could also provide opportunities for lynx movements and dispersal from relatively large source populations in British Columbia through the Selkirk's and into the limited boreal habitat present in the Mount Spokane area. WDFW, Spokane County and other groups have also been working to secure a wildlife corridor connection between Mount Spokane State Park and Antoine Peak Conservation Area to the south. Antoine Peak provides critical habitat for large mammals and preserves a wildlife corridor that connects the Spokane River Valley with Mount Spokane State Park. Other generalized corridors extending west from Mount Spokane State Park to other conservation areas are shown on the Open Space Corridors map.

WDFW develops management recommendations to assist landowners, managers, and others in conducting land use activities in a manner that incorporates the needs of fish and wildlife. Management recommendations are developed through a comprehensive review and synthesis of the best scientific information available. Management Recommendations for Washington's Priority Habitats and Species (see Rodrick and Milner 1991, Larsen 1997, Larsen et al. 2004, Knutson and Naef.1997) should be used in conjunction with the mapped locations of respective priority habitats and species.

6.0 HMP Field Studies

ICF conducted a reconnaissance-level survey of the 279-acre expansion area to become familiar with the wildlife habitats mapped by PBI (Morrison and Wooten 2010), to evaluate habitat conditions relative to the life history requirements of the 21 focal species identified by WDFW, and to gather

additional site-specific data to support and inform the HMP. Selected field studies conducted during the summer of 2013 included surveys for the northern goshawk, a field delineation for wetlands and streams, and selected coring of mature trees to estimate forest age. Detections of avian focal species (visual, song or other evidence) recorded during field efforts, as well as visual observations of large ungulates (deer, elk, and moose) and any areas of concentrated use by large ungulates (determined from tracks, pellet groups, wallows and trails), are complied in Figure 6. A summary of the study findings is presented below.

6.1 Northern Goshawk

ICF completed two Broadcast Acoustical surveys and an Intensive Search survey for northern goshawk in the expansion area. The Broadcast Acoustical survey is applied to broad scale surveys for goshawk over larger geographic areas. It utilizes recorded goshawk calls along transect routes to elicit responses from adult goshawk and their young during the nesting through postfledging phase, which generally corresponds to June 1 through August 15. Woodbridge and Hargis (2006)recommend that one Broadcast Acoustical survey be conducted during the nesting phase and one after the young birds have fledged (i.e., left the nest). However, because of timing constraints, both of our Broadcast Acoustical surveys and our Intensive Search survey were conducted during the postfledging phase. The Intensive Search survey utilizes closely spaced transects to detect evidence of nesting goshawk within smaller habitat areas stratified for potential nesting habitat and is intended to increase the probability of detecting goshawk, in light of the late timing of the initial acoustical survey, through the combination of survey methods as recommended in Woodbridge and Hargis (2006). This survey technique is most effective from late June through August as evidence from nesting progressively accumulates over the nesting season. Both survey methods followed that outlined by Woodbridge and Hargis (2006) in *Northern Goshawk Inventory and Monitoring Technical Guide*. A brief summary of our survey approach and findings follows.

Broadcast Acoustical Survey Methodology

Broadcast acoustical surveys were conducted on the following dates:

- Survey 1 - July 24, 25, and 26, 2013
- Survey 2 – August 6, 7, and 8, 2013

The entire 279-acre expansion area was surveyed, as well as an 800 meter (m) buffer to the north and west of the expansion area (Figure 8). Parallel transects were established throughout the survey area, spaced 250 m apart. Call stations (using recorded goshawk calls) were spaced every 200 m along the transects, and offset from stations on adjacent transects by 100 m. Complete 6-sequence calls of juvenile wail vocalizations were broadcast at each station as described by Woodbridge and Hargis (2006). We visually searched for approaching goshawk while listening for goshawk vocalizations at the calling stations and while moving between stations, and looked for evidence of goshawk use (e.g., nests, plucking posts, prey items, molted feathers, and whitewash).

We did not survey a buffer area to the east and south-southeast of the expansion area because habitat was not suitable for goshawk nesting (i.e., either habitat was unforested and/or supported the existing ski area operations). We did not initially survey a buffer area to the south-southwest of the proposed expansion area because any potential habitat in this area is located down slope of a prominent ridgeline, and topography would limit any potential disturbance impacts from the

proposed ski development (Figure 8). However, after we had completed our first broadcast acoustical survey, WDFW provided previously uncompiled goshawk location data that included several goshawk sightings along the ridgeline near the CCC cabin, as well as historical nesting records approximately 550m further south of the 800 m buffer. Consequently, we added several stations along the ridgeline (Stations 81-84), and added a transect through an area of potentially suitable habitat south of the Summit Road (Stations 85-90). These stations were first surveyed July 31st following the Intensive Search survey.

Intensive Search Survey Methodology

The intensive search survey was conducted on July 30 and 31, 2013. Prior to the survey, potentially suitable goshawk nesting habitat was delineated using the vegetation and habitat data compiled by Pacific Biodiversity Institute for the expansion area (Morrison and Wooten 2010), and key habitat elements summarized for northern goshawk by Pacific Biodiversity Institute (2010) in Habitat Elements and Life Stage Matrix for Wildlife Species of Interest in Mount Spokane State Park. The PBI vegetation/habitat data encompassed the 279-acre expansion area as well as about a 328 ft buffer around the site. We selected four key habitat elements to screen for potentially suitable goshawk nesting habitat:

- Forest stands with slopes less than 40%;
- Forest canopy cover greater than 40%;
- Forest canopy height greater than 65 ft; and
- Tree diameter of 19 inches or greater for the 8 largest trees per acre in a stand.

The area of potentially suitable goshawk nesting habitat represented by this modeling effort is presented in Figure 9. Three surveyors walked parallel transects spaced 20 m apart through the potential nesting habitat, with the middle observer broadcasting recorded goshawk calls every 250 m as described by Woodbridge and Hargis (2006). [Note – Figure 9 shows the locations for the middle of the three parallel transects walked.] Observers recorded any evidence of goshawk encountered during the surveys (e.g., visual or auditory detections, nests, prey remains, feathers, and/or whitewash).

Goshawk Survey Findings

The following findings were derived from the Broadcast Acoustical and an Intensive Search surveys completed for the expansion area and surrounding buffer:

- No visual or auditory detections of northern goshawk were recorded during the two broadcast acoustical surveys or the intensive search survey.
- No nest structures were observed and no accumulations of prey items or plucking posts were encountered. Scattered feathers collected during the surveys that could not be field identified were compared to northern goshawk specimens in the University of California Davis museum collection, and determined not to be goshawk.
- Our modeling and field survey efforts indicate that 44 acres of the 279-acre expansion area provide potentially suitable nesting habitat for goshawk. This habitat is located at lower

elevations along the northwest perimeter of the expansion area (Figure 9). No evidence of goshawk use of this area for nesting was detected during the intensive search survey.

- The remainder of the expansion area (i.e., the mid and upper elevation portions) is unsuitable for nesting, either because forest stands are too open (e.g., high levels of tree mortality and stand decadence have reduced the forest canopy cover below 40%), or trees are too small and dense.
- Better potential nesting habitat generally lies to the northwest and west outside of the expansion area, with suitable nesting habitat in these areas generally patchy in occurrence. It appears that more contiguous forest stands that may provide better quality nesting habitat occur down slope of the 800 m buffer to the northwest, west and south.

6.2 Tree Coring

During summer and fall of 2013, ICF cored and aged 108 trees using 16 inch increment borers to help assess forest age and assist in refining the distribution of old-growth/mature forest within the expansion area. Trees ranging in size from stand average to stand dominant were selected from mature forest patches where proposed clearing for ski development would occur. Eleven sites were chosen for coring, distributed across upper elevation, mid elevation and lower elevation zones of the expansion area (Figure 10). These sites were judged to be representative of mature forest conditions throughout the 279-acre expansion area, as based upon our extensive field reconnaissance effort that included parallel transects spaced at 250 meter intervals for northern goshawk surveys. Areas documented by Morrison and Wooten (2010) to contain the largest diameter trees in the expansion area were included in the sample sites (e.g., Station 4-4). Data collected included GPS patch location, species, dbh, and age. Tree rings were counted in the field immediately after extraction of each tree core. Tree age was determined by adding 5 years to each tree ring count to account for early seedling/sapling growth not captured by the tree rings. Results are presented in Table 5 and Figure 11.

Table 5. Estimated Age of Trees Cored from the Expansion Area.

Survey Site	Survey Date	Tree Type	Diameter at Breast Height (dbh)	Estimated Age (Years)
2-1	10-11-13	Subalpine fir	14.6	112
		Subalpine fir	14.5	80
		Subalpine fir	14.3	115
		Subalpine fir	15.1	109
		Subalpine fir	18.7	112
		Subalpine fir	10.1	62
		Subalpine fir	10.1	73
		Subalpine fir	13.6	74

		Subalpine fir	17.5	119
		Subalpine fir	13.3	147
Mean Age± SE				***100 ± 26.7***
2-2	10-11-13	Douglas fir	17.0	125
		Larch	19.9	128
		Larch	18.1	110
		Douglas fir	14.1	136
		Subalpine fir	16.1	132
		Lodgepole pine	16.5	133
		Douglas fir	19.5	134
		Lodgepole pine	16.5	123
		Larch	15.3	112
		Subalpine fir	16.8	131
Mean Age± SE				***126.4± 9.1***
2-3	10-11-13	Larch	13.8	144
		Douglas fir	15.3	125
		Douglas fir	12.6	132
		Lodgepole pine	12.6	118
		Douglas fir	13.3	128
		Douglas fir	16.3	122
		Larch	14.9	129
		Douglas fir	17.5	131
		Douglas fir	16.9	77
		Douglas fir	13.8	115
Mean Age± SE				***122.1 ± 17.8***
2-4	10-10-13	Western hemlock	12.0	95
		Western hemlock	14.0	96
		Lodgepole pine	11.6	121
		Lodgepole pine	12.5	109

		Western hemlock	11.8	129
		Western hemlock	9.6	109
		Lodgepole pine	12.0	143
		Lodgepole pine	13.3	109
		Western hemlock	9.0	119
		Lodgepole pine	10.4	115
Mean Age± SE				***114.5 ± 14.5***
4-1	7-29-13	Subalpine fir	17.2	120
		Subalpine fir	13.1	100
		Subalpine fir	9.7	125
		Subalpine fir	15.4	132
		Subalpine fir	11.3	121
		Subalpine fir	9.4	108
		Subalpine fir	15.3	128
		Subalpine fir	12.0	111
		Subalpine fir	12.1	133
Mean Age± SE				***119.8 ± 11.3***
4-2	8-8-13	Subalpine fir	15.2	115
		Subalpine fir	13.2	128
		Lodgepole pine	14.9	103
		Lodgepole pine	14.1	118
		Subalpine fir	22.6	130
		Lodgepole pine	14.7	108
		Lodgepole pine	19.7	115
		Lodgepole pine	20.1	112
Mean Age± SE				***116.1 ± 9.2***
4-3	8-8-13	Larch	17.6	149
		Douglas fir	21.7	134
		Subalpine fir	17.4	109

		Douglas fir	19.9	141
		Douglas fir	16.2	129
		Larch	14.6	145
		Western white pine	17.9	121
		Larch	14.9	123
		Douglas fir	16.8	123
Mean Age± SE				***130 ± 13.0***
4-4	8-1-13	Western hemlock	17.8	106
		Douglas fir	18.3	103
		Douglas fir	24.0	119
		Western hemlock	28.7	106
		Western hemlock	27.1	131
		Douglas fir	27.2	113
		Douglas fir	25.7	109
		Western white pine	24.7	116
		Western hemlock	20.5	101
		Douglas fir	21.5	88
		Western hemlock	26.4	121
		Douglas fir	24.6	113
		Douglas fir	38.3	Not aged[3]
Mean Age± SE.				***110.5 ± 11.0***
6-1	10-10-13	Subalpine fir	13.6	145
		Subalpine fir	13.8	100
		Subalpine fir	12.7	165
		Subalpine fir	10.6	121
		Subalpine fir	15.2	165

[3] Not cored because tree was too large for the 16 inch increment borer.

		Subalpine fir	16.6	170
		Subalpine fir	12.0	175
		Subalpine fir	11.6	131
		Subalpine fir	9.5	145
		Subalpine fir	11.0	135
Mean Age± SE.				***145.2 ± 24.1***
6-2	10-10-13	Subalpine fir	11.6	101
		Lodgepole pine	13.6	108
		Lodgepole pine	12.9	123
		Lodgepole pine	15.0	107
		Subalpine fir	16.5	142
		Subalpine fir	13.5	118
		Lodgepole pine	13.1	113
		Lodgepole pine	11.6	102
		Lodgepole pine	14.0	114
		Subalpine fir	11.0	109
Mean Age± SE				***113.7 ± 12.0***
6-3	10-10-13	Lodgepole pine	14.4	135
		Lodgepole pine	15.5	163
		Douglas fir	14.6	99
		Douglas fir	18.1	139
		Lodgepole pine	10.5	134
		Lodgepole pine	11.2	133
		Douglas fir	16.4	126
		Larch	14.1	135
		Larch	11.9	166
		Larch	15.2	156
Mean Age± SE				***138.6 ± 19.6***

The following conclusions were drawn from the tree coring data collected from the expansion area:

- Trees cored from the expansion area ranged in age from 62 to 175 years.
- Most cored trees (88%) fell within the age range of 90 to 149 years, with the peak range being between 110-129 years (40.7%).
- Only 7 trees (6.5%) were estimated at 150 years of age or older.
- Trees cored at Plot 6-1 (high elevation subalpine fir, northeast portion of the expansion area) had the oldest mean age at 145.2 years, and included 4 trees older than 150 years.
- Trees cored at Plot 2-1 (high elevation subalpine fir, southeast portion of the expansion area) had the youngest mean age at 100.3 years.
- Trees at higher elevations were generally smaller in girth (i.e., dbh) for a given age than were trees at lower elevations, likely reflecting slower growth rates due to more extreme environmental conditions. For example, the largest diameter trees cored were in Plot 4-4, a lower elevation, mixed conifer forest stand in the northwestern part of the expansion area (average diameter of 23.9 in dbh, range 17.8-28.7 in dbh; mean age 110.5 years, range 88-131 years). Plot 4-4 corresponds with the forest stands identified by Morrison and Wooten (2010) as containing the largest trees in the expansion area.

Based upon tree core age data collected by ICF and habitat variable data compiled by PBI (Morrison and Wooten 2010) for the entire expansion area, it appears forest stands in the expansion area don't meet the CAO definition for old growth forest east of the Cascades[4] (i.e., >150 years of age, with 10 trees/acre >21 in dbh, and 1-3 snags/acre >12-14 in dbh). None of our representative sample sites supported old-growth forest conditions. Few trees we sampled exceeded 150 years of age, and areas with an abundance of large trees exceeding 21 in dbh[5] were limited in acreage and located in lower elevation forests (see Figure 12) that were younger than 150 years. Snags were abundant throughout much of the expansion area, and although compliance with this criterion could not be determined from the Morrison and Wooten (2010) database, field reconnaissance suggests this criterion is often met. During our extensive site reconnaissance efforts in the expansion area (e.g., see Figures 8 and 9), we did not observe other forest stands that differed substantially enough from our sample sites to suggest the presence of old-growth conditions consistent with the CAO definition.

The preponderance of trees in the 90 to 150 year age range suggests that stand modifying events occurred within the expansion area in the mid to late 1800s. Morrison et al. (2007) assessed fire occurrence and history in the Mount Spokane area, and determined that fire was very infrequent during the last century, but occurred every 20 to 150 years in pre-settlement times. Fires were typically more common in the lowlands surrounding Mt. Spokane, and very likely burned up the mountain slopes on occasions. Only a few small fires have been documented in Mount Spokane State Park in recent times (Morrison et al. 2007), and there is no evidence of recent fire events in the expansion area. Periodic wildfires dating to the late 1800s present a plausible explanation for the stand age patterns observed in the expansion area. Recently, forests in some part of the expansion

[4] See CAO Table 11.20.060A for priority habitat definitions.

[5]We used the Morrison and Wooten (2010) variable maxdbh, representing the average diameter of the 8 largest trees/ac in a stand, as a more conservative index to evaluate compliance with the tree diameter criterion.

area suffered extensive damage from wind and ice storms. It is possible that repeat weather events such as these may also have influenced forest stand ages in the expansion area.

Forests in the expansion area are best described under the CAO as mature stands that often possess some old-growth forest characteristics (e.g., abundant snags and logs). Mature forests east of the Cascades are defined in the CAO as 80-160 years old with average tree diameters exceeding 21 in dbh. Although most of the forest stands in the expansion area haven't achieve the minimum diameter criterion, presumably due to harsh growing conditions, mature forest best represents site conditions when stand age is factored in. Defining forests as those stands that support at least 30% canopy cover of trees (Cowardin et al. 1979), 209 acres of mature forest are mapped in the expansion area (Figure 7).

6.3 Wetland Delineation

ICF conducted wetland delineation fieldwork on July 29, 30, 31, and August 1, 2013 using the delineation methods outlined in the Corps' *Wetland Delineation Manual* (1987 Manual) (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (*Regional Supplement)* (U.S. Army Corps of Engineers 2010), and Ecology's *Washington State Wetlands Identification and Delineation Manual* (Washington State Department of Ecology 1997). Refer to the wetland delineation report (ICF 2013), included as Appendix D, for a complete description of the methods and findings for wetlands, streams and protective buffers identified in the expansion area. The study area was examined on foot prior to flagging wetland boundaries or collecting wetland delineation data. Drainages were walked to determine their perennial initiation point (PIP), which was defined as the point at which flowing surface water was first observed. Where potential wetlands were encountered, paired upland and wetland data plots were established within representative plant communities that exhibited uniform topographic, soil, and hydrologic characteristics. At each plot, data on the vegetation, soils, and hydrology were collected and recorded on *Regional Supplement* field data forms. Both manuals and the supplement require the presence of wetland indicators for hydrophytic vegetation, hydric soils, and wetland hydrology for an area to be considered a wetland.

Wetland functions were assessed and individual wetlands rated using Ecology's *Washington State Wetland Rating System for Eastern Washington* (Hruby 2004). This method uses functional scores to group wetlands into four different categories (Categories I, II, III, and IV) based on their sensitivity to disturbance, rarity, functional capacity, and the ease at which they can be replaced (i.e., mitigated). These categories were then used to determine the appropriate width for the protective wetland buffers as described in Section 11.20.050(C), Alternative 3, of the Spokane County CAO. Stream buffer widths were determined per Section 11.20.060(C)(1)(h) of the Spokane County CAO.

Wetland boundary flags, data plots, and PIPs were surveyed in the field using a Trimble GeoXH GPS receiver. The resulting data file was differentially corrected to sub-meter accuracy and plotted on a base map using AutoCAD® Stream channels were mapped using topography, aerial photography, and previous mapping on the site. Buffers were established in AutoCAD® by offsetting the delineation boundaries by the appropriate width.

ICF identified 5 wetlands (Wetland A, B, C, D, and E) and 11 perennial stream channels (Streams 1, 3a, 3b, 4a, 5a, 5b, 6a, 6b, 6c, and 7) on or adjacent to the expansion area (Figure 12)[6]. Delineated wetlands include one large palustrine scrub-shrub (PSS)/slope wetland with palustrine emergent (PEM) components (Wetland A), and four smaller PSS/slope wetlands (Wetlands B, C, D, and E). Characteristics of each delineated wetland and the minimum protective buffers assigned under the Spokane County CAO are presented in Table 6. Identified streams were all determined to be unnamed tributaries to Blanchard Creek and were classified as Type Np Waters under the Washington Department of Natural Resources (WDNR) Water Typing System (Washington Administrative Code [WAC] 222-16-031) (Table 4). Type Np Waters are non-fish bearing perennial streams that *do not go dry any time of a year of normal rainfall and include the intermittent dry portions of the perennial channel below the uppermost point of perennial flow* (WAC 222-16-031). Characteristics for each delineated stream and the minimum protective buffers assigned under the Spokane County CAO are provided in Table 7.

Table 6. Characteristics of the Delineated Wetlands in the Expansion Area.

Feature Name	Cowardin Class[2]	HGM Class[1]	Ecology Wetland Rating[3]	Wetland Functional Assessment Scores	Minimum Buffer Width (feet)[4]	Area in Project Site (acres)
Wetland A	PSS, PEM	Slope	Category II	34	110	2.70
Wetland B	PSS	Slope	Category II	27	75	0.41
Wetland C	PSS	Slope	Category IV	27	40	0.05
Wetland D	PSS	Slope	Category IV	25	40	0.79
Wetland E	PSS	Slope	Category II	27	75	0.31
Total						**4.26**

[1]HGM (hydrogeomorphic) class based on *Washington State Wetland Rating System for Eastern Washington* (Hruby 2004).

[2]Cowardin Class of wetland within study area based on *Classifications of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979).

[3] Ecology rating based on the *Washington State Wetland Rating System for Eastern Washington* (Hruby 2004), data forms provided in ICF (2013), Appendix B.

[4]Spokane County buffer widths determined per Spokane County Code Section 11.20.050(C), Alternative 3.

[6] Wetland D is actually located outside of the expansion; however, it is included in this report because it is within 150 feet of the site boundary.

Table 7. Characteristics of the Delineated Streams in the Expansion Area.

Feature Name	Receiving Water	WDNR Stream Type[1]	Minimum Buffer Width (feet)[2]	Approximate Length within Project Site (feet)
Stream 1	Blanchard Creek	Np	75	191
Stream 3a	Blanchard Creek	Np	75	1,838
Stream 3b	Blanchard Creek	Np	75	1,124
Stream 4a	Blanchard Creek	Np	75	1,817
Stream 5a	Blanchard Creek	Np	75	403
Stream 5b	Blanchard Creek	Np	75	2,206
Stream 6a	Blanchard Creek	Np	75	868
Stream 6b	Blanchard Creek	Np	75	564
Stream 6c	Blanchard Creek	Np	75	885
Stream 7	Blanchard Creek	Np	75	143
Total				**10,451**

[1] Stream type based on WDNR Stream Typing System per WAC 222-16-031.
[2] Spokane County buffer widths determined per Spokane County Code Section 11.20.060(C)(1)(h)

7.0 Impacts to Wildlife Species and their Habitats

7.1 General Wildlife Effects

The physical actions associated with the proposed action would result in impacts to the 21 focal wildlife species and their habitat, and are referred to as *impact mechanisms*. Impacts can be classified and discussed in many different ways. For the purposes of this HMP, impacts to wildlife are discussed in terms of direct versus indirect impacts, and short-term versus long-term impacts, as described below. Activities leading to direct and indirect impacts to wildlife and their habitat include the following:

Direct Impacts

Direct effects from project activities generally occur at the same time and place as the management activity or action causing the impact. Implementation of the proposed action would result in direct impacts to wildlife and wildlife habitat that may be either long-term or short-term in duration. These impacts include permanent and temporary habitat loss; conversion of habitat from one type to another; habitat degradation resulting from the removal important habitat elements such as large trees, snags, and dead or broken-topped trees; habitat fragmentation; and disturbance to wildlife from noise and human presence. Direct impacts to wildlife or their habitat may result from the following proposed activities:

- Clearing with grading for chairlifts and ski trails
- Clearing without grading for chairlifts and ski trails

- Chairlift terminal construction and tower placement
- Utility line installation
- Routine annual maintenance
- Increased human activity and presence

Indirect Impacts

Indirect effects often occur at some distance or time from the activity or action, and may also be short-term or long-term in duration. Indirect impacts to wildlife and wildlife habitat which may occur with expansion of the ski area include water quality degradation in wetlands and streams from increased erosion and runoff; habitat degradation from the spread of noxious weeds; changes in the availability of forage or prey within the expansion area; behavioral disruptions to breeding and rearing of young; and long-term changes to the abundance and diversity of wildlife using the expansion area. Project components potentially causing these types of impacts include:

- Clearing with grading for the chairlift and ski trails;
- Clearing without grading for the chairlift and ski trails;
- Utility line installation
- Routine annual maintenance
- Increased human activity and presence
- Edge effects and habitat fragmentation

Short-term Impacts

Short-term impacts to wildlife and their habitat include temporary habitat loss from ground disturbing activities during construction that would be revegetated after completion of construction. Short-term impacts may also include temporary disturbance from noise and human presence during construction and routine annual maintenance. All previously listed activities have the potential to cause temporary noise disturbance. Project actions that may contribute to short-term impacts include:

- Vegetation disturbance in buffer areas of chairlift construction
- Clearing with grading for the chairlift and ski trails within areas containing modified herbaceous habitat
- Clearing without grading for the chairlift and ski trails within areas containing modified herbaceous habitat
- Utility line installation
- Routine annual maintenance

Long-term Impacts

Long-term impacts associated with construction activities include the permanent loss or conversion of wildlife habitat, as well as habitat fragmentation that may reduce habitat suitability, decrease connectivity, or impede wildlife movement and dispersal. Noise disturbance and human presence associated with operation of the ski facilities could also contribute to long-term effects if wildlife are displace from or reduce their use of suitable habitats in the expansion area during the ski season. Long-term impacts on wildlife or their habitat could result from the following proposed activities:

- Clearing with grading for the chairlift and ski trails
- Clearing without grading for chairlift and ski trails
- Chairlift terminal construction and tower placement
- Utility line installation
- Routine annual maintenance, such as vegetation mowing or brushing for chairlift and trail maintenance, and occasional felling of hazard trees
- Snow compaction from grooming
- Increased human activity and presence

7.2 Focal Wildlife Species, Including Priority Species

An assessment of the project effects on the 21 focal wildlife species and their habitats, including priority species, is presented in this section. Key information sources evaluated included: the *Mount Spokane Ski and Snowboard Park Final SEIS* prepared for the project (Washington State Parks and Recreation Commission 2012); *Recreational and Trail Impacts on Wildlife Species of Interest in Mount Spokane State Park* (Snetsinger and White. 2009) that was included as Appendix C2 of *the Mount Spokane Master Facilities Plan FEIS* (Mount Spokane State Park 2010); and supplemental species and habitat information collected by ICF or provided by WDFW in 2013.

Recreation Impacts

Potential effects from construction and operation of recreational facilities on Mount Spokane are identified in *Recreational and Trail Impacts on Wildlife Species of Interest in Mount Spokane State Park* (Snetsinger and White. 2009). These potential effects on wildlife, as derived from the scientific literature, can include:

Stress/physiological response – Studies of heart rates and fecal glucocorticoid levels have shown stress responses to human activity. Chronic stress can make wildlife susceptible to illness and reduce individual fitness (Sapolsky 1992 in Creel et al. 2002).

Breeding/rearing disturbance – Species considered generally tolerant of human activity may experience higher levels of disturbance at breeding and rearing sites. This may result in reduced attentiveness to young, disruption of feeding patterns, abandonment of nests/dens, and/or cause adults to undertake additional risks to their young by moving them to a new location.

Displacement/avoidance – A variety of species often move away from human activity or intentionally avoid associated sites. Sites may be avoided due to the disruption caused by human presence or habitat changes associated with the site (e.g., soil compaction, dryness of soils and vegetation along roadsides and trails). Animals displaced by recreation are less likely to survive and reproduce where habitat is unfamiliar or inferior (Gutzwiller 1995). Displacement or avoidance is the most common wildlife response found in the literature.

Habitat fragmentation/edge effects – Habitat fragmentation and edge effects are typically associated with timber harvest and/or road construction, however, ski trails can have similar, though typically less intense impacts.

Predator/competitor increased accessibility – Ski trails can greatly ease travel and access for species less adapted for movement in deep snows. This may increase rates of predation on some species and increased competition for prey for others.

Snag/coarse woody debris reduction – Snags and coarse woody debris are used by wildlife for cover, nesting and denning, and are key habitat components for some species. These components may be lost through ski trail development, recreational site development and associated removal of hazard trees.

Habituation – Many species can become habituated to human presence. Habituation often poses risks to animals, resulting in undesirable behaviors, poor nutrition, incidental destruction of property, and a host of other factors.

Table 8 summarizes potential recreation impacts to the twenty-one focal wildlife species identified for evaluation under the proposed action. Impacts are compiled according to 3 general categories: Skiing, Human Presence, and Developed Recreation Sites. Although recreation is widely recognized as an increasingly important factor affecting wildlife, these effects are not fully studied and much remains to be learned before a thorough understanding wildlife-recreation interactions is reached. For many less studied species, information on recreational impacts is completely lacking. For others, sources often consist primarily of anecdotal information contained in older natural history-oriented studies. Wide-ranging carnivores and ungulates have received the most detailed attention, along with recent studies addressing recreational impacts on presence, diversity and density for general species groups or habitat types. Yet even for the best studied species, data is often lacking on specific thresholds of disturbance that constitute adverse effects (e.g., intensity of use, distance thresholds, temporal effects). Furthermore, conflicting information on species tolerance for human disturbance exists for many species. These gaps and limitations in the available scientific information must be considered in any evaluation of recreational impacts on wildlife. Instances of no or limited information should not be confused with an implication of no effect.

Some focal wildlife species that inhabit Mount Spokane undertake seasonal movements away from the expansion area during the winter ski season, and would not be subject to winter recreational impacts. These movements may involve long-distance migrations outside of the Pacific Northwest, or local altitudinal movements to more hospitable habitats during winter. For example, the olive-sided flycatcher is a neotropical migrant that winters in the southern hemisphere, while Pacific (winter) wrens move from colder locales to more temperate habitats throughout the western U.S. during winter. The silver-haired bat and hoary bat are both summer residents of the Columbia Basin that leave the area in late summer or early fall for California and Mexico (Hayes and Wiles 2013). Large ungulates that inhabit Mount Spokane (i.e., deer, elk, and moose) move downslope and out of the expansion as fall snow depths increase, and onto winter ranges where forage is more accessible

and energetic demands are reduced. In the spring as the snow pack declines, these species reverse their altitudinal migrations and move upslope, following the green up of forage vegetation back into the expansion area.

Table 8. Summary of Potential Impacts by Recreation Type on the 21 Focal Species.

Species	Skiing	Human Presence	Developed Recreation Sites
CARNIVORES			
Gray wolf (*Canis lupus)*	No information	Direct human disturbance at den and rendezvous sites can cause stress and abandonment (Claar et al. 1999).	Mixed response to trails – both avoidance and attraction. In winter use trails for travel and in summer more likely to avoid (Creel et al. 2002, Whittington et al. 2005).
Canadian lynx *(Lynx canadensis)*	High intensity recreation can preclude lynx use of suitable habitat. Lynx may adapt to regular and concentrated recreational use if critical habitat needs are met (Ruggiero et al. 1999). See Section 7.3 for further discussion	Direct human disturbance at den sites can cause stress and abandonment. Otherwise, are generally tolerant of humans (Claar et al. 1999). See Section 7.3 for further discussion.	High intensity recreation can preclude lynx use of suitable habitat. Lynx may adapt to regular and concentrated recreational use if critical habitat needs are met (Ruggiero et al. 1999). See Section 7.3 for further discussion.
Wolverine (*Gulo gulo)*	Groomed trails may allow greater access to winter habitats by predators.	Negative associations of wolverine presence with helicopter and backcountry skiing (Krebs et al. 2007).	Evidence mixed – sometimes avoiding human infrastructure but also have been found near active campgrounds (Claar et al. 1999, Copeland et al. 2007).
American marten *(Martes Americana)*	Groomed trails may allow greater access to winter habitats by predators.	No information	No information
UNGULATES			
Rocky mountain elk (*Cervus elaphus)*	Daily movement away from heavily used x-country ski trails (Ferguson 1982). Flight responses from skiers within 650 meters (Cassirer et al. 1992).	Can be sensitive to human presence, but also may habituate, conserving energy (Thompson and Henderson 1998).	Can be sensitive to human presence around heavily used recreation sites, but also may habituate, conserving energy (Thompson & Henderson 1998).
White-tailed deer (*Odocoileus virginianus ochrourus)*	Mule deer responses from skiers involve more running and are of greater duration than for disturbance from snowmobiles (Freddy 1986, Freddy et al. 1986).	Respond to human presence associated with various forms of recreation – show physiological response, displacement and avoidance.	In developed areas, white-tailed deer were found to become increasingly nocturnal and secretive and to use greater cover during the day (Vogel 1983 *in* Canfield et al. 1999). Ski trails may enhance mobility of deer in snow (Richens and Lavigne 1978 *in* Boyle and Samson 1985)
Moose (*Alces alces)*	Displacement and avoidance of heavily-used cross-country skiers and ski trails (Ferguson and Keith 1982).	Tolerance to humans varies by situation – habitat, social groupings, nutrition, reproductive status, & individual animals. Most effects are discussed in the literature as related to hunting season and summer wildlife watching.	Avoidance of heavily used cross-country ski trails (Ferguson et al. 1982).

Species	Skiing	Human Presence	Developed Recreation Sites
BIRDS			
Northern goshawk (*Accipiter gentilis)*	No specific information, but impact of passing recreationists is likely minimal. To reduce nest site disturbance a spatial buffer of 400-500 meters is recommended (Jones 1979 in Gaines et al. 2003).	No specific information, but impact of passing recreationists is likely minimal. To reduce nest site disturbance a spatial buffer of 400-500 meters is recommended (Jones 1979 in Gaines et al. 2003).	Limited information but there are documented cases of camping near nests leading to nest failure (Speiser 1992 in Squires and Reynolds 1997). Goshawks nest further from human features (habitations and roads) than otherwise expected (Speiser and Bosakowski 1987).
Boreal owl (*Aegolius funereus richardoni)*	No specific information, but are considered fairly tolerant of human disturbance (ADFG 1994).		
Pileated woodpecker (*Dryocopus pileatus)*	No specific information, but are considered fairly tolerant of human disturbance. Some birds may change roost sites if disturbed and may aggressively defend nest. (Bull and Jackson 1995).	No specific information, but are considered fairly tolerant of human disturbance. Some birds may change roost sites if disturbed and may aggressively defend nest. (Bull and Jackson 1995).	Ski trail development can result in loss of snags, a key habitat component
Black-backed woodpecker (*Picoides arcticus)*	No specific information, but are considered fairly tolerant of human disturbance. May aggressively defend nest. (Dixon and Saab 2000).	No specific information, but are considered fairly tolerant of human disturbance. May aggressively defend nest. (Dixon and Saab 2000).	Ski trail development can result in loss of snags, a key habitat component
Dusky grouse (*Dendragapus obscurus pallidus)*	No specific information. "Increasing recreational inroads into montane areas and urbanization remain a threat to dusky grouse" (Zwickel and Bendell 2005).		
Brown Creeper (*Certhia americana)*	No information.	No information.	Fragmenting effects of trails can lead to increases in nest predation (Hickman 1990, Miller & Hobbs 2000). Trail construction can result in loss of snags and other important habitat components. No information.
Pacific (winter) wren (*Troglodytes troglodytes)*	No specific information but are considered fairly tolerant of human disturbance (Hejl et al. 2002a).	No specific information but are considered fairly tolerant of human disturbance (Hejl et al. 2002a).	Fragmenting effects of trails can lead to increases in nest predation (Hickman 1990, Miller & Hobbs 2000). Trail construction can result in loss of snags and other important habitat components.
Olive-sided flycatcher (*Contopus cooperi)*	No specific information but are considered fairly tolerant of human disturbance (Hejl et al. 2002b).	No specific information but are considered fairly tolerant of human disturbance (Hejl et al. 2002b).	Ski trail construction can result in loss of snags and other important habitat components.
SMALL MAMMALS			
Pika	Snow compaction from	No effects to summer	Snow compaction from

Species	Skiing	Human Presence	Developed Recreation Sites
(*Ochotona princeps)*	snowmobiles and grooming equipment would disturb use of subnivian environments and could cause mortality.	foraging behavior due to seasonal use of the Study Area.	snowmobiles and grooming equipment would disturb use of subnivian environments and could cause mortality. Clearing for ski area facilities could result in impacts to foraging habitat outside of talus areas, including gathering adequate supplies of grasses stored in burrows during the summer, for winter consumption.
Pygmy shrew (*Sorex hoyi)*	Snow compaction from snowmobiles and grooming equipment would disturb use of subnivian environments and could cause mortality.	No information	Snow compaction from snowmobiles and grooming equipment would disturb use of subnivian environments and could cause mortality.
Hoary bat (*Lasiurus cinereus)*	No information.	No information.	No information.
Silver-haired bat (*Lasionycteris noctivagans)*	No information.	No information.	No information.
OTHER SPECIES			
Western toad[7] (*Bufo boreas)*	No information on specific recreation impacts in literature. However any activity that would lead to more bare ground, has been related to a decline in anuran species (Vinson 1998)		
Compton tortoise-shell butterfly (*Nymphalis vaualbum)*	No information on specific recreation impacts in scientific literature.		

Source: Mt Spokane SEIS (Washington State Parks and Recreation Commission 2012), as adapted from Appendix C2 of the Mt Spokane Master Facilities Plan FEIS (Washington State Parks and Recreation Commission. 2010).

Habitat Removal and Alteration

Vegetation removal during construction of the proposed chairlift and seven ski trails would result in approximately 74.28 acres of direct impacts to wildlife habitat (Table 9, Figure 13). Forest overstory would be removed and shrubs taller than 18 inches would be pruned within all cleared areas (59.04 acres); all understory vegetation would be removed in areas where grading occurs (15.24 acres). Woody debris generated from clearing the lift and ski trails will be retained on-site, dispersed by lopping and scattering this material within remaining habitats and by corduroy placement of larger trees felled within trails (see Section 8). Most clearing and grading impacts would occur to forest habitats, primarily the subalpine fir communities (61.2 acres, Table 9). However, at lower elevations near the proposed bottom terminal of the new chairlift, impacts would occur to western hemlock forest types (12.06 acres). Impacts to shrub and meadow communities

[7] Suitable habitat for western toad is absent from the expansion area.

Table 9. Potential Impacts to Plant Associations/Wildlife Habitats within the Expansion Area

Common Name	Scientific Name	Map Code	Area Within Ski Trail/Lift Corridors (acres)	Construction Disturbance			Total Clearing and Grading Within Corridors (acres)
				Clearing Only (acres)	Clearing and Grading (acres)	Grading Only (acres)	
Forest/Woodland			**76.70**	**58.51**	**14.69**	**0.06**	**73.26**
Subalpine fir/Lady fern	*Abies lasiocarpa/Athyrium filix-femina*	ABLA/ATFI	0.02	0.02	0.0	0.0	0.02
Subalpine fir/Hitchcock's woodrush	*Abies lasiocarpa/Luzula glabrata ssp. hitchcockii*	ABLA/LUGLH	1.02	0.91	0.0	0.0	0.91
Subalpine fir/Fools huckleberry	*Abies lasiocarpa/Menziesia ferruginea*	ABLA/MEFE	6.13	5.41	0.72	00.0	6.13
Subalpine fir/Carolina bugbane	*Abies lasiocarpa/Trautvetteria caroliniensis*	ABLA/TRCA	>0.01	0.0	0.0	0.0	0.0
Subalpine fir/Thinleaf huckleberry	*Abies lasiocarpa/Vaccinium membranaceum*	ABLA/VAME	1.16	0.15	0.14	0.04	0.33
Subalpine fir/Bear-grass	*Abies lasiocarpa/Xerophyllum tenax*	ABLA/XETE	56.32	44.85	8.94	0.02	53.81
Western hemlock/Lady fern	*Tsuga heterophylla/Athyrium filix-femina*	TSHE/ATFI	0.0	0.0	0.0	0.0	0.0
Western hemlock/Oak fern	*Tsuga heterophylla/Gymnocarpium dryopteris*	TSHE/GYDR	1.37	1.18	0.2	0.0	1.38
Western hemlock/Fool's huckleberry	*Tsuga heterophylla/Menziesia ferruginea*	TSHE/MEFE	6.67	5.75	0.92	0.0	6.67
Western hemlock/Bear-grass	*Tsuga heterophylla/Xerophyllum tenax*	TSHE/XETE	4.01	0.24	3.77	0.0	4.01

Shrub			**0.14**	**0.14**	**0.00**	**0.00**	**0.14**
Sitka alder/Mesic forb	*Alnus viridis ssp. sinuata*/Mesic forb	ALVIS/Mesic Forb	0.14	0.14	0.0	0.0	0.14
Sitka alder/Triangle-leaf groundsel	*Alnus viridis ssp. sinuata/Senecio triangularis*	ALVIS/SETR	0.00	0.0	0.0	0.0	0.0
Herbaceous/Meadow			**2.98**	**0.39**	**0.03**	**0.21**	**0.63**
Sulfur-flower buckwheat–Green fescue	*Eriogonum umbellatum var. majus–Festuca viridula*	ERUMM–FEVI	0.65	0.04[a]	0.0	0.0	0.04[a]
Green fescue–Idaho fescue	*Festuca viridula–Festuca idahoensis*	FEVI–FEID	2.33	0.35[a]	0.03[a]	0.21	0.59[a]
Spreading phlox/green fescue–Hound's tongue hawkweed	*Phlox diffusa/Festuca viridula–Hieracium cynoglossoides*	PHDI3/FEVI–HICY	0.00	0.0	0.0	0.0	0.0
Non-vegetated			**0.91**	**0.0**	**0.0**	**0.25**	**0.25**
Talus	Talus	Talus	0.29	0.0	0.0	0.0	0.0
Developed	Developed	Developed	0.62	0.0	0.0	0.25	0.25
Total			**80.73**	**59.04**	**14.72**	**0.52**	**74.28**

[a] Represents scattered trees within meadow habitats to be cleared..

would be minor (0.14 and 0.63 acres, respectively). There would be no direct impact to talus areas from clearing and grading. However, snow compaction from grooming equipment and skiing has the potential to alter subnivian microclimates within talus (0.29 acre) and meadow (2.98 acres) lying within ski trails that would not be disturbed, reducing habitat suitability for small mammals (see discussion below).

In the southern portion of the expansion area, the natural characteristic of the terrain is open glades with scattered tree islands or dead standing trees. Forests in much of the south-central portion of the expansion area consist of open woodlands that have been significantly impacted by blowdown during windstorms, or suffered extensive tree damage from ice storms and/or root rot fungal infection. The proposed layout for the ski trails is designed to utilize these existing forest openings where feasible, which minimizes the extent of forest clearing required to create skiable trails.

Following construction, disturbed areas not supporting tower pads or chairlift terminals (about 1.31 acres) will be reseed with native herbaceous vegetation (i.e., grasses, forbs, and wildflowers), and managed in this condition for the life of the ski area (see Section 8). Low growing shrub species would retained within managed ski trails, but volunteer trees would be periodically removed. Long-term impacts would persist in these modified vegetation communities for as long as developed ski area is maintained. Vegetation within ski trails will be managed to a height of 18 inches to allow for safe winter recreation, but limit erosion and maintain vegetative cover for wildlife use. Effects of these habitat changes on the 21 focal wildlife species are quantified in Table 10. For purposes of this analysis, it is assumed that managed ski trails would support at least 60% cover of native herbaceous vegetation, 10% cover of low growing shrubs, and 10-15% cover of coarse woody debris. No trees or snags would be retained. Maps depicting the distribution of modeled suitable habitat for each species under as-built conditions are provided in Appendix C.

In addition to direct impacts to wildlife and wildlife habitat from clearing and grading, indirect edge effects would occur along the borders of proposed trails, as the opening of the forest canopy influences microclimate variables such as solar radiation (Ballere et al. 1996; Teramura and Sullivan 1991), air temperature, and soil moisture (Chen et al. 1990, 1992, 1995). Edge effects can create unique habitats that support a greater diversity of plants and animals. However, the narrow borders can also serve as travel routes for predators, contributing to increased levels of predation along the habitat edges. Increased competition for resources may also occur when edge-associated species colonize early successional habitats and forest edges created by logging or the construction of ski trails (Rosenberg and Raphael, 1986). This has the potential to reduce the viability of adjacent interior forest species.

Dense, mature stands of trees may also suffer additional indirect adverse effects from wind and weather whenever adjacent forest cover is removed. For example, wind throw and snow loading along new ski trails cleared through forested areas could result in additional tree losses along trail edges. Under the proposed action, much of the proposed tree removal would occur in the bottom half of the expansion area where wind velocities are expected to be lower than at the summit of Mount Spokane. Tree losses from wind throw in these areas is expected to be much less.

Indirect impacts to wildlife and wildlife habitat could also occur from future maintenance of ski trails and chairlift terminals. These impacts would include, but are not limited to, periodic mowing and brushing to maintain trails in a condition suitable for skiing, as well as hazard tree removal. The increases in human activity and noise associated with these actions are expected to be brief, and to result in only temporary and localized avoidance or displacement for some wildlife species. These

short-term impacts would cease after maintenance activities have been completed. Mowing and brushing would preclude future forest regeneration by not allowing saplings to establish during the life of the ski area, altering typical community successional patterns.

Construction of new ski trails and recreational facility sites could degrade the quality of subnivian habitats used by small mammals, such as shrews and voles that remain active throughout the winter. These species utilize the narrow, insulated space that forms between the snowpack and the soil surface for shelter, foraging and travel, as well as for protection from predators. Focal species on Mount Spokane which utilize subnivian habitats include the pygmy shrew and pika, in addition to the marten which often preys on subnivian species. Subnivian habitat could be adversely affected by tree removal, disturbances to forest floor vegetation, soil compaction, and the redistribution of coarse woody debris. These habitat changes could create barriers to dispersal for some small mammals with limited capabilities for movement. Once winter operations begin, ski trail compaction from snow grooming and skier use could further impact subnivean habitat in these areas. Cumulatively, these impacts could alter the distribution and abundance of small mammals and other prey species along the new ski trails.

Forest removal and long-term maintenance of herbaceous-dominated ski trails could benefit some species by providing enhanced feeding opportunities. For example, juxtaposition of grasslands and low shrubs within maintained ski trails should be beneficial to ungulates (e.g., deer, elk, moose) after snow melt by providing high quality foraging habitat in close proximity to cover. Similarly, an increase in insect abundance and biomass is expected due to the increase in light and habitat diversity at ski trail edges. This could be beneficial to birds and other species that feed on insects, such as the olive-sided flycatcher. Flowering plants within maintained ski trails should provide expanded foraging opportunities for adult Compton's tortoiseshell butterflies.

Table 10. Estimated Change in Suitable Habitat for the 21 Focal Species in the Expansion Area under As-built Conditions.

Species	Key Habitat Elements Used to Model Suitable Habitat	Estimated Habitat (acres): Existing Conditions	Estimated Habitat (acres): As Built Conditions	Net Habitat Change (acres)[a]	Comments
Canada lynx (*Lynx canadensis*)	Breeding/denning: Forest stands with tree canopy closure ≥40% and coarse woody debris ≥15%.	0	0	0	PHS database contains 15 records, dating from 1988 to 2002, within 5 miles of the expansion area, No records from the expansion area.
	Summer foraging: Forest and shrub stands with shrub cover >10%.	260	187	-73	Although adequate habitat is present, denning is not documented in Mount Spokane State Park (Romain-Bondi et al. 2009).
	Winter foraging: Forest stands with ≤ 30% slope and shrub cover ≥20%.	83	63	-20	
	Dispersal: All forest and shrub stands, plus any herbaceous/nonvegetated cover type < 300 ft from forest or shrub stands.	275	275	0	Subalpine forest in the expansion area generally lacks large diameter trees characteristic of denning habitat.
	Source: Romain-Bondi et al. 2009; Morrison et. al 2007				Deep winter snow pack may reduce habitat suitability for snowshoe hare, the preferred winter prey of lynx. Human activity and disturbance associated with expanded alpine skiing may reduce suitability of winter dispersal and foraging habitat. Lynx are currently exposed to a low level of human disturbance from backcountry skiing

Gray wolf (*Canis lupis*)	Summer foraging: Deer, elk and moose habitat >1/4 mile from the Summit Road and Kit Carson Trail. Winter foraging: Deer, elk and moose habitat < 3500 ft in elevation. Source: Romain-Bondi et al. 2009	138 0	138 0	0 0	Wolf use of Mount Spokane State Park is believed to be limited to dispersal and foraging by lone individuals. High snow depth during winter months precludes use by preferred ungulate prey.
Wolverine (*Gulo gulo*)	Summer foraging: Any habitats >5000 ft in elevation. Winter foraging: Any habitats >3500 ft in elevation. Source: Romain-Bondi et al. 2009	191 279	191 279	0 0	Human activity and disturbance associated with expanded alpine skiing may reduce suitability of high elevation winter foraging habitat. Wolverine are currently exposed to a low level of human disturbance from backcountry skiing.
American marten (*Martes americana*)	Non-winter cover and foraging: All habitats except developed. Winter cover and foraging: Forest stands with tree canopy cover >37% and either a) 8 largest trees/ac ≥19 in dbh; b) more than 4 snags/ac with a quadratic mean diameter ≥12 in; or c) coarse woody debris between 20% and 50%. Non-forest areas <165 ft from suitable forest stands. Source: Romain-Bondi et al. 2009; Allen 1982; Morrison et. al 2007.	277 140	276 103	-1 -37	Managed ski trails are expected to provide foraging habitat after snow melt. Snow compaction from skiing and snow grooming could adversely affect the subnivian zone within managed ski trails, reducing winter prey availability. Lop and scatter of woody debris during initial clearing and corduroy placement of felled trees could limit this effect.

Rocky Mountain elk (*Cervus elaphus*)	Cover: Forest stands >1/4 mile from Summit Road and tree canopy cover >50%. Summer/fall foraging: Any habitat [<5000 ft in elevation, <60% slope or >200 feet from the Summit Road] with tree canopy cover ≤ 40% and within 900 ft of elk cover. Winter foraging: Habitats <3500 ft in elevation. Source: Romain-Bondi et al. 2009	74 2.2 0	49 29 0	-25 +27 0	Managed ski trails in close proximity to cover would provide foraging habitat after snow melt. High snow depths preclude use of the expansion area during winter months.
White-tailed deer *(Odocoileus virginianus ochrourus*)	Summer /fall foraging: Any habitat with herbaceous cover >15% or shrub cover >22%. Summer/fall cover: Forest stands with canopy cover >50%, or Any habitat with shrub/sapling tree cover >52%. Winter foraging/cover: Habitats <3000 ft in elevation. Source: Romain-Bondi et al. 2009; Kieffer et al. 1999	276 172 0	277 119 0	+1 -53 0	Managed ski trails in close proximity to cover would provide foraging habitat after snow melt. High snow depths preclude use of the expansion area during winter months.

Moose (*Alces alces*)	Breeding/calving: Forest and shrub stands with gentle slopes (0-10%) and southerly exposures Summer/fall foraging: Forest and shrub stands with slopes <50% and shrub cover between 5% and 95%. Summer cover: Forest stands with canopy cover >70% and canopy height > 33 ft Winter foraging/cover: Snow depths <35 in. Source: Romain-Bondi et al. 2009;	0 274 42 0	0 275 31 0	0 +1 -11 0	Steep slopes and northwest exposures not expected to provide breeding/calving habitat. Managed ski trails in close proximity to cover would provide foraging habitat after snow melt. High snow depths preclude use of the expansion area during winter months.
Northern goshawk (*Accipiter gentiles*)	Breeding/nesting: Forest stands with slopes <70%, tree canopy cover >40%, 8 largest trees/ac >19 in dbh, and avg tree height >65 ft. Foraging: Forest stands with slopes <70%, tree canopy cover >32%, and avg tree height >65 ft, or Nonforest stands <4 acres interspersed with suitable forest. Source: Romain-Bondi et al. 2009; Morrison et. al 2007	44 93	30 63	-10 -30	An intensive search survey of potentially suitable nesting habitat in 2013 detected no evidence of goshawk nesting in or within 328 ft of the expansion area. Forest fragmentation resulting from ski trail construction may reduce suitability of retained tree islands as foraging habitat.

Boreal owl (*Aegolius funereus richardsoni*)	Breeding/nesting: Forest stands >4000 ft in elevation with combined trees and snags/ac >23, and 8 largest trees/ac >14 in dbh. Foraging/roosting: Forest stands >3500 ft with tree canopy cover >35%. Source: Romain-Bondi et al. 2009; Heinrich et. al 1999	209 209	146 146	-63 -63	Uncommon year-around resident in mountains of northeast Washington. Although considered fairly tolerant of human disturbance, human activity associated with expanded alpine skiing may reduce suitability of subalpine tree islands as winter foraging and roosting habitat. Boreal owl are currently exposed to a low level of human disturbance from backcountry skiing.
Pileated woodpecker (*Dryocopus pileatus*)	Breeding/nesting: Forest stands with tree canopy cover >50%, and 8 largest trees/ac >20 in dbh. Foraging: Forest stands with tree canopy cover >50%, and quadratic mean diameter of snags >9.8 in or cover of coarse woody debris >10%. Roosting: Forest stands with tree canopy cover >50%, and 8 largest trees/ac >16 in dbh. Source: Romain-Bondi et al. 2009; Schroeder 1983 Lewis and Azerrad 2003.	33 178 169	21 123 116	-12 -55 -53	Subalpine forest generally lacked large diameter snags required for nesting. No field evidence of foraging by pileated woodpeckers was observed above 4,808 feet in elevation. Subalpine forest generally lacked large diameter snags required for roosting High-altitude breeders often move into down-slope forests during winter (BirdWeb 2013).
Black-backed woodpecker (*Picoides articus*)	Breeding/nesting: Forest stands with quadratic mean diameter of snags >10 in, or # snags/ac >30. Foraging/roosting: Forest stands with # snags/ac >26. Source: Romain-Bondi et al. 2009	264 264	187 186	-77 -78	Densities of black-backed woodpeckers are expected to be low because snags within high severity tree kill areas are older than the 1 to 5 year mortality range preferred by this species.

Dusky grouse (*Dendragapus obscurus pallidus*)	Breeding/nesting: Any habitat with tree canopy cover between 10 and 65%, and shrub cover between 5% and 53% or herbaceous cover between 20% and 80%.	196	141	-55	Undertake altitudinal migrations between more open, lower elevation breeding areas and higher elevation wintering areas located in dense conifer forest (BirdWeb 2013).
	Summer foraging: Any habitat with shrub cover between 5% and 53% or herbaceous cover between 20% and 80%.	276	276	0	Forest edge habitat created by managed ski trails may provide suitable nesting habitat.
	Winter foraging and roosting: Dense conifer forest (assume tree canopy cover >50%.	155	104	-51	Herbaceous cover within managed ski trails expected to provide summer foraging opportunities. Human presence and disturbance associated with expanded alpine skiing is expected to reduce suitability of subalpine tree islands as winter foraging and roosting habitat. Grouse are currently exposed to a low level of human disturbance from backcountry skiing.
	Source: Romain-Bondi et al. 2009; Schroeder 1984.				
Brown creeper (*Certhia americana*)	Breeding/nesting/foraging: Forest stands with [quadratic mean diameter of trees >7.5 in or quadratic mean diameter of snags >7.5 in], or 8 largest trees/ac >20 in dbh. Source: Romain-Bondi et al. 2009.	264	187	-77	Forest fragmentation resulting from ski trail construction may reduce suitability of retained tree islands. High-altitude breeders may move down-slope into the foothills and valleys during winter. There may be some dispersal from eastern Washington in winter (BirdWeb 2013).

Pacific (winter) wren (*Troglodytes troglodytes*)	Breeding/nesting/summer foraging: Forest stands with tree canopy cover >35% and cover of coarse woody debris >7.5%, or Any habitat within 25 ft of a stream. Source: Romain-Bondi et al. 2009; Gould et. al 1999.	187	131	-56	Wrens from colder locales move to more temperate habitats throughout the western U.S. during winter. Forest fragmentation resulting from ski trail construction may reduce suitability of retained tree islands.
Olive-sided flycatcher (*Contopus cooperi*)	Breeding/nesting: Forest stands with tree canopy cover <50%, and a tree density between 25 and 53 trees per acre or snag density between 6 and 17 trees per acre. Source: Romain-Bondi et al. 2009; Vesley et. al 2007.	12	10	-2	Neotropical migrant not present during winter months. Openings created by ski trails may increase levels of nest parasitism by brown-headed cowbirds, and increase rates of nest predation by ravens and other avian predators. Habitat edge created by managed ski trails may provide beneficial foraging habitat for olive-sided flycatcher, especially post-breeding.
American pika (*Ochotona princes*)	Breeding/nesting/foraging: Talus, and adjacent upland meadow within 5 ft of talus, that are above 5000 ft in elevation. Source: Romain-Bondi et al. 2009.	2	2	0	Habitat suitability of talus within ski trails may be reduced during winter if snow compaction from skiing and grooming degrades subnivian zone. .
American pygmy shrew (*Sorex hoyi*)	Breeding/parturition/foraging: All habitats except talus and developed. Source: Romain-Bondi et al. 2009.	275	274	-1	Snow compaction from skiing and snow grooming may reduce habitat suitability of the subnivian zone within managed ski trails Lop and scatter of woody debris during initial clearing and corduroy placement of felled trees could limit adverse effects.
Silver-haired bat (*Lasionycteris noctivagans*)	Foraging/roosting/breeding: All habitats except developed. Source: Romain-Bondi et al. 2009.	277	276	-1	Local summer resident. Although clearing for ski trails will remove roosting habitat, the managed ski trails and forest edge represent foraging habitat.

Hoary bat (*Lasiurus cinereus*)	Foraging/roosting: All habitats except developed. Source: Romain-Bondi et al. 2009.	277	276	-1	Rare local summer (non-breeding) resident. Although clearing for ski trails will remove roosting habitat, the managed ski trails and forest edge represent foraging habitat.
Western toad (*Bufo boreas*)	Breeding/metamorphosis: Warm, shallow water bodies. Foraging/migration: Stream corridors, and forest stands with <75% tree canopy cover, that lie within 3280 ft of breeding ponds. Source: Romain-Bondi et al. 2009.	0 0	0 0	0 0	Adequate water bodies for spawning are absent from the steep, high elevation slopes and headwater streams. Significant upslope movement into the expansion area by post breeding adults or juveniles not expected.
Compton's tortoiseshell butterfly (*Nymphalis vau-album*)	Breeding/metamorphosis: Habitats containing willow, birch or aspen. Foraging: All habitats, except talus, with tree canopy closure <30%; or All habitats within 30 m of streams. Source: Romain-Bondi et al. 2009.	0 109	0 169	0 +60	Absence of preferred larval host plants (willow, birch or aspen) precludes breeding and larval metamorphosis. Flowering plants within managed ski trails expected to provide foraging opportunities for adults.

[a] Substantial overlap may exist between the various habitat categories examined for a species. Consequently, net habitat change is not additive for a species.

Breeding/Rearing Disturbance

Noise generated during construction will represent an unavoidable short-term impact on wildlife. The duration and level of noise created during ground clearing, grading, excavation, and facility construction may disturb breeding and nesting behavior, particularly in songbirds and raptors. Although bird species vary in their sensitivity to noise disturbance, their nesting life-stage is critical to population viability. Loud and continuous noise events during the egg-laying, incubating, and early nestling stage can cause adult birds to temporarily vacate nests, or permanently abandon nests. Eggs and hatchling birds left unattended in the nest may be exposed to increased levels of predation, inclement weather, and abandonment (Anderson and Squires 1997). The nesting season for songbird species such as brown creepers may begin in April but peaks in May, June, and July (NatureServe 2013). Similarly, for raptor species such as the northern goshawk, first clutches of eggs are produced in the end of April, however, this may be later in the season at higher elevations with colder weather patterns (NatureServe 2013). Romain-Bondi (2009) reviewed bird species on the focal species list and determined that April 1 to July 15 represents the critical period for breeding and nesting by most avian species in Mount Spokane State Park. A mitigation measure requiring preconstruction monitoring of the weekly construction footprint for the presence of nesting avian species during this critical period is included as a mitigation measure (see Section 8). If monitoring detects the presence of nesting by avian focal species, construction in the occupied area will cease and an avoidance/protection plan will be developed in consultation with Washington State Parks.

Similarly, noise and disturbance generated during construction could potentially affect rearing sites for resident mammals such as marten, moose, deer, elk, and pika. This may result in reduced attentiveness to young, disruption of feeding patterns, abandonment of nests or dens, and/or cause adults to undertake additional risks to their young by moving them to new locations (Snetsinger and White 2009). Small mammals, such as the pika, begin parturition in May with a peak in June (NatureServe 2013). Marten den and raise their young during the spring months of March to June (Buskirk and Ruggiero. 1994, NatureServe 2013). After a review of mammals on the focal species list, Romain-Bondi (2009) determined the critical period for denning and rearing of young to be March 1 to July 15 for mammals in Mount Spokane State Park. Preconstruction monitoring of the weekly construction footprint will be conducted during this period by a qualified wildlife biologist as a mitigation measure to evaluate construction effects on these species (see Section 8). If denning by mammalian focal species is detected, construction activities in the occupied area will cease and an avoidance/protection plan will be developed in consultation with Washington State Parks.

Displacement/Avoidance Behavior

Habitat loss resulting from vegetation removal to construct the ski lift and trails, as well as increased recreational use of the new ski corridors, may result in displacement/avoidance behavior by wildlife. In addition, ski trail grooming often occurs at night, and noise and light from this activity may temporarily alter use of the area by nocturnal species. Wildlife often moves away from human activity or avoids high use recreation sites. Animals displaced into unfamiliar, inferior, or already occupied habitats are less likely to survive and successfully reproduce. During breeding and rearing periods, and during winter and early spring foraging seasons, displacement stress on wildlife is likely to increase due to susceptibility to weather, illness, predation and other factors, and may contribute to a reduction in individual fitness (Romain-Bondi 2009).

Construction of the chairlift and ski trails would reduce and fragment areas of relatively undisturbed habitat in the proposed expansion area. Increases in human activity associated with chairlift and ski trail development may reduce the effectiveness of this area for wildlife dispersal or movements, particularly during winter months for those species sensitive to human activity. Wildlife species that are more dependent on intact habitat for movement corridors or are more sensitive to human presence will be more susceptible to displacement and associated stresses. While habitats in the expansion area are relatively undisturbed, existing human presence from backcountry skiers, hikers, and other users may currently be reducing the suitability of the expansion area for species sensitive to human presence, such as gray wolf and wolverine. Although specific counts of current backcountry use are unavailable, it is estimated that up to 200 visitors a day may use the expansion area on any given winter weekend or powder day for backcountry skiing or other dispersed recreational activities (Washington State Parks and Recreation Commission 2012). Further disturbance is evident from snowmobiles that regularly use the Chair 4 road, which lies near the western edge of the expansion area, during winter weekends. This may include 100 or more snowmobiles/day during winter weekends, and as many as 20-30 snowmobiles/day during weekdays, each making numerous passes (McQuarrie 2014).

Night skiing is not proposed within the expansion area, but nighttime grooming of the new ski trails would occur during operation. Noise and disturbance associated with nighttime grooming could impair nocturnal movements by some wildlife species active in high elevation habitats during winter, such as wolverine or lynx. Since these nighttime activities would be of limited duration, some opportunities for nocturnal uses by wildlife would be maintained, though at a reduced level.

During the summer, noise and disturbance associated with ski lift and trail maintenance activities may have minor direct impacts on animals that occupy or move through the expansion area. These activities are expected to be of short duration, with lift maintenance occurring on an annual basis and ski trail maintenance occurring less frequently due to slow vegetation growth rates in these subalpine habitats.

Habitat Connectivity and Fragmentation

Habitat connectivity refers to the size, quality, and spatial arrangement of a species' habitat across the landscape, particularly as it relates to movement and dispersal of organisms. Development may contribute to fragmentation of the landscape by disrupting connectivity between areas of suitable habitat. This could be a consequence of the physical removal or alteration vegetation, the construction of structures that act as barriers to species movements, or result from behavioral exclusion caused by high levels of human activity. The consequences of fragmentation may include a reduction in available habitat for local wildlife populations, as well as disruption of dispersal and gene flow between more distant populations. Fragmentation may effectively create isolated patches of otherwise suitable habitat that are too small to support a viable wildlife population, resulting in regional population declines.

Wildlife populations that utilize the expansion area and surrounding landscape are already subject to some degree of habitat fragmentation due to existing recreational development on Mount Spokane. Connectivity with habitats immediately east and south of the expansion area is most limited during the winter ski season (mid-November to mid-April), when widespread human disturbance from skiing occurs during daylight and early evening hours. Opportunities for dispersal through this area are possible in the evening after night skiing and trail grooming ceases. Areas south of the expansion area are also exposed to substantial recreational use during summer months.

The proposed action would expand skiing west of the mountain summit into undeveloped areas, further affecting habitat connectivity, particularly during winter months. Some disturbance from winter skiing already exists in this area due to backcountry skiing that occurs during daylight hours. However disturbance levels in this area would increase substantially during the winter ski season, which would likely alter movement patterns by species that may use or disperse through this high elevation habitat in winter (e.g., wolverine, lynx, boreal owl). Physical fragmentation of forested habitats in the expansion area would also occur with construction of lift and ski trails through this area. Although these trails will be narrow in design (see Table 1) and sited to utilize existing natural openings in the forest canopy, adverse fragmentation effects could be realized by some species. For example, songbirds that use interior forest habitats would be subjected to higher levels of nest parasitism and presence of nest predators as species such as the brown-headed cowbirds ravens, and jays exploit openings created by the new ski trails. Relatively unfragmented and intact habitat blocks would remain to the north and west of the expansion area, allowing opportunities for wildlife movements around the expansion area.

7.3 Federally Listed Species

One federally listed species, the Canada lynx, has been documented in or adjacent to Mount Spokane State Park. The contiguous U.S. population of lynx was listed as threatened under the ESA on March 24, 2000 (USFWS 2000). Threatened species are those likely to become endangered within the foreseeable future throughout all or a significant portion of their range. The lynx was also classified by WDFW as a Washington State threatened species in 1993 (Washington Administrative Code 232-12-011). Regulatory compliance is coordinated through USFWS and WDFW. No land within Spokane County has been designated as critical habitat for recovery of Canada lynx (USFWS 2009). The Washington State Recovery Plan for the lynx (Stinson 2001) indicates that potential lynx habitat on outlying peaks like Mount Spokane is likely marginal and only occupied intermittently.

The Canada lynx is not currently thought to be established as a resident animal in Mount Spokane State Park. There have been multiple lynx sightings and tracks recorded in the Park, but no evidence of lynx denning (Romain-Bondi et al. 2009 The PHS database contains 15 lynx records of varied reliability within 5 miles of the expansion area that date from 1988 to 2002. No records have been reported in more than 10 years, and none are known for the proposed expansion area or the PASEA. The nearest record to the expansion area (from 1999) lies about 0.7 mile to the west (Figure 5). Other records occur to the north, west, south, and southeast. Romain-Bondi et al. (2009) indicates that existing forest conditions in Mount Spokane State Park appear adequate habitat for lynx denning, foraging, and dispersal. Results of habitat modeling for Park lands to the south and southwest of the expansion area predict a majority of the landscape as providing moderate or higher habitat suitability for dispersal and non-winter foraging, but low habitat suitability for lynx breeding and winter foraging (Morrison et al. 2007). Lynx habitat suitability within the expansion area probably mirrors these findings.

Available habitat for lynx in the expansion area is summarized in Table 4, and estimated impacts to this habitat following clearing and construction of the ski lift facilities and ski trails are provided in Table 10. Suitable habitats and impacts to those habitats were quantified by determining the availability of key habitat features preferred by lynx, as described by Morrison et al. (2007) and Romain-Bondi et al. (2009), within vegetative cover types found in the expansion area. Existing habitat variable data collected from stand cover types by Morrison and Wooten (2010) were used to screen cover types for lynx habitat suitability. Maps prepared by ICF depicting the distribution of

modeled suitable habitat for lynx under existing and as-built conditions are provided in Appendix C and E, respectively. No lynx breeding/denning habitat was identified in the expansion area (Table 4). Mature forest habitats lack large trees and extensive cover of large woody debris that is generally preferred by breeding lynx. However, most of the expansion area (260 acres) was determined to provide suitable lynx summer foraging habitat. The proposed ski area expansion would remove about 73 acres of summer foraging habitat (Table 10). Lynx winter foraging habitat is more restrictive than non-winter foraging habitat due to a winter dependency on snowshoe hare (Romain-Bondi et al. (2009). About 83 acres of the expansion area provides lynx winter foraging habitat. This would be reduced by 20 acres under as-build conditions (Table 10). Most of the expansion area (275 acres) was determined to provide potential dispersal habitat for lynx. Under as-built conditions, these areas should continue to function in this capacity as the openings created by the relatively narrow ski trails (widths of 60 to 191 feet, Table 1) would not be expected to preclude crossing by lynx. Human activity and disturbance associated with expanded alpine skiing may reduce the suitability of lynx winter foraging and dispersal habitat (e.g., disturbance/ avoidance behavior, behavioral habitat fragmentation) during the winter ski season. However, lynx are currently exposed to a low level of human disturbance from backcountry skiing in the PASEA.

The effects of recreational activities on lynx populations have not been well studied (Ruggiero et al. 1999). Prediction of recreational effects is largely based on known lynx ecology, preliminary habitat use data from Colorado's lynx reintroduction efforts, ecological concepts, the cautious application of anecdotal accounts (e.g., Roe et al. 2000), and professional judgment. Recognizing the lack of data on lynx and recreational activities, Ruggiero et al. (1999) concluded that "limited anecdotal observations do not support the hypotheses that snowmobiling, ski touring, or hiking (i.e., dispersed recreation) result in significant behavioral disturbances to lynx." However, this statement is unqualified with respect to the intensity of these activities.

With respect to developed recreation effects on lynx at a scale relevant to the proposed action, Ruediger et al. (2000) indicated "to date, most investigations of lynx have not shown human presence to influence how lynx use the landscape. Intuitively we assume that some threshold exists where human disturbance becomes so intense that it precludes use of an area by lynx." "High intensity recreational use, such as that occurring at ski areas, may provide a level of disturbance that effectively precludes lynx use (at least temporarily) of otherwise suitable habitat (Ruggiero et al. 1999)." They go on to state that "lynx may be able to adapt to the presence of regular and concentrated recreational use, so long as critical habitat needs are being met." Such use has been demonstrated by some lynx at ski areas such as Beaver Creek, Vail, Vail Pass, Copper, Keystone, A-Basin, Wolf Creek, Purgatory, Telluride, and Canadian ski areas (Thompson and Halfpenny 1989, Thompson 2006). The natural activity patterns of lynx (largely nocturnal) versus recreational activities (largely diurnal) provide an opportunity to maintain both uses in the same landscape. A key to providing temporal segregation of use is ensuring that effective diurnal security habitats are present and adequately distributed (Ruggiero et al. 1999). While lynx and ski areas may not be incompatible, the developed ski terrain itself would constitute only a small part of their normally used range. Larger surrounding tracts of *undeveloped*, effective forest are needed to facilitate lynx use of ski areas (Thompson and Halfpenny 1989).

Lynx diurnal security habitat (DSH) includes those areas providing cover that is also relatively isolated from, and unaffected by, human development and activities. These are areas where largely nocturnal and crepuscular lynx can rest during the day without being regularly displaced or harassed by humans, or exposed to other risk factors (Ruediger et al. 2000, Shenk 2005). Denning habitat is often used as a surrogate for security habitat, but security habitat is more widespread

because it generally includes a greater variety of forest structural stages and aspects, and can include smaller habitat patches and less isolation from risk factors. The structural cover component of security habitat is not as important as that associated with denning. It is likely that most forested habitats that provide adequate cover and diurnal seclusion from human activities, predators, and competitors support potential security habitat. Non-forested habitats can also provide effective diurnal security areas, depending on the level of human activity and a host of other factors (Thompson and Halfpenny 1989).

DSH is defined more narrowly as secure winter daytime bedding sites in highly disturbed or heavily used areas such as downhill ski areas and snowmobile play areas (Ruediger et al. 2000). It is assumed that the distribution of viable DSH is more important in fragmented landscapes experiencing intense or widespread human activities, whether recreational or not. So long as effective blocks of DSH are present and adequately distributed, and other critical habitat needs are met, lynx may be able to adapt to the presence of regular and concentrated human use during winter and other seasons (Ruediger et al. 2000). DSH allows lynx the ability to retreat from adjacent human disturbances during daytime hours, and emerge at dusk to hunt and travel when most human activity ceases. "Security habitats will generally be sites that naturally discourage winter (or other displacing) human activity because of extensive forest floor structure, or stand conditions that otherwise make human access difficult…Security habitats are likely to be most effective if they are sufficiently large to provide visual and acoustic insulation from winter (and other seasonal) human activity and to easily allow movement away from infrequent human intrusion" (Ruediger et al. 2000). While habitat block size, buffering distances, and other variables have not been well-studied or quantified relative to potentially disruptive human activities, the Lynx Biology Team indicated that a 50 meter buffer is required to protect DSH from such human disturbances (Roberts 2009). In the general landscape, effective DSH is most needed to facilitate extended lynx movements between April and September when lynx are no longer relatively sedentary on winter range and are dispersing to and from mates (Shenk 2008).

DSH is an issue in the proposed expansion of Mount Spokane Ski and Snowboard Park because it has the potential to affect lynx habitat connectivity across the ski area. Currently, DHS across Mount Spokane is most limited during daylight hours of the winter ski season (mid-November to mid-April) when backcountry ski use of the expansion area and remaining PASEA acreage takes place. The closer that effective security habitat is to developed ski terrain, the closer to that terrain a lynx could bed during the day, then cross the ski area from dusk through dawn to access other DSH patches before the ski area reopens. Where distances across developed ski terrain are within a lynx's daily travel distance, lynx could theoretically avoid human interaction. Mature, unfragmented forest that lies west and south of the expansion area provides potential DSH for lynx use during periods of backcountry skiing. Connectivity is less of a concern outside of the ski season because of the relative absence of human activity in the expansion area. At that time, lynx would be able to move freely through most of the expansion area and PASEA with minimal impact from human disturbance.

Based on available literature, it is unlikely that the proposed action would preclude lynx from crossing through or navigating around the expansion area during the winter ski season. The ability of lynx to cross the expansion area is an issue as animals move between largely intact habitat blocks. The best available data indicate that the distribution of suitable patches of lynx habitat should be considered relative to the daily movement distances of resident females, typically up to 3 to 6 miles (Ruediger et al. 2000). There are currently no vegetative barriers to lynx movement within the expansion area. With construction of the new ski facilities, the travel distance for lynx across the

expansion area (about 1 mile) would not exceed the maximum 3- to 6-mile range recommended for project planning in lynx habitat (Ruediger et al. 2000). The new ski area structures (e.g., lift terminals and towers) would represent inanimate objects that a lynx encountering them would simply walk around (Ruediger et al. 2000). The relatively narrow ski trails (60 to 191 feet, Table 1) should be crossed by lynx as they would be now in their undisturbed state. Effective DSH would still remain in mature, unfragmented forest to the north, west and south of the expansion area, providing movement routes around the ski terrain.

Extended movements by lynx across the expansion area would be less likely during winter when skiing takes place because individual animals tend to be relatively sedentary on their winter range (Shenk 2008). However, should a lynx establish a home range that includes the expansion area or dispersing individuals attempt to pass through this area during the active ski season, an approximately 15 hour interval would be available during the crepuscular and nocturnal hours when lynx are most active for individuals to cross the expansion area relatively undisturbed by human presence. Although no nighttime skiing is planned for the expansion area, limited nighttime disturbance for up to several hours would occur during the early evening or morning hours for snow grooming.

Although lynx are primarily active during nocturnal and crepuscular periods when skiing in the expansion area would not occur, lynx could be active at any time of day. Should a lynx attempt to cross the ski terrain when skiers are present, several outcomes are possible. The animal could continue to cross the ski area while avoiding skiers until it clears the active ski terrain; stop within the forested intertrail islands where it would likely be disturbed over the course of the ski day, before continuing its crossing; or retreat back through the ski area where it may be subjected to stress and disturbance by skiers. Lynx have been observed in active ski terrain during operating hours at Durango Mountain Resort and Telluride Ski Area, and remained in the vicinity of those ski areas after the encounters (Tompkins and Grother 2006). While those two ski areas differ in context from Mount Spokane, the accounts provide insight into how some lynx respond to active ski terrain. Other, similar anecdotal accounts have been documented at Canadian ski areas (Roe et al. 2000). Nonetheless, such daytime encounters with skiers could result in stress and harassment to lynx, further impairment of connectivity between effective patches of DSH around the ski area, or contribute to a lack of connectivity for lynx that might abort a crossing attempt.

Summarizing the ability of lynx to cross the expansion area, it is likely that most lynx could cross through the area outside of the ski season, and that most lynx should be able to cross during the ski season if they exhibit their typical nocturnal and crepuscular activity patterns. Opportunities would exist for lynx to move around the developed ski terrain by utilizing existing DSH to the north, west and south of the expansion area. This conclusion is based on: (1) documentation of lynx crossing through other ski areas (e.g., Beaver Creek, Vail, Vail Pass, Copper Mountain, Keystone, A-Basin, Wolf Creek, Purgatory, Telluride, and Canadian ski areas); (2) lynx being largely sedentary while on their winter range (i.e., they undertake less extensive movements during winter, but they are physically capable of doing so if they so choose); (3) distances across the existing and proposed ski terrain would be well below the maximum 3- to 6-mile range recommended for project planning in lynx habitat; and (4) lynx are capable of moving more than 6 miles overnight if they so choose (Thompson, unpublished data, Roe et al. 2000; Ruediger et al. 2000; USDA Forest Service 2008). Nevertheless, if a lynx attempted to cross developed and active ski terrain during daylight hours of the winter ski season, that movement attempt may be impaired or thwarted.

7.4 Priority Habitats

An assessment of the project effects on priority habitats found within the expansion area follow.

Moose/Elk Habitat

After accounting for non-vegetated cover types that don't provide habitat for moose and elk (i.e., developed and talus), the expansion area supports about 275.19 acres of priority habitat for each of these species. Construction of the ski lift infrastructure for the proposed action (i.e., upper and lower terminals, lift towers - see Section 3.0, Project Location and Description) would permanently remove about 1.31 acres of priority habitat for each species. Clearing and grading associated with ski trail construction would alter another 74.03 acres of existing cover types that could be used by moose and elk, primarily by converting forest habitat that provides cover to herbaceous/low shrub-dominated habitats that would provide foraging opportunities after snow melt. These altered habitats would continue to function as moose and elk habitats. High snow depths preclude moose and elk use of the expansion area during the winter ski season. During low or snow-free periods when these species could be present, noise and disturbance impacts to moose and elk from ski area maintenance is expected to be infrequent, localized and of short duration, allowing continued use by these species. Consequently, overall impact to moose and elk priority from habitat loss, habitat alteration and animal disturbance is expected to be minor.

Freshwater Wetlands

ICF identified 5 freshwater wetlands and 11 perennial streams (Type Np Waters) on and adjacent to the expansion area (Appendix D). Potential project encroachments into these resources are illustrated in Figure 14. Under the proposed action, no fill would be placed into wetlands or stream channels during construction. Clearing activities would result in the pruning of vegetation taller than 18 inches high from approximately 5,870 sq. ft. (0.13 acre) of Wetland E (Table 11), a predominantly scrub-shrub wetland dominated by Sitka alder. This would alter the water quality, hydrologic and habitat functions provided by this wetland. No impacts would occur to other wetlands, including Wetland A, the relatively large scrub-shrub wetland located along the southern perimeter of the expansion area that supports dense thickets of Sitka alder, pockets of emergent wetlands, and scattered grand fir trees. Ski trails and lift corridors would cross 1,887 sq. ft. (0.04 acre) of stream channels that support non-wetland waters of the U.S. and state (Table 11). A deep snow pack would minimize impacts by ski traffic crossing these stream channels. In some locations, timber bridges or arch culverts may be constructed to carry the future ski trails across streams that lie in ravines or deeper channel cuts. These structures would be designed to completely span the channel and avoid excavation or placement of any fill material below the ordinary high water mark. The location of such structures has yet to be determined, but would be included in project level application documents.

Because no wetlands or streams would be filled under the proposed action, no compensatory mitigation is expected to be required by the US Army Corps of Engineers or the Washington State Department of Ecology under their respective regulatory programs. However, Spokane County's CAO prohibits most activities with wetlands or streams, and mitigation would be required to address vegetation removal from Wetland E under CAO Sections 11.20.050. Mitigation to comply with CAO requirements will be addressed in a permit application package submitted at a later date.

Riparian

The proposed action will encroach into the protective CAO riparian buffers assigned to some of the streams (CAO Section 11.20.060(C)(1)(h)) and wetlands (CAO Section 11.20.050(C), Alternative 3) that lie in the expansion area. See Section 6.3 for a description of how the buffer widths were determined. Encroachment would primarily consist of clearing trees and pruning shrubs taller than 18 inches from the buffers of Streams 1, 3b, 4a, 5a, 5b, 6a, 6b, and 6c, and from buffers for Wetlands A and E (Figure 14); no grading impacts are anticipated in these buffers. Small permanent losses of protective buffers, not yet quantified, would also occur with construction of timber bridges or arch culverts to carry skiers across deeply channelized streams. Total impact to protective buffers is estimated at 171,292 sq. ft., or 3.9 acres (Table 11). Actual functional impacts to riparian habitat would likely be less than the impact to protective buffers because topography in the expansion area is generally steep and stream gradients are high, such that floodplains associated with these streams and the transitional zone between aquatic and upland habitats (i.e., the riparian zone) are constrained. Mitigation for riparian buffer impacts that comply with CAO requirements will be addressed in a permit application package, and could include measures such as buffer width averaging, vegetation enhancement or buffer compensation.

Table 11. Proposed Project Encroachment into Wetlands, Stream, and Associated Buffers

Project Feature	Resource Affected	Wetland/Stream Channel Encroachment (sq. ft.)[a]	Buffer Encroachment (sq. ft.) [b]
Ski Trail 1	Wetland A	0	15,073
	Stream 6a	156	25,134[c]
	Stream 6b	180	
	Stream 6c	180	
Ski Trail 2	Stream 6a	0	19,777
Ski Trail 3	Stream 4a	240	32,303[c]
	Stream 5a	177	
	Stream 5b	219	
Ski Trail 4/Chair Lift 6	Stream 4a	159	24,408[c]
	Stream 5a	117	
	Stream 5b	123	
Ski Trail 5	N/A	0	0
Ski Trail 6	Wetland E	5,870	27,232
Ski Trail 7	Stream 1	243	14,459
	Stream 3b	255	12,906
Total		**7,757 sq. ft. (0.18 acre) [a]**	**171,292 sq. ft. (3.93 acres)**

[a] Stream encroachment calculations based on an average channel width of 3 feet. However, no physical disturbance below the ordinary high water mark of stream channels would occur during construction.

[b] See Tables 6 and 7 for minimum buffer widths assigned under the CAO .
[c] Buffer encroachments were not separated by stream type due to multiple overlapping areas.

Old-growth/Mature Forests

Forests in the expansion area are best described under the CAO[8] as mature stands that often possess some old-growth forest characteristics, such as abundant snags and logs (see Section 6.2 Tree Coring). Construction of the ski trails and lift infrastructure would result in clearing of about 63 acres of mature forest from the expansion area. Some additional tree losses could occur along trail edges from wind throw and snow loading where new ski trails are cleared through densely forested areas. However, most of these additional tree losses are expected to be within those portions of ski trails subject to trail edge treatments (i.e., forest scalloping and feathering). These edge treatments have been included within the average trail clearing widths shown in Table 1 to provide worst case estimates of trail clearing impacts. Fragmentation of mature forest stands caused by ski trail construction may reduce habitat suitability of remaining tree islands for some wildlife, such as interior forest species. Fragmentation effects would be most evident along the northern and western perimeter of the expansion area where dense mature forest cover predominates and extends offsite. Natural meadows and opening are common in the southern quarter of expansion area, and significant tree damage from windstorms and ice storms have fragmented forests in the central part of the expansion area. Habitat fragmentation from ski trail construction in these areas would have less adverse effects on wildlife.

Snags and Logs

A number of the focal wildlife species depend on snags and coarse woody debris (i.e., logs) as critical habitat elements for foraging, reproduction, roosting and dispersal habitat (Romain-Bondi et al. 2009). Specifically, snags are a preferred habitat element for American marten, silver-haired bats, northern goshawks, pileated woodpeckers, black-backed woodpeckers, brown creepers, and olive-sided flycatchers. Similarly, coarse woody debris is a preferred habitat element for American marten, lynx, pileated woodpecker, winter wren, American pygmy shrew, and western toad. Snags and coarse woody debris are important to these focal species for nesting, denning, roosting, cover and/or foraging habitat.

Current density of snags and coarse woody debris is relatively high throughout the expansion area due to wind throw, ice damage, disease and insect outbreaks (Morrison and Wooten 2010). Under the proposed action, snags will be removed from about 73.26 acres of forest/woodland habitats cleared for the lift and ski trails, but snag levels within remaining portions of the expansion area will be relatively unchanged. To the extent practical, woody debris generated from clearing the lift and ski trails will be retained on-site, dispersed by lopping and scattering this material within remaining habitats and by corduroy placement of larger trees felled within trails (see Section 8). Consequently, abundance of woody debris will increase in adjacent unaltered habitats, partially offsetting losses within lift and ski trails. All large trees and snags (over 20 inches dbh) located in retained tree islands will be left standing unless they pose a hazard to skiers. No formal trails will be routed through these tree islands, minimizing impacts to these high value wildlife habitat elements.

[8] See CAO Table 11.20.060A for priority habitat definitions.

Talus

Very little talus habitat (<2 acres) occurs in the expansion area, with all located near the summit of Mount Spokane (Figure 4, Table 2). No physical impact to talus is expected under the proposed action. No grading or other physical disturbance to rock and boulder surfaces that comprise talus would take place during construction of the ski lift and trails (see Section 8). Deep snow pack would cover talus during the winter ski season. However, compaction from snow grooming and skiing along ski trails could degrade the subnivian zone at the snow-land surface interface, reducing habitat suitability of talus for small mammals (e.g., pika) active under the snow. This could affect approximately 0.29 acre of talus.

Wildlife Corridors

No defined wildlife corridors have been mapped for the expansion area. A generalized wildlife travel corridor links Mount Spokane State Park with the rest of the Selkirk Mountains to the north. WDFW, Spokane County and other groups have also been working to secure a wildlife corridor connection between Mount Spokane and Antoine Peak Conservation Area to the south. This would preserve a wildlife corridor that connects the Spokane River Valley with Mount Spokane State Park (Ferguson 2008). Prominent ridgelines and stream corridors are also recognized as providing travel corridors for wildlife movement.

Proposed ski development in the expansion area would not likely constitute a barrier to wildlife travel within these generalized corridors, but could cause animals that travel through this high elevation habitat in winter (e.g., wolverine, lynx) to alter their movement patterns. Some disturbance from winter skiing already occurs in the expansion area from backcountry ski use during daylight hours, as well as from the adjacent ski area. Undeveloped forest habitat to the west of the expansion area would offer a travel route around the ski area that would be subject to less human disturbance during the winter recreation season. Animals could also move through the expansion area at night when human activity would be reduced (no nighttime skiing will occur). The prominent northeast-southwest ridgeline situated at the top of Mount Spokane has already been modified to support current ski operations, and is not likely to serve as a major corridor route during the winter.

Outside of the winter ski season, disturbance impacts that could alter wildlife movements along generalized travel corridors are expected to be similar to slightly above preconstruction levels. Only low-intensity summer recreational use is anticipated in the expansion area, including continued use of an existing mountain bike trail and dispersed recreation such as hiking and berry picking. Once ski operations cease in the spring, most maintenance operations would be limited until after July 15 to minimize impacts to wildlife (see Section 8). Maintenance activities are expected to represent localized, short-term impacts that would cease after maintenance is completed, similar to the existing ski area. Again, forest habitat west of the expansion area would offer an alternative travel route around the ski area for animals if needed.

8.0 Mitigation and Enhancement Measures[9]

This section describes best management practices (BMPs), avoidance, minimization and enhancement measures that have been developed to mitigate adverse effects from proposed ski areas expansion on focal wildlife species and their habitats. Many of these mitigation measures are considered common practices used by ski area managers in alpine and sub-alpine environments to prevent or limit potential resource impacts. They are also similar in scope and intent to the mitigation measures included in the 2010 Mount Spokane Master Facilities Plan FEIS prepared by Washington State Parks. Specific measures are proposed for implementation during the construction phase, and for post-construction application during ski area operation and maintenance. Additional detail on many of these mitigation and enhancement measures can be found in the following reports[10]: *Mount Spokane Ski and Snowboard Park Draft Supplemental Environment Impact Statement (October 2012); Mt. Spokane Ski and Snowboard Park Trail Clearing Prescriptions* (January 2013); *Mt. Spokane State Park Ski Area Expansion Post-Construction Vegetation Maintenance Plan* (December 2012); *Mt. Spokane Ski and Snowboard Park Non-Native Invasive Species Management Plan* (December 2012); *Mt. Spokane Ski and Snowboard Park Hazardous Tree Management Plan* (December 2012); and the *Mt. Spokane Ski and Snowboard Park Trail Erosion Control Plan* (January 2014).

Also included in this section are conceptual mitigation strategies intended to help compensate for impacts to focal wildlife that cannot be achieved on the expansion area through BMPs, avoidance, minimization and enhancement measures. These measures are intended for application in other portions of the Mount Spokane State Park, and would require extended coordinated planning between Washington State Parks and WDFW to fully develop and implement. Preliminary discussions of these potential mitigation strategies have been conducted by these agencies.

8.1 Construction-Related Measures

During construction, the following BMPs, avoidance, minimization and enhancement measures will be applied to mitigate potential adverse impacts to vegetation and terrestrial habitats that support focal wildlife species:

- All construction staging areas will be identified and located before ground-disturbing activities begin.
- Prior to construction, ski trail clearing limits will be flagged in the field using GPS according to the approved trail layout. Flagged clearing limits will be approved by Washington State Parks before tree clearing begins.
- Ski trail construction through forested areas will include edge treatments (i.e., scalloping, feathering) to reduce the biological and visual effects of trail clearing.
- No mechanized timber harvesting equipment will be used during trail clearing or slash dispersal operations. All trees will be cut by manual methods.

[9] It is anticipated that these measures will be amended prior to initiation of construction activities to reflect the final mitigation requirements and conditions resulting from the approval process.

[10] These documents may be amended at a later date to reflect final approval conditions by Washington State Parks and/or Spokane County.

- Woody debris generated from clearing the lift and ski trails will be dispersed within the expansion area by lopping and scattering this material along trail edges, in CAO stream and wetland buffers, and by corduroy placement of larger trees felled within trails.
- To the extent possible, all understory vegetation shorter than 18 inches high will be retained during ski trail clearing, except where grading will occur.
- To the extent practical, snow cats will be used to move trees felled during tree clearing operations. snow cover is sufficient to protect the ground surface and understory vegetation from operation of over-the-snow machinery (i.e., 3 feet deep or greater and deemed sufficient by the Commission), snow cats will be used to move trees felled during tree clearing operations. When snow cover is insufficient or lacking, small trees will be moved by hand and larger trees will be left in place or cut into pieces small enough to be moved by handA limited number of informal skiing routes will be allowed through retained treed islands. Only hand clearing of trees, snags, understory vegetation, and downed woody debris will be permitted, as needed, to provide a safe travel route through the tree islands consistent with its Resource Recreation classification.
- Crews and equipment will be transported to and from work areas using snowmobiles or snow cats. When snow cover is insufficient or lacking, crews will access the work area on foot from existing roads (e.g., Summit Road, Chair 4 road). Equipment will be carried in by hand.
- Construction equipment wash stations will be established at the base of the ski area. An equipment wash station will be located at least 200 yards from any natural drainage to avoid contamination. All soiled equipment shall be washed before entering and before leaving the expansion area. This includes construction personnel vehicles in addition to trucks and other heavy equipment. Equipment wash stations will be monitored frequently and after completion of all construction activities. All weed material will be removed promptly.
- Prior to any grading, topsoil will be salvaged for use during site restoration and revegetation. All graded sites will be restored to a natural terrain appearance, unless otherwise noted in the grading plans submitted for final approval. Cut and fill slopes will be minimized at the transition between graded and existing terrain.
- Appropriate dust control measures will be instituted at staging areas and in areas subject to grading to reduce construction-related fugitive dust.
- Except for communication lines, all other utilities will be buried.
- Topsoil replacement, native plant seeding, and weed-free mulching (as necessary) will be used to stabilize disturbed soils in all areas where grading and soil disturbance will occur to promote native plant re-establishment.
- Silt fence and erosion control blankets would be used as necessary. Exposed areas would be seeded with a native seed mix and covered with straw after completion of construction. Seed mixtures will be comprised of a variety of native seed grasses, wildflowers and forbs. To avoid weed contamination, all purchased seed and mulch shall be certified weed-seed free. Preference will be given to local seed sources, cultivars, and species available

commercially. Straw cover to minimize erosion prior to completion of construction would be applied, if soil becomes saturated and/or runoff occurs from the disturbed areas.

- All construction areas and roadways within the expansion area will be monitored annually for at least five growing seasons for noxious weeds; any noxious weeds found will be treated.
- Protective riparian buffers will be established around all streams and wetlands, in compliance with the CAO (Figure 12, Tables 6 and 7)[11]. Where ski trails cross riparian buffers, tree removal from buffers will be timed and conducted in a manner that minimizes sediments entering streams and damage to associated habitats. Felled trees within riparian buffers will be left in place and supplemented with additional woody debris from adjacent areas to facilitate nutrient, sediment and energy retention; stream bank stabilization; moderation of water temperatures through shading; and wildlife habitat.
- Following construction, riparian areas disturbed by clearing for the ski lift and trails (3.9 acres, Figure 14) will be revegetated with native, low growing shrubs and herbaceous plants compatible with ski operations[12].
- Disturbed riparian buffers will be evaluated post-construction to access condition and develop site-specific enhancement prescriptions to maximize vegetative cover, soil stabilization and water quality (consistent with the Erosion and Sediment Control plan), and habitat value for wildlife. Plant suitability will be based on species present in adjacent vegetative communities, and will include species such as thinleaf huckleberry (*Vaccinium membranaceum*), Alaska blueberry (*Vaccinium alakanaense*), Sitka alder (*Alnus viridis* spp. *sinuate*), thimbleberry (*Rubus parviflorus*), twinberry (*Linnaea borealis*), beargrass (*Xerophyllum tenax*), lady fern (*Athyrium filix-femina*), and Hitchcock's woodrush (*Luzula glabrata* ssp. *hitchcockii*), depending upon availability.
- If any new populations of special status plant species are encountered during construction, work will be suspended in that area until Washington State Parks is consulted.
- Post construction mitigation will be guaranteed through bonding with Spokane County.

During construction, the following BMPs, avoidance and minimization measures will be implemented to mitigate potential adverse impacts to soils, streams and aquatic habitats that support focal wildlife species:

- A grading and erosion control plan will be developed and submitted to Spokane County for review and approval prior to implementation of construction.
- Forest clearing in areas susceptible to mass wasting will be avoided to the extent practical during final trail layout and construction. The area of grading and soil compaction will be minimized by limiting access by construction equipment. Drainage structures for stormwater and erosion control will not divert water into areas with of mass wasting potential.

[11] The width of these buffers is anticipated to be determined during the final approval process with Spokane County.

[12] The composition, extent and location of these plantings is anticipated to be included in a mitigation plan submitted to Spokane County with the necessary permit documents for approval.

- To minimize the effects of unstable slopes, the recommendations contained in the Geotechnical Report (dated November 7, 2011 by ALLWEST Testing and Engineering and included as an appendix to the EIS) will be followed.
- Protective CAO riparian buffers established around wetlands and streams will be re-identified and flagged prior to the initiation of construction activities.
- In areas where site conditions necessitate (i.e., excessively steep slopes and/or highly erosive soil types), temporary sediment detention basins will be installed to detain runoff and trap sediment. Sediment basins would be sited within the overall disturbance limits of the applicable project elements. Temporary sediment basins will be reclaimed and revegetated following reestablishment of permanent vegetation.
- On steeper slopes (>30% slope gradient) subjected to grading, jute-netting or other appropriate measures may be installed to further stabilize disturbed soils and enhance revegetation. These may include:
    - Seeding and mulching of the disturbed area.
    - Burial of the top end of the netting in a trench of at least 4 inches depth and 8 inches width. The trench shall be backfilled and tamped.
    - Netting should extend beyond the edge of the mulched and/or seeded area at least 1 foot on the sides and 3 feet on the top and bottom.
    - The netting should be rolled downslope and secured with staples or pins
    - Netting should overlap at least 4 inches on the sides and secured with staples 5 feet apart along the overlap.
    - The lower end of the uphill strip should overlap the downhill strip at least 1 foot and should be secured with staples 1 foot apart.
- MS 2000 will develop a Spill Prevention and Response Plan as part of the construction documents. Fuel, oil and other hazardous materials will be stored in structures placed on impermeable surfaces with impermeable berms designed to fully contain the hazardous material plus accumulated precipitation for a period at least equal to that required to mitigate a spill. Petroleum products will not be discharged into drainages or bodies of water. No fuels or construction machinery will be stored within stream or wetland buffers.
- Project-specific documents provided to Spokane County during final permitting will specify additional erosion protection (such as two rows of silt fence, straw bales and/or more permanent structures such as logs) to be provided between streams and construction areas close to stream channels. Water bars will be constructed within the newly disturbed areas to minimize downslope water movement through the site, and to direct sediment laden water away from stream channels. Water bars will be lined with erosion control fabric, sod, and/or mulch to prevent failures prior to the establishment of vegetation, as necessary.
- Bridge crossings installed over stream channels will be completed in a single span to avoid any in-water work. All footings will be constructed above the bankfull channel width. Additional short and long-term erosion control measures (e.g., erosion blanket, straw bales, rip-rap.) and water quality monitoring (e.g., pH, turbidity) will be specified in permit

documentation for the bridge crossings, consistent with any required Hydraulic Project Approval permitting.

- No soil-disturbing activities will be initiated during periods of heavy rain, spring runoff or in excessively wet soils.
- During vegetation clearing, dragging or pushing logs and logging debris across the soil surface will be limited to minimize soil disturbance and retained groundcover.
- Areas determined to have been compacted by construction activities will be subjected to mechanical subsoiling or scarification to the compacted depth to reduce bulk density and restore porosity.
- In all areas where grading or soil disturbance will occur, topsoil will be stockpiled and re-spread following slope grading, prior to re-seeding. The stockpiled soil will be protected from wind and water erosion.
- Immediately following completion of approved ground disturbing activities and seeding, all areas of ground disturbance will be mulched with weed-free straw, wood chips, bark, or jute mat.

During construction, the following BMPs, avoidance and minimization measures will be applied to mitigate potential adverse impacts to focal wildlife species:

- Mount Spokane 2000 will develop worker awareness procedures and training requirements to educate construction personnel on the types of sensitive wildlife and wildlife habitats in the expansion area, the environmental rules and regulations that apply to these resources, and the measures required to avoid and minimize potential adverse effects on these resources.
- A qualified wildlife biologist will conduct preconstruction surveys of the weekly construction footprint for the twenty-one focal wildlife species between March 1 and July 15. This period generally corresponds to the critical breeding and rearing life stages for birds and mammals at Mount Spokane State Park (Romain-Bondi 2009).
- If nests or den sites of focal wildlife species are identified on or adjacent to the weekly construction footprint, the nest or den sites will flagged and construction activities in that area will be suspended. Consultation will be initiated with Mount Spokane State Park staff. A plan will be developed to minimize adverse project impacts to nest or den sites, and approved by the regulatory agencies before any further construction activities can proceed in that area. Work may be relocated to an alternative site approved by the qualified wildlife biologist provided no harm would occur to focal wildlife.
- If any focal wildlife species are observed on or adjacent to the active construction area, work in the immediate area will temporarily be suspended until that individual has passively or physically been moved outside of the work area.
- If any new population of special status wildlife is encountered during construction, work will in that area be suspended until Mount Spokane State Park staff is consulted, and a plan to mitigate potential adverse impacts is developed.

- No formal ski trail clearing will occur within the retained tree islands. All large trees and snags (over 20 inches dbh) located within tree islands will be protected and retained unless they are determined by Washington State Parks to pose a potential recreational hazard.
- All construction activities will be confined to daylight hours, excluding emergencies.
- To prevent inadvertent entrapment of wildlife during construction, all excavated, steep-walled holes or trenches more than 1 foot deep will be covered at the close of each working day with plywood or similar material, and/or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If a covered species is encountered during construction work, to the extent feasible, construction activities should be diverted away from the animal until it can be safely removed by the qualified wildlife biologist.
- Plastic monofilament netting or similar material will not be used for erosion control, because smaller wildlife may become entangled or trapped in it. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.
- Mount Spokane 2000 will develop and implement a noise abatement plan to reduce potential noise impacts from construction activities. All construction equipment will be properly tuned and maintained. Practicable methods to control, prevent and minimize noise will be employed, such as use of mufflers and sound attenuation devises on equipment and vehicles.
- To avoid attracting predators, all food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in enclosed containers that are inaccessible to wildlife. Trash will be removed and disposed of at an appropriate facility at least once a week.
- Construction workers will be prohibited from feeding wildlife.
- To prevent harassment, injury, or mortality of sensitive wildlife by dogs or cats, construction workers will be prohibited from bringing these pets to the work site.
- To avoid injury or death to wildlife, no firearms will be allowed on the construction site except for those carried by authorized security personnel or local, state, or federal law enforcement officials.
- Mount Spokane State Park staff will be notified within 1 working day of the discovery of, injury to, or mortality of a focal wildlife species that results from project-related construction activities or is observed at the construction site. Notification will include the date, time, and location of the incident or of the discovery of a focal wildlife species that is dead or injured. For an injured animal, general information on the type or extent of injury will be included.

8.2 Operation-Related Measures

After construction has been completed and ski operations begin, the following BMPs, avoidance, and minimization measures will be applied to limit potential adverse impacts to focal wildlife species and their habitats. These measures will remain in force throughout the life of the ski area, unless modified by Washington State Parks:

- No nighttime skiing will occur in the expansion area, Nighttime disturbance for snow grooming will be limited to several hours during the early evening or morning hours.
- Nighttime lighting in the expansion area will be limited to the greatest extent practicable and only include safety lighting around the top and bottom terminal structures and nighttime grooming equipment. All facility lighting will be screened and directed downward, away from the night sky.
- Mount Spokane 2000 will develop worker awareness procedures and training requirements to educate maintenance personnel on the types of sensitive wildlife and wildlife habitats in the expansion area, the environmental rules and regulations that apply to these resources, and the measures required to avoid and minimize potential adverse effects on these resources.
- Mount Spokane 2000 will develop and implement a noise abatement plan to reduce potential noise impacts from maintenance activities. All equipment will be properly tuned and maintained. Practicable methods to control, prevent and minimize noise will be employed.
- Trash will be kept in receptacles that are inaccessible to wildlife, and will be emptied regularly. Signs will be posted prohibiting the feeding of wildlife.
- Unless authorized by Mount Spokane State Park staff, once the ski season closes the ski area maintenance activities in the expansion area will be limited until after July 15th to minimize potential adverse effects to the twenty-one focal wildlife species. A review of birds and mammals on the focal species list indicates that critical breeding and rearing life stages generally occur prior to July 15 at Mount Spokane State Park (Romain-Bondi 2009). Should maintenance be required before August 1, monitoring will be conducted by a qualified wildlife biologist in the area where the activity is planned. If the monitoring detects active use by focal wildlife species, and unacceptable adverse impacts are anticipated in consultation with Washington State Parks and WDFW, an avoidance/protection plan will be developed.
- All vegetation maintenance will be timed and conducted in a manner that minimizes sediment entering streams, and damage to wetland and riparian habitats. Routine maintenance shall avoid streams, wetlands and their riparian buffers. Vehicles and equipment will not be permitted to cross streams, wetlands and riparian buffers during non-snow periods. All activities within stream and wetland buffers must be in compliance with the Spokane County CAO.
- Maintenance within meadow habitat will be performed in a manner that limits or prevents damage to this habitat. Mechanized equipment during winter will only be allowed in meadows when snow depths are sufficient to prevent contact with vegetation. Outside of the ski season, mechanized equipment will be kept off meadows except where approved by Washington State Parks. If bare soil is exposed or erosion occurs in meadows, these areas will be restored with native plants and monitored for noxious weeds.
- Only limited hand clearing of trees, snags, understory vegetation, and downed woody debris will be allowed within treed ski islands, to the extent needed to maintain safe travel routes

through the tree islands. Any vegetation removal will require prior approval from Washington State Parks.

- Potentially hazardous trees will be inspected, evaluated and managed consistent with the Mt. Spokane Ski and Snowboard Park Hazardous Tree Management Plan. When appropriate, the main trunk of a hazardous tree identified for removal may be retained for wildlife habitat, as determined by Washington State Parks.
- During winter, mechanized equipment will only be allowed in talus habitats when snow depths are sufficient to prevent contact with the rocky substrate. During the summer months, use of machinery or other activities that disturb the rock environment will be kept to a minimum to limit disturbance to pika which may occupy talus habitat.
- Vegetation within ski trails will be managed to a height of 18 inches to allow for safe winter recreation, but limit erosion and maintain vegetative cover for wildlife use. Equipment will access the site over snow, when practical to prevent equipment from breaking through the snow and damaging the vegetation and topsoil. Access in snow-free periods will be limited to low impact equipment such as 4WD ATVs managed in a manner that minimizes damage to topsoil and vegetation. Streams, wetlands, their CAO buffers, and meadows will be avoided after snow melt. Any disturbed or sparsely vegetated areas will be restored using native species and geotextiles, as needed, to minimize erosion and the spread of noxious weeds.
- In consultation with Washington State Parks, Mt Spokane 2000 will develop an Integrated Pest Management Plan (IPM) that includes measures to prevent the spread of invasive plant species in the expansion area. Treatment options will include prevention (e.g., seeding, use of certified weed free seed fill, vehicle cleaning, weed removal before seed set); cultural (e.g., mulch, proper plant selection for site conditions, proper site preparation); mechanical (e.g., mowing, hand pulling, and other physical methods); chemical (e.g., herbicides); and biological (e.g., insects, disease parasitoids) measures, as well as monitoring for treatment success.
- Pesticides and herbicides will be used in accordance with the manufacturer recommended uses and applications, and in such a manner as to prevent primary or secondary poisoning of fish and wildlife. Any use will comply with Washington State Department of Agriculture's rules for licensing, posting and documentation; copies of spray records will be submitted annually to Washington State Parks.
- An equipment wash station will be established at the base of the ski area prior to any ground-disturbing activities. The wash station will be located at least 200 yards from any natural drainage to avoid contamination. All soiled vehicles and equipment shall be washed before entering and before leaving the expansion area. Equipment wash stations will be monitored frequently and after completion of all activities. All weed material will be removed promptly.
- Vehicles designated as "town run" transports shall not be used for mountain travel or maintenance, whenever practicable.
- After the ski season ends and prior to maintenance operations beginning, Operations Personnel will review descriptions of noxious weeds known to occur on Mount Spokane. It

is the responsibility of all mountain personnel to be on the lookout for and to report any invasive weed species observed to the Operations Manager.

- All maintenance personnel will be responsible for hand pulling, bagging and removing from the mountain any small patches of noxious weeds encountered. The location and species will be reported to the Operations Manager for follow-up control work, as needed. Larger patches of noxious weeds will be reported to the Operations Manager so that an effective control plan can be developed.
- Maintenance personnel must maintain separate mountain-specific clothing on-site, to be worn whenever working in those areas that lie outside of the base area.
- The perimeter of the cleared ski trails will be monitored annually with GPS to prevent ski trail encroachment over time into adjacent forested habitat.

8.3 Conceptual Mitigation Strategies

The mitigation measures described above have been designed to help alleviate impacts to focal wildlife species and their habitats during the construction and operation of the proposed ski area expansion. Included are measures to restore and enhance disturbed habitats within the expansion area that are compatible with ski area operations (e.g., management of woody debris, riparian restoration using low-growing native shrubs, revegetation of ski trails using native species). Nevertheless, ski area expansion will result in unavoidable adverse effects to some focal wildlife that cannot be entirely mitigated by the suite of mitigation measures proposed, particularly species that require large expanses of mature forest and the habitat complexity they provide (e.g., large trees, canopy layering, abundant large snags, extensive woody debris. Clearing and grading required to construct the ski lift and trails will convert about 73.26 acres of mature forest and woodland habitats to a managed herbaceous-low shrub community for the life of the ski area; permanent habitat removal will be limited to about 1.31 acres required to site the chair lift terminals and lift towers pads. Some species that use the expansion area will incur additional impacts caused by fragmentation of forest habitats, and from disturbance and displacement caused by winter recreational use. Impacts to focal wildlife species and their habitat are described in detail in Section 7 of this report.

The following conceptual mitigation strategies are intended to highlight additional measures that could be implemented to further offset remaining unavoidable ski expansion impacts to focal wildlife species. These measures are intended for application in other portions of the Mount Spokane State Park outside of the expansion area, and would require extended coordinated planning between Washington State Parks and WDFW to fully develop and implement. Preliminary discussions of these potential mitigation strategies have been conducted by these agencies.

Modification of Land Classifications

WAC 352-16-020 establishes a Land Classification System (LCS) for management of State Park Lands. The LCS is a management zoning system for park lands and waters that sets forth, in a general fashion, the basic philosophy, physical features, location, activities, and developments in a park. Six land classifications are recognized: Natural Area Preserve, Natural Areas, Natural Forest Area, Resource Recreation Area, Recreation Area, and Heritage Area. Each classification sets an appropriate intensity for recreational activities and facilities development. Classifications are

aligned along a spectrum ranging from low to high-intensity recreational uses and developments. By classifying park lands, the agency is able to consciously strike a balance between protecting park resources and providing an appropriate variety of recreational opportunities to park visitors.

One potential strategy to provide additional compensation for unavoidable ski expansion impacts to focal wildlife species would be to reclassify selected lands in the Park to a classification that provides additional protections for wildlife. For example, an evaluation of other Recreation and Resource Recreations lands in the Park, lands designated for low- to high-intensity outdoor recreational use, could be conducted to identify those lands that provide important wildlife functions for key species such as breeding habitat, wintering habitat or movement corridors. These parcels could be re-designated as Natural Areas or Natural Forest Areas to provide additional protections for natural resource features that benefit wildlife, while reducing designated recreational uses to low intensity, subordinate functions. Such reclassification would ensure that wildlife derive increased long-term benefits that would help sustain local wildlife populations within the Park boundary, and help support regional populations and population interconnectivity.

Protective Covenants

Another strategy to provide additional compensation for unavoidable ski expansion impacts would be to add protective covenants to the existing land classifications of selected parcels that would afford long-term benefits to focal wildlife species. The covenants should be more protective and offer greater wildlife value than a re-classification of the lands. Protective covenants could include placement of additional restrictions on activities within the remaining State Parks owned lands that lie outside the ski expansion area, such as not allowing the construction of supporting facilities for recreational users (e.g., lodges or warming huts); restricting the development of future trails; permitting only low-intensity recreational uses such as hiking, snowshoeing or berry picking; and prohibiting overnight camping. Protective covenants could also be applied to select Park lands outside the PASEA, where specific restrictions could be tailored to help meet the specific habitat and life history needs of focal wildlife species.

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Appendix A

Qualifications and Certifications of Daniel W. Baber
- Resume
- Professional Wildlife Biologist Certification, The Wildlife Society

Qualifications and Certifications of Pablo Herrera
- Resume

Qualifications and Certifications of Lori Anderson
- Resume

DANIEL W. (BILL) BABER, PHD

Senior Wildlife Biologist

Bill Baber specializes in wildlife and wetlands ecology, natural resource assessment, mitigation design and implementation, NEPA and ESA compliance, and project management. His experience includes projects related to aviation, transportation, hydroelectric, landfill, water storage, mining, nuclear energy, destination resort, residential development, ROW, forest management and habitat restoration throughout the Pacific West. Bill has researched and managed game and nongame species, including mule and black-tailed deer, Roosevelt elk, wild pigs, bald eagles, raptors, upland game birds, furbearers, and red-legged frogs. He has conducted inventories, habitat assessments, and monitoring for wildlife and wetland habitats; evaluated wildlife aviation risk in compliance with FAA requirements, including preparation of wildlife hazard assessments and wildlife hazard management plans; prepared NEPA compliance documents such as EAs and EISs; assessed impacts to threatened and endangered plants and animals by means of BAs, BEs, survey and manage species reports, and no-effect letters; designed and implemented comprehensive mitigation plans to meet permitting and license requirements, including habitat-based forest management programs that maintain long-term forest productivity while enhancing wildlife habitat value; and prepared local permitting/compliance documents (significant natural resource inventories, natural resource assessments). Bill's wetland experience includes wetland delineations, functions and values assessments, Section 404 permit applications, wetland mitigation design, wetland monitoring, and wetland mitigation banking.

Years of Experience

- Professional start date: 10/1985
- ICF start date: 10/1985

Education

- PhD, Wildlife Science, Oregon State University, Corvallis, 1985
- MS, Biology (Ecology emphasis), Florida Institute of Technology, Melbourne, 1978
- BS, Biology (Marine emphasis), Florida Institute of Technology, Melbourne, 1976

Professional Memberships

- The Wildlife Society
- American Society of Mammalogists

Certifications

- Certified Wildlife Biologist, The Wildlife Society, 1990
- Qualified Airport Wildlife Biologist, 2009

Training

- Airport Wildlife Hazard Management
- BAs, ODOT
- BAs, WSDOT
- HEP

Key Skills

Natural Resource Assessment and Mitigation Planning. Bill has extensive experience assessing development-related impacts to wildlife and their habitats throughout the Pacific West and designing appropriate mitigation to satisfy permitting required by local, state, and federal agencies. He has supported projects and permitting in habitats ranging from wetlands, riparian, grassland, shrub-steppe, temperate forest, alpine, and desert communities. Bill's high-quality analyses, attention to detail, and high level of responsiveness to clients and regulators underlies a competency to resolve complex technical, regulatory and interagency issues.

ESA Compliance. Bill has more than 25 years of experience addressing threatened and endangered species issues throughout the West. He has prepared more than 20 BAs and BEs,

worked on two HCPs, and completed numerous no-effects letters for sensitive wildlife and plant species in Oregon, Washington, Idaho, California, and Florida. These consultations have served the needs of diverse private and public sector clients and have often addressed programmatic management approaches applicable to large resource areas and jurisdictions.

Aviation-Wildlife Hazard Management Planning. Bill has been evaluating wildlife-aviation risk in compliance with FAA requirements and 14 CFR-Part 139.337 since 2002. He completed the Airport Wildlife Hazard Management Workshop through Embry-Riddle Aeronautical University (ERAU) in May 2009 and was deemed qualified as an Airport Wildlife Biologist by ERAU in December 2009. Bill has prepared or assisted in the preparation of WHAs and WHMPs at Portland International Airport (PDX), San Francisco International Airport (SFO), and Hillsboro Airport (HIO), a general aviation airport.

Project Management. Bill has managed a wide variety of natural resource-related projects throughout the West. His responsibilities include preparing project scopes, budgets and schedules; report preparation; client and regulatory agency coordination; invoicing and budget management; subcontractor management; quality control; and product delivery. He is highly organized and detailed oriented, and he readily anticipates and resolves issues to keep projects on track and within budget.

Project Experience

Transportation—Roads, Bridges, and Highways

Buena Vista Ferry Replacement—Oregon Department of Transportation (ODOT), Marion County, Oregon

Served as contract manager. The Buena Vista ferry connects Buena Vista Road on the east and west sides of the Willamette River and is considered a “mobile bridge” for transportation purposes. The project involves the replacement of the ferry boat and deteriorating car ramps that access the ferry, upgrading the ferry from diesel to electric by installing overhead electric power and support, and installing a low water cable. It is divided into three phases—the design acceptance package, the performance standards and evaluation package, and construction administration/construction engineering and inspection services. Phases 1 and 2 have been completed; Phase 3 is near completion. ICF provides overall contract management and is responsible for wetlands and cultural resources permitting and landscape management design. The Buena Vista project is funded through the ARRA.

North Portland Road/Columbia Boulevard Intersection Development Project—ODOT and Portland Bureau of Transportation, Multnomah County, Oregon

Served as contract manager. The North Portland Road/Columbia Boulevard intersection lies between two major industrial areas in north Portland—the Rivergate and the Columbia Corridor Industrial Districts—which contain the highest concentration of industrial sector employment in the Portland Metro region. ICF and a team of subconsultants is assisting the Portland Bureau of Transportation in developing a concept plan for reducing or possibly eliminating through truck traffic from using these streets to proceed through St. Johns’ residential neighborhoods. The planning process and development of alternatives is being informed by input from a technical advisory committee, a stakeholder committee, traffic studies, and engineering assessments.

The project will identify a range of transportation systems and operational improvements to achieve identified goals and objectives.

Time Oil Road Turtle Underpass Design—Port of Portland, Multnomah County, Oregon

Served as project manager. Reviewed available information on the design and construction of small-animal underpasses. Designed a generic underpass system to allow safe passage of western painted turtles and other small animals under Time Oil Road. The underpass system included orientation/exclusion fencing and a single underpass linking wildlife habitat areas. Monitoring of the constructed underpass has documented its use by turtles and a wide variety of other wildlife species.

Mt. Hood Corridor Project BA—ODOT and FHWA, Clackamas County, Oregon

Served as project coordinator. Prepared wildlife sections and directed preparation of fish and plant sections of combined programmatic BA, BE, and biological analysis that addressed potential impacts of future transportation projects along 13-mile segment of Highway 26 traversing Mt. Hood National Forest. A no-build alternative and three build alternatives, each containing four widening options, were considered. A total of 39 plants and animals were evaluated in the programmatic document (seven fish, 24 wildlife, four plant, and four invertebrate species), including the northern spotted owl, peregrine falcon, bald eagle, bull trout, and steelhead. Included findings on rare, threatened, and endangered species in the project EIS.

Historic Columbia River Highway BA—ODOT, Wasco County, Oregon

Served as project manager. ODOT intends to restore the Hood River to Mosier segment of the Historic Columbia River Highway and reopen it for recreational use. Managed preparation of a BA evaluating project effects on peregrine falcons. Prepared a three-year monitoring plan for a peregrine falcon eyrie located near the project and conducted baseline monitoring.

Highway 58 Upgrade Project—ODOT, Lane County, Oregon

Served as project manager. Directed the preparation of BAs (northern spotted owl, peregrine falcon, bald eagle) and Forest Service BEs to assess impacts on threatened, endangered, and sensitive wildlife that may be affected by construction of three passing lane segments between Oakridge and crest of Cascades. Supervised the collection of data on northern spotted owls in the project vicinity for two years.

Highway 20 Realignment Project—ODOT, Lincoln County, Oregon

Served as project manager and wildlife expert. ODOT proposes realignment, roadway widening, and construction of passing lanes over approximately 12.5 miles of Highway 20 through the Oregon Coast Range. I prepared BAs to evaluate the effects of the proposed upgrades on the northern spotted owl, marbled murrelet, and northern bald eagle. Supervised protocol surveys for spotted owls and marbled murrelets in the project vicinity.

Highway 224 Slide Repair Project—ODOT, Clackamas County, Oregon

Served as project coordinator and wildlife expert. Prepared the wildlife section and directed the preparation of the fish and plant sections of a Biological Evaluation that analyzed the impacts of

repairing a slide-prone portion of Highway 224 within the Mt. Hood National Forest. Two fish, five wildlife, and two plant species were considered in the Biological Evaluation.

Energy

Western Energy Power Administration Transmission Line Maintenance and Vegetation Management Reauthorization EIS—Western Energy Power Administration and US Forest Service, Colorado, Utah, and Nebraska

Served as wildlife subject matter expert. Western Area Power Administration operates and maintains approximately 273 miles of electrical transmission lines covering a total of approximately 4,055 acres on National Forest System lands in Colorado, Utah, and Nebraska. Western proposes to improve vegetation management and maintenance practices in these ROW areas using an integrated vegetation management (IVM) approach. Responsible for evaluating the potential environmental effects of revising Western's vegetation management practices on wildlife and wildlife habitat, including rare, threatened and endangered wildlife, migratory birds, and big game. Direct, indirect, and cumulative effects were considered for the Proposed Action and the No Action Alternative.

Levy Nuclear Power Project EIS—NRC, Levy County, Florida

Served as terrestrial ecology subject matter expert. Evaluated the potential environmental effects to terrestrial resources of a proposed nuclear power facility at a 3,105 acre greenfield site located on the north central coast of Florida. Associated offsite facilities also addressed in the EIS included a heavy haul road; barge slip and barge slip access road; makeup and blowdown pipelines, including associated cooling water intake and discharge structures; and approximately 180 miles of transmission lines required to incorporate the power into the Florida electrical grid system. Responsibilities include participation in the acceptance review, site audit, public scoping, development of requests for additional information (RAIs), review of RAI responses, preparation of draft NEPA EIS text, response to public comments on the draft EIS, preparation of final NEPA EIS text, preparation of a BA, and assisting NRC counsel with addressing intervenor contentions.

Altamont Pass Wind Resource Area Avian Monitoring Project—Alameda County Community Development Agency, California

Serves as wildlife expert. ICF is conducting long-term avian impact analyses at the Altamont Pass Wind Resource Area (APWRA) in central California. The APWRA supports 5,400 wind turbines distributed over about 50,000 acres. We conduct rigorous annual monitoring and robust experimental analysis of seasonal and site-specific shutdown of high-risk turbines to inform strategies for repowering the APRWA with new generation wind turbines. Assisted with the preparation of the annual avian fatality monitoring reports, prepared the findings of a study to evaluate the effects of a short-search interval (48-hour) monitoring on the detection of bird fatalities, and prepared the findings of a study to assess the effects of vertebrate scavenging on bird carcass detectibility.

Big Eddy-Knight Transmission Line Project—BPA, Oregon and Washington

Served as wildlife expert. BPA is proposing to construct a new 500kV transmission line from The Dalles, Oregon, to a new substation north and east of Goldendale, Washington. Assisted

BPA in evaluating the likely impacts to wildlife resources within the multiple proposed alignments under consideration, with special focus on Forest Service and Columbia River Gorge National Scenic Area sensitive species. Wildlife assessments were incorporated into an EIS prepared by BPA. Drafted responses to wildlife comments on the draft EIS.

Kaweah Hydroelectric Project—Tulare County, California

Served as project manager. Coordinated study of rare, threatened, or endangered plant and animal species in support of FERC relicensing project. Used wildlife habitat relationships system to assist in evaluation of wildlife habitat suitability. Evaluated golden eagle, goshawk, great gray owl, wolverine, fisher, kit fox, yellow-legged frog, and golden trout.

Salt Caves Hydroelectric Project—Klamath County, Oregon

Served as wildlife expert. Conducted studies to determine migratory black-tailed deer and bald eagle use of Klamath River Canyon, participated in interagency HEP study to quantify impacts and evaluate mitigation, developed comprehensive wildlife mitigation plan, wrote wildlife section of FERC hydroelectric license application Exhibit E, and responded to FERC requests for additional information.

Garden Bar Dam and Reservoir Water Power Project—Nevada and Placer Counties, California

Served as wildlife task leader. Conducted studies to evaluate impacts on migratory mule deer in foothills of western Sierra Nevada. Developed conceptual wildlife mitigation plan HEP, prepared wildlife section of FERC hydroelectric license application Exhibit E, responded to FERC requests for additional information, and negotiated with resource agencies on client's behalf.

Guadalupe Oil Field Remediation Project—San Luis Obispo County, California

Served as wildlife ecologist. Assisted in review of CEQA EIR and ecological risk assessment that addressed impacts from remediation of 20-million gallon spill of diluent (a diesel-type liquid) at site along the central coast of California.

Cowlitz Falls Hydroelectric Project—Lewis County Public Utility District, Washington

Served as project manager. Prepared and managed implementation of fish and wildlife mitigation at 70MW hydroelectric project constructed in western Washington. Prescribed mitigation measures focused on big game, bald eagles, ruffed grouse, forest management, wetlands, shoreline/riparian management, and fishery enhancement. Conducted or managed on-ground work, including forest management to benefit wildlife, meadow creation, development of diked reservoir subimpoundments, island creation and planting, reclamation and management of reservoir and riverine riparian habitat, forest reclamation, tributary stream habitat improvements, bald eagle management, and enhancement of transmission line corridor.

Power Line Upgrade EA—Consumers Power, Inc., and Siuslaw National Forest, Benton, Lane, and Lincoln Counties, Oregon

Served as project manager. Consumers Power, Inc., proposed to upgrade four power line segments that cross federal, state, municipal, and private lands in the central Oregon Coast Range. Directed project scoping; developed issues and alternatives; prepared supporting BA and BE; conducted surveys for special-status plants and animals; and prepared EA and

decision notice. Assessed impacts on biological resources, special-status plants and animals, cultural resources, visual resources, recreation, and public services.

Transportation—Airports

Walla Walla Regional Airport Wildlife Hazard Assessment—Port of Walla Walla, Washington

Served as qualified airport wildlife biologist. ICF and WH Pacific are conducting a WHA for Walla Walla Regional Airport in compliance with FAA requirements pursuant to 14 CFR Part 139.337. Baseline information is currently being collected on wildlife occurrence and wildlife habitats on and around the airfield, and a wildlife-aviation strike record is being compiled. Once baseline monitoring is complete, problematic wildlife conflicts with airport activities will be described and recommended actions to reduce wildlife-aviation hazards will be developed. If mandated by the FAA, ICF and WH Pacific will work collaboratively with Wall Walla Regional Airport to prepare a WHMP.

Wildlife Hazard Management Plan—San Francisco International Airport, California

Served as Qualified Airport Wildlife Biologist. As part of a collaborative ICF team, assisted SFO in revising its WHMP in compliance with FAA requirements and 14 CFR-Part 139.337. The WHMP delineates the responsibilities, policies, procedures, and regulations to reduce wildlife-aircraft hazards. FAA guidance requires that airports take steps to limit the risk of airplane strikes by creating and following a WHMP. ICF reviewed the current WHMP and assessed current strategies for minimizing bird use of the airport and areas within two miles of the airport. We reviewed the current WHMP, mapped general habitat types within a two-mile radius of SFO, identified habitat types and land uses known to be attractive to species that pose a potential hazard to aviation, and analyzed bird strike and wildlife activity data. Using this information, ICF prepared an update of the WHMP.

Shadow Unmanned Aircraft Systems Training Facility EA—Corps of Engineers, Kittitas and Yakima Counties, Washington

Served as terrestrial ecology subject matter expert. The Yakima Training Center (YTC) is a 327,000-acre subinstallation of Joint Base Lewis/McChord (JBLM) that serves as a desert-style training complex for soldiers stationed at JBLM, the Army National Guard, Special Operations Command, Marine Corps, Air Force, Navy, and Coast Guard units, local and federal law enforcement agencies, and allied forces from Canada and Japan. The U.S. Army is proposing to construct a Shadow Unmanned Aircraft System (UAS) training facility on the northern portion of YTC, consisting of a runway and parking lot. The training facility is needed to support mission-critical military training for operating Shadow UAS. I was responsible for evaluating the potential environmental effects of implementing the proposed action at two alternative sites. Resource areas I addressed in the EA included geomorphology and hydrology; vegetation; fish and wildlife; and threatened and endangered species.

Hillsboro Airport WHMP and WHA—Port of Portland, Oregon

Served as project manager and wildlife task leader. Assisted the Port of Portland (Port) in assessing potential wildlife hazards at HIO and prepared a WHMP to alleviate or eliminate those hazards. Since HIO is a general aviation airport that does not currently service scheduled air

carrier aircraft, it is not obligated to develop and maintain a WHMP. Nonetheless, aviation safety is paramount in the Port's airport management objectives for HIO. The WHMP followed the process completed to address aviation safety concerns at Portland International Airport, and complied with the requirements outline in 14 CFR Part 139.337 regarding WHA and management. By preparing a WHMP that meets 14 CFR Part 139.337 standards, HIO will be able to readily demonstrate compliance with the standards should air carrier aircraft operations begin at the airport.

Hillsboro Airport Helipad Project—Port of Portland, Hillsboro, Oregon

Served as project manager. The Port proposed to build a helicopter training pad on the northeast side of HIO to alleviate noise problems caused by the current flight pattern of helicopter training. In support of this project, directed the preparation of a wetlands delineation on lands around the helipad, a joint Corps and Oregon Department of State Lands Section 404/removal-fill permit application to place fill material into jurisdictional wetlands and other waters, and a Clean Water Services (CWS) natural resource assessment to establish and mitigate the loss of protective buffers around wetlands and other water quality sensitive areas. Obtained a CWS service provider letter as part of the land use application for the project and a no-effects letter for NMFS documenting that the proposed project would not impact threatened or endangered salmonids.

Portland International Airport SW Quad Safety Fill Project—Port of Portland, Multnomah County, Oregon

Served as wildlife task leader. The purpose of the project was to remove from the SW Quad those habitat elements (i.e., wetlands, open water, trees) that were serving as attractants to wildlife species posing a wildlife strike hazard to aircraft operations, in compliance with FAA regulatory mandates. Specifically, the project involved converting a stormwater conveyance canal to an underground piped structure, filling adjacent wetlands and remnant drainage ditches, removing associated riparian forest patches, and modifying some existing grassland areas. Prepared a natural resource assessment for riparian habitat, described and mapped wildlife habitats, numerically assessed wildlife value using the Wildlife Habitat Assessment rating system, directed a City of Portland environmental review, and prepared a BA addressing impacts to proposed, threatened or endangered species associated with filling 3.94 acres of wetlands and other waters.

Alcoa Wildlife-Aviation Risk Report—Port of Portland, Multnomah County, Oregon

Served as project manager and wildlife task leader. Evaluated potential restoration opportunities on the former Alcoa/Reynolds Metals Company property with regard to the risk that wildlife expected to use the restored areas could pose to aviation operations at the nearby Troutdale Airport, a general aviation airport. A baseline description of natural resources was prepared for the site that included surface waters, wetlands, fish and wildlife resources, threatened and endangered species, and cultural resources. Conceptual restoration treatments were evaluated for potential wildlife-aviation risk based upon a qualitative aggregation of the treatment distance to the airfield, treatment location relative to the runway protection zone, potentially hazardous wildlife likely to be attracted by the treatment, and how the distribution of existing habitats across the landscape could influence movement patterns of potentially hazardous wildlife.

Portland International Airport WHMP, BA, and NEPA EA—Port of Portland, Multnomah County, Oregon

Served as project manager and wildlife task leader. Assisted the Port in revising the WHMP for PDX, in compliance with FAA requirements and 14 CFR-Part 139.337. The WHMP presents an integrated and adaptive program to effectively manage risk at PDX by reducing the probability of occurrence of wildlife/aircraft collisions. The risk management techniques and protocols adopted in the WHMP include wildlife control procedures to discourage, disperse, and remove wildlife species of concern from the airfield vicinity; habitat modification practices to reduce the attractiveness of lands on and around the airport to wildlife species of concern; research and development projects to gather data and field test new equipment and techniques; and information and education programs to articulate the hazards wildlife can pose to the safe operation of aircraft. Implementation of the WHMP is based upon management strategies developed to address the wildlife hazards unique to specific management areas identified at PDX. In support of the WHMP, prepared a BA evaluating plan impacts to proposed, threatened, and endangered species and prepared the wildlife sections of a NEPA EA that addresses the environmental impacts associated with implementing the management strategies developed in the plan.

Portland International Airport Airfield Safety Improvement Project BA—Port of Portland, Multnomah County, Oregon

Served as wildlife task leader. The Port proposes to fill 8.25 acres of wetlands adjacent to runways. The wetlands pose operational and safety hazards to aircraft by attracting certain wildlife hazardous to aircraft and by impeding movement of emergency vehicles in event of an aircraft incident. Assisted in preparing a BA that evaluated impacts of proposed action on wildlife and plants.

Portland International Airport Wildlife Hazard Assessment—Port of Portland, Multnomah County, Oregon

Served as project manager and wildlife task leader. Prepared a WHA for PDX to fulfill FAA requirements pursuant to 14 CFR Part 139.337(b). Baseline information on wildlife and wildlife habitats within 10,000 feet of PDX was summarized and assessed in relation to potential aviation safety concerns. Based upon an evaluation of the wildlife observation data and wildlife-aircraft strike records collected at PDX, as well as those factors that contribute to strike probability (e.g., wildlife abundance, habitat use patterns) and harm (e.g., body size, flocking behavior), a list of those wildlife species considered to pose the greatest wildlife strike hazard to aircraft (i.e., wildlife species of concern) was developed. The suitability of wildlife habitats surrounding PDX to support wildlife species of concern was reviewed, and recommendations were provided to aid in wildlife risk management at PDX

Parks, Trails, and Open Space

Middle Kyle Canyon Complex EIS Management Indicator Species Report—Forest Service, Clark County, Nevada

Served as wildlife task leader. Prepared a management indicator species (MIS) report for a 4,000 acre recreational development proposed by the Forest Service within the Spring Mountains National Recreational Area (SMNRA). The proposed development included a visitor

center; camping and picnic areas; amphitheater; hiking and biking trails; and Forest Service administrative offices, among other features. The report evaluated the effects of the proposed development on designated MIS wildlife and plants in the SMNRA.

Wauna Remediation Site Wetland Mitigation Project—Georgia-Pacific Corporation, Clatskanie, Oregon

Served as project manager. Assisted Georgia-Pacific with permitting issues for a wetland fill required under a joint federal/state remediation plan. Services provided included developing a conceptual wetland mitigation plan to restore a former wetland along the Columbia River that was degraded when a retaining dike to contain dredged material failed, managing construction activities (excavation, grading, planting and seeding) to restore the 0.6 acre mitigation site; preparing an as-built report documenting wetland restoration efforts; and monitoring the restored wetland for five years in compliance with Corps and Oregon Department of State Lands requirements.

Claremont Wetland Mitigation Project—The Marshall Grimberg Group, Washington County, Oregon

Served as wetland task leader. Designed the wetland planting plan and monitored installation of shrubs and trees on a 6.6-acre wetland enhancement site along Bronson Creek. Negotiated a modification to a joint Section 404/removal-fill permit that altered a portion of the upland buffer to mitigation wetland. Oversaw on-site mitigation monitoring and prepared annual monitoring reports (six years) for submittal to state and federal agencies.

Development Projects

Maletis Property Residential Development—West Hills Development, Washington County, Oregon

Served as terrestrial task leader. Supported West Hills Development with natural resource permitting for a proposed 11 acre residential development consisting of 114 multi-family dwellings in 6 buildings and 2 single-family lots. Services provided include: preparing a Clean Water Services (CWS) natural resource assessment to establish and mitigate the loss of protective buffers around wetlands; obtaining a CWS service provider letter to support the land use application; preparing a Significant Natural Resources Inventory consistent with Section 422 of the Washington County Community Development Code; and preparing a Joint Section 404/Removal-Fill Permit application to address permanent and temporary development impacts to state and federally regulated wetlands.

PDX Logistics Center ESA No Effects Determination—Port of Portland, Multnomah County, Oregon

Served as terrestrial ecology subject matter expert. ICF prepared an Endangered Species Act no-effect letter (NOEL) on behalf of the Port of Portland that demonstrates proposed development at the Portland International Airport Logistics Center site will have no measurable effect on fish, wildlife and plant species listed under the ESA. I addressed listed wildlife (2 species) and plants (5 species) in the NOEL. The proposed action requires the issuance of a Clean Water Act Section 404 Permit (a federal action) for the fill of on-site wetlands that have

reformed on the site since previously existing wetlands were filled in 2004 and 2005. The NOEL satisfied ESA compliance requirements for the issuance of the permit.

North Bethany Creek Development and Street P15 Project—West Hills Development and Washington County Land Use and Transportation Department, Washington County, Oregon

Served as terrestrial task leader. Supported West Hills Development and Washington County with natural resource permitting for an integrated residential subdivision (15 acre, 51 residential lots) and county road project. The project includes restoration of a 500 ft section of stream channel piped since before 1936 for agricultural development. Services provided include: preparing a Clean Water Services (CWS) natural resource assessment to establish and mitigate the loss of protective buffers around wetlands; obtaining a CWS service provider letter to support the land use application; preparing a Significant Natural Resources Inventory consistent with Section 422 of the Washington County Community Development Code; and preparing a ESA no-effect letter demonstrating the action would have no measurable effect on listed wildlife and plant species.

Arbor Heights East Residential Development—West Hills Development, Washington County, Oregon

Served as terrestrial task leader. Supported West Hills Development with natural resource permitting for a 22 acre, 77 lot residential development. Services provided include: preparing a Clean Water Services (CWS) natural resource assessment to establish and mitigate the loss of protective buffers around wetlands; obtaining a CWS service provider letter to support the land use application; preparing a Significant Natural Resources Inventory consistent with Section 422 of the Washington County Community Development Code; conducting a wildlife salvage operation during the draining and removal of a small pond; and preparing a post construction report documenting as-built conditions for compensatory mitigation involving enhancement of a riparian corridor.

Portland International Center EA—Port of Portland, Multnomah County, Oregon

Served as terrestrial task leader. Prepared the terrestrial sections of a NEPA EA for the Portland International Center (PIC), a 458-acre master-planned, mixed-use plan district located on the west side of PDX. The PIC includes office, retail, hotel, and a variety of light industrial/employment uses (including aviation-related uses) subject to the agreement between the FAA and the Port. The FHWA was designated as a cooperating agency for the purpose of identifying the potential effects of the proposed project on federal highways The EA was prepared consistent with FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures* (FAA 2004), and FAA Order 5050.4A, *Airport Environmental Handbook* (FAA 1985). In support of the EA, prepared a no-effects letter documenting project effects on federally listed threatened and endangered species.

Arbor Lakes Residential Development—West Hills Development, Washington County, Oregon

Served as terrestrial task leader. Supported West Hills Development with natural resource permitting for a large, multiphase residential development. Services provided include preparing wetland functional assessments, joint Section 404/removal-fill permit applications, and

compensatory wetland mitigation plans for the wetland impacts. CWS natural resource assessments were also prepared to establish and mitigate the loss of protective buffers around the wetlands, and CWS service provider letters were obtained as part of the phased land use applications for the project. As-built reviews of wetland and upland buffer mitigation implementation were completed. Annual monitoring for an onsite compensatory wetland mitigation site was completed.

Tract W Red-Legged Frog Assessment—GS Properties, Multnomah County, Oregon

Served as project manager and monitor. Assessed impacts on a large breeding population of northern red-legged frogs from a multifamily development in the West Hills area of Portland. Collected two years of pre-project baseline data and conducted seven years of post-construction monitoring. Annual monitoring included red-legged frog breeding surveys (egg mass counts), water quality assessments (monthly water temperature, dissolved oxygen, conductivity, pH, turbidity, and contaminant evaluations), water level monitoring, and vegetation surveys.

Arbor Heights and Arbor Crossing Residential Developments—West Hills Development, Washington County, Oregon

Served as project manager. Supported West Hills Development with natural resource permitting for two residential developments. Services provided included preparing separate wetland delineation reports, wetland functional assessments, and joint Section 404/removal-fill permit applications for each project and developing a combined compensatory wetland mitigation plan for the wetland impacts. CWS natural resource assessments were also prepared for each project to establish and mitigate the loss of protective buffers around the wetlands, and CWS service provider letters were obtained as part of the land use application for the projects. Both projects have been permitted and constructed.

Rivergate Sensitive Species Assessment—Port of Portland, Multnomah County, Oregon

Served as wildlife task leader. Conducted wildlife habitat suitability assessments for western meadowlark, streaked horned lark, and western painted turtle on two sites in the Port's Rivergate Industrial District proposed for development.

Arbor Pass Creekside Residential Development—West Hills Development, Hillsboro, Oregon

Served as project manager. Supported West Hills Development with natural resource permitting for a large, multiphase condominium development. CWS natural resource assessments were prepared to establish and mitigate the loss of protective buffers around wetlands, and CWS service provider letters were obtained as part of the phased land use applications for the project. Prepared a significant natural resource overlay impact and on-site mitigation plan to meet City of Hillsboro zoning and permit requirements. Designed and negotiated a plan to mitigate for significant natural resource impacts from the extension of NW Wilkins Street at the City's Hamby Park.

Edgewater Development Clean Water Services Natural Resources Assessment—Matrix Development Corp., Washington County, Oregon

Served as wildlife task leader. Prepared this assessment as part of the permitting effort for a 69-acre residential development along the Tualatin River. Developed a detailed mitigation plan to compensate for project encroachments into water quality sensitive areas and vegetated corridors.

Summer Hills Residential Development—Clark County, Washington

Served as project manager. Prepared wetland assessment, wildlife assessment, and mitigation plan for proposed cluster residential development in compliance with county land use provisions. Coordinated with natural resource agencies and provided expert testimony before land use hearing officer.

Conway Ranch Resort EIR—Mono County Planning Department and Conway Ranch Partnership, California

Served as assistant project manager. Assisted in preparation of CEQA EIR for proposed destination recreational resort. Prepared and negotiated conceptual mitigation plan to compensate for impacts on migratory mule deer and sage-grouse. Participated in County land use hearing to evaluate project.

West Union Meadows Significant Natural Resources Report—West Hills Development Company, Washington County, Oregon

Served as project manager. Assessed significant natural resources consistent with Section 222 of Washington County Community Development Code for proposed 90-acre residential development and sewer line right-of-way. Described and mapped wetland, riparian, and wildlife habitat types and assessed their resource value to wildlife. Determined and mitigated project impacts on significant natural resources on-site.

Jenkins-Kim Significant Natural Resource Inventory—LDC Design Group Inc., Washington County, Oregon

Served as wildlife task leader. Prepared a Washington County Section 422 significant natural resource inventory as part of the permitting effort for a 20-acre residential development site recently annexed into the urban growth boundary. Described and mapped wetland, riparian, and wildlife habitat types and assessed their resource value to wildlife. Determined project impacts on significant natural resources.

Saltzman Heights Permitting Effort—Venture Properties Inc., Washington County, Oregon

Served as wildlife task leader. Prepared a Washington County Section 422 significant natural resource inventory and a CRS natural resource assessment as part of the permitting effort for an 18-acre residential development. Also prepared the wetland mitigation plan for the Section 404 wetland removal/fill permit application.

Various Wetland Delineation Projects—Portland/Vancouver Metropolitan Area, Oregon and Washington

Served as project manager. Conducted wetland delineations for 20 proposed residential development sites. Prepared wetland assessment reports, advised clients on applicable wetland regulations, consulted with agencies on client's behalf, and recommended site-specific mitigation.

Mines and Quarries

Centralia Mine West Field Expansion Project—TransAlta Centralia Mining LLC, Lewis County, Washington

Served as project manager and wildlife task leader. TransAlta Centralia Mining (TCM) has identified lands immediately west of the Centralia Mine permit area as a potential source of additional coal to supplement the permitted reserves at the mine. In support of future permitting to expand the existing permit area boundary, TCM investigated the environmental resources present in the West Field expansion area that could be affected by any mining operations there. Managed the documentation of the baseline environmental conditions for wildlife resources, fishery resources, and wetlands that occur on and around the West Field expansion area, and prepared the baseline wildlife report. For the baseline wildlife effort, existing wildlife habitats on the expansion area were mapped, wildlife expected to occur in the expansion area were identified, and an assessment was made of the likelihood that the expansion area supports candidate, proposed, threatened or endangered wildlife species identified by federal or Washington state agencies.

Pit 20 Wetland Mitigation Plan and Planting Plan—TransAlta Centralia Mining LLC, Lewis County, Washington

Served as project manager. Evaluated the feasibility of creating viable wetland habitat at the Pit 20 site, an old coal mine pit undergoing reclamation. Historic wetland conditions were reviewed, on-site conditions were assessed, bathymetry of the pit was examined, and water quality was reviewed for potential contaminants. A detailed wetland mitigation plan was prepared that outlined landscape conditions, grading, hydrology, target wetland/riparian habitats, seeding and planting plans, special habitat features to benefit fish and wildlife, and wetland functions to be achieved. The plan was used by TCM to seek a land use change from the Office of Surface Mining (OSM).

Bodie Mineral Exploration Program EIR—Bridgeport, California

Served as wildlife task leader. Evaluated effects on wildlife of comprehensive mineral exploration project in compliance with CEQA guidelines.

Crown Jewel Mining Project—Okanogan National Forest and Battle Mountain Gold, Okanogan County, Washington

Served as wildlife task leader. Directed analysis and preparation of BE for threatened, endangered, and sensitive wildlife; assisted in preparation of wildlife sections of NEPA EIS; directed preparation of wildlife technical report supporting EIS; responded to public comments concerning wildlife on draft EIS; and participated in permit documentation for proposed gold mining operation in northern Washington.

Skookumchuck Gravel Pit Wildlife Resources Report—TransAlta Centralia Mining LLC, Lewis and Thurston Counties, Washington

Served as project manager. Assessed the potential impacts of a proposed 41-acre gravel pit expansion on Washington priority species (Bald Eagle, western gray squirrel, Mardon skipper) and habitats (Oregon white oak woodland). Developed a management plan to protect and mitigate important wildlife habitats and species.

Centralia Mine Sensitive Species Assessments—TransAlta Centralia Mining LLC, Lewis and Thurston Counties, Washington

Served as project manager. TransAlta Centralia Mining is preparing a permit renewal application for submittal to the OSM to renew coal-mining leases at Centralia Mine in western Washington. OSM requires the 14,450-acre mine, in operation since 1969, to renew its operating permit at a maximum of five-year intervals through the life-of-mine permit (2025). Prepared a BA (federal) and a biological report (state) to determine whether renewal of mining operations is likely to affect any federal or state proposed, threatened, endangered, or sensitive species, as well as federally proposed or designated critical habitat. Addressed coastal cutthroat trout, bull trout, coho salmon, Olympic mudminnow, bald eagle, Oregon spotted frog, mardon skipper, white-topped aster and small-flowered trillium.

Proposed Aggregate Mine—Eugene Sand and Gravel Incorporated, Lane County, Oregon

Served as wildlife task leader. Eugene Sand and Gravel proposed to construct and operate a gravel mine on a 559-acre site along Willamette River north of Eugene. Assisted with development of comprehensive project design and permitting package. Prepared wildlife sections of biological report used in county land-use process. Addressed bald eagle, western pond turtle, red-legged frog, and Oregon chub.

Mitchell Creek Sedimentation Pond BA—TransAlta Centralia Mining LLC, Lewis County, Washington

Served as project manager. Directed the preparation of a BA evaluating effects on sensitive fish species of a mine-related sediment pond proposed in a headwater tributary of Mitchell Creek. Species addressed in the BA were bull trout and coastal cutthroat trout. Conservation measures were designed to mitigate impacts of the proposed action.

Pond 3B Natural Resources Assessment—TransAlta Centralia Mining LLC, Lewis County, Washington

Served as project manager. Evaluated natural resource value of wetlands associated with Pond 3B, a 115-acre coal fines refuse pond on the Centralia Coal Mine property where a functional wetland community has developed across much of the shallow water portions. Documented wetland, aquatic, and wildlife resources and evaluated overall functional value of developing wetland. Noted opportunities where active management could be employed to enhance similarly created wetlands and improve habitat conditions for fish and wildlife.

Conservation Planning

Bay Delta Conservation Plan—DWR/Science Applications International Corporation, Central Valley, California

Served as wildlife expert. ICF is preparing a revision of the Bay Delta Conservation Plan (BDCP), one of the most complex and controversial habitat conservation plans in the United States. The BDCP is designed to fundamentally change how the Sacramento-San Joaquin Delta is managed for water supply and endangered species. Estimated and analyzed impacts to covered terrestrial species that would result from the implementation of covered activities under the BDCP and drafted HCP sections addressing the impact analysis and conservation strategy.

Elliott State Forest HCP EIS—Oregon Department of Forestry, Coos and Curry Counties, Oregon

Served as wildlife task leader. ICF was retained to prepare a NEPA EIS evaluating the potential environmental effects associated with management of forest resources on the Elliott State Forest (ESF). The ESF encompasses approximately 93,000 acres of State-owned forestlands along the south-central Oregon coast. The Oregon Department of Forestry sought an incidental take permit in accordance with section 10(a)(1)(B) of the ESA for three listed species and an additional unlisted 17 species over a 50-year period (2008-2058). Prepared the wildlife sections of the EIS, evaluating the potential effects to one listed and eight unlisted wildlife species for the proposed HCP and for two additional alternatives considered.

Landfills

Short Mountain Landfill BA—Lane County Department of Public Works, Oregon

Served as wildlife task leader. Directed terrestrial resource studies and prepared a BA evaluating impacts associated with the proposed 140-acre expansion of the Short Mountain Landfill along the Coast Fork Willamette River. Species addressed in the BA were the bald eagle and Oregon chub.

Weyerhaeuser Regional Landfill EIS—Weyerhaeuser Company, Cowlitz County, Washington

Served as wildlife and monitoring task leader. Directed studies to evaluate baseline wildlife and habitat resources, prepared the wildlife sections of the EIS, and helped design the mitigation plan for siting a 400-acre solid waste facility. Managed the 10-year monitoring effort for the aquatic and terrestrial habitat mitigation plan that included a 5,100-foot stream diversion channel designed to support cutthroat trout, 10 acres of created wetland linked to the diversion channel, three off-channel ponds to provide fish and wildlife habitat, and a landfill cell revegetation plan designed to benefit wildlife.

Columbia Ridge Landfill Biological Enhancement Study—Waste Management, Gilliam County, Oregon

Served as project manager and wildlife expert. Directed a biological enhancement study to inventory range and wildlife resources at an operating municipal landfill. Plant communities were mapped, range condition was assessed, forage production was estimated, and wildlife

inventories were conducted. A coordinated management plan was developed to permit prudent livestock grazing while effectively protecting and enhancing other biological resources.

Fisheries

Springfield Sockeye Hatchery Project EA—BPA, Bingham County, Idaho

Served as wildlife task leader. Prepared the wildlife sections of an EA for the proposed construction and operation of the Springfield sockeye hatchery. The hatchery will support the Snake River Salmon Captive Broodstock Program, which serves to mitigate for losses to endangered Snake River sockeye salmon resulting from construction and operation of the Federal Columbia River Power System. Existing wildlife resources in the study area were described and impacts expected to occur under the proposed action (i.e., hatchery construction and operation) and for the no-action alternative were assessed. Also described were mitigation measures to avoid or minimize impacts on wildlife resources, unavoidable impacts remaining after mitigation, and cumulative impacts

Fisheries Support Services Contract—Bureau of Water Works, City of Portland, Oregon

Served as contract manager. Provided strategy and technical research services regarding recent and anticipated salmonid listings as they related to City's activities. Strategic services were aimed at addressing the ESA, CWA, and other regulations. Directed the preparation of BAs and BEs for various projects in compliance with the ESA. Technical services included analyses of fish life histories, limiting factors, habitat use/availability, and protection/enhancement actions.

Forestry

Wildlife Management Prescriptions for the Forest Grove Watershed—City of Forest Grove and ITS Management, Washington County, Oregon

Served as wildlife task leader. Developed a set of forest management prescriptions designed to maintain long-term forest productivity while retaining and enhancing wildlife habitat value in the municipal watershed. These habitat-based prescriptions are intended to be integrated with the overall stewardship of the watershed to ensure that ecosystem functions both within and adjacent to the Forest Grove Watershed are protected and enhanced.

Dry Creek Ridge Timber Harvest EIS—Washington Department of Natural Resources, Klickitat County, Washington

Served as project manager. Prepared SEPA EIS analyzing impacts of proposed timber harvest on Dry Creek Spotted Owl pair and on subpopulation of owls within a 528,000-acre area on east slope of Cascade Mountains. Considered future effects of federal (Northwest Forest Plan) and state (Washington Forest Practices Rules, Department of Natural Resources HCP) conservation strategies on long-term viability of owl subpopulation in effects analysis.

Sheep Ranch BE—The Campbell Group, Lane County, Oregon

Served as project manager. Managed preparation of BA that addressed direct and indirect effects of proposed special-use permit to haul timber from private inholding on Siuslaw National Forest lands in central Oregon Coast Range. Addressed two fish, six wildlife, and two plant

species, including northern spotted owl, marbled murrelet, bald eagle, coastal coho salmon, and West Coast steelhead.

NEPA EAs—Okanogan National Forest, Washington

Served as project manager. Supervised baseline data collection and preparation of EAs for proposed timber harvests on two Forest Service planning areas. Key issues were big game winter range; lynx habitat; fishery resources; rare, threatened, and endangered species; habitat diversity; and range use.

Oregon Special-Emphasis Area Evaluation—Oregon Forest Industries Council, Western Oregon

Served as project coordinator. Reviewed key documents pertaining to northern spotted owls and ecosystem management for information addressing federal resource concerns and conservation goals within five special-emphasis areas (SEAs) initially identified by the USFWS. The SEAs were identified in a notice of intent to prepare a proposed rule pursuant to section 4(d) of ESA. The rule would redefine federal protective measures for owls on nonfederal lands. Prepared summary report of biological criteria that led the USFWS to propose Oregon SEAs to assist the State in developing an independent strategy for conservation of owls on nonfederal lands.

Water

Mason Flats Restoration Site Turtle Monitoring—Portland Bureau of Environmental Services (BES), Multnomah County, Oregon

Served as project manager and wildlife monitor. In 2012, BES restored 9 acres of the Mason Flats wetland site to provide for enhanced treatment of stormwater. Restoration involved grading to remove dense reed canarygrass and establish new open water habitat beneficial to turtles; seeding and planting of native trees, shrubs and herbaceous species; installing large woody debris suitable for basking by turtles; and importing substrate suitable for nesting by turtles. ICF, in cooperation with Oregon Wildlife Institute, is conducting the initial monitoring of the site for western painted turtles, including surveys for basking turtles and turtle use of imported nesting substrate. Monitoring results will be documented in a final report. A monitoring protocol is being developed and BES staff will be trained to conduct future monitoring.

Wastewater Treatment Plant Upgrade Feasibility Assessment—City of Lebanon, Linn County, Oregon

Served as wildlife task leader. Completed the habitat and wildlife sections of a feasibility assessment for the City's plans to discharge secondary treated municipal wastewater into a large stream channel/wetland/gravel pond complex adjacent to the South Santiam River. Prepared a wildlife habitat map, queried the Johnson and O'Neil database for a list of wildlife species that may occur on site, and assessed the effects of the proposed wastewater discharge and other project features on sensitive wildlife (red-legged frogs and northwestern pond turtles) and their habitats.

Milltown Hill Dam Supplemental EIS—Reclamation and Douglas County Public Works Department, Douglas County, Oregon

Served as wildlife task leader. Douglas County had applied for a loan through Reclamation to construct a water storage project on Elk Creek. Prepared wildlife and vegetation sections of supplemental EIS that updated the potential project effects on these resources since the EIS was issued. Addressed rare, threatened, and endangered species (Columbian white-tailed deer, northern spotted owl, northwestern pond turtle); potential risk to wildlife from elevated levels of mercury in reservoir sediments and water; interrelated and interdependent effects; and mitigation.

Larson's Conduit Intertie BE—Portland Bureau of Water Works, Multnomah County, Oregon

Served as project manager. The City of Portland is proposing to construct an intertie for the Bull Run water supply conduits that provide municipal water to the Portland metropolitan area. The intertie would be sited on the Mt. Hood National Forest. Managed the preparation of a BE that assessed the construction impacts of the intertie on proposed, endangered, threatened, and sensitive fish, wildlife, and plants. Addressed the northern spotted owl, bald eagle, red-legged frog, chinook salmon, and steelhead. Directed the preparation of a survey and manage species report that addressed terrestrial mollusks, aquatic mollusks, fungi, mosses, liverworts, and lichens that may occur at the intertie site.

Publications

Baber, D.W. and B.E. Coblentz. Diet, nutrition and conception in feral pigs on Santa Catalina Island. Journal of Wildlife Management 51:304-315. 1987.

Coblentz, B.E. and D.W. Baber. Biology and control of feral pigs on Santiago Island, Galapagos, Ecuador. Journal of Applied Biology 24:403-418. 1987.

Baber, D.W. Gross antler anomaly in a California mule deer: the "cactus" buck. The Southwestern Naturalist 32: 404-406. 1987.

Baber, D.W. and B.E. Coblentz. Density, home range, habitat use and reproduction in feral pigs on Santa Catalina Island. Journal of Mammalogy 67:512-525. 1986.

Baber, D.W. Ecology of feral pigs on Santa Catalina Island. Ph.D. Thesis, Oregon State University, Corvallis. 91pp. 1985.

Baber, D.W. Mortality in California mule deer at a drying reservoir: The problem of siltation at water catchments. California Fish and Game 70:248-249. 1984.

Baber, D.W., M.C. Hansen and B.E. Coblentz. Preliminary findings of the feral pig project on Santiago Island. Annual Report of the Charles Darwin Research Station 1983:45-47. 1983.

Baber, D.W. and B.E. Coblentz. Immobilization of feral pigs with a combination of ketamine and xylazine. Journal of Wildlife Management 46:557-559. 1982.

Baber, D.W. and J.G. Morris. Florida scrub jays foraging from feral hogs. The Auk 97:202. 1980.

Environmental Training and Lecturing

Baber, Bill. Endangered species issues in Oregon. Habitat Conservation Planning in Oregon and Southwestern Washington. Portland, Oregon. 2002.

Employment History

ICF International. Senior Wildlife Biologist. Portland, Oregon. 11/1985–Present.

Oregon State University, Department of Fisheries and Wildlife. Teaching Assistant and Doctoral Student. Corvallis, Oregon and Santa Catalina Island, California. 09/1978–08/1982 and 05/1983–10/1985.

Charles Darwin Research Station. Wildlife Biologist. Santiago Island, Ecuador. 09/1982–04/1983.

Institute for Wildlife Studies. Wildlife Biologist. Santa Catalina Island, California. 10/1980–09/1981.

Florida Institute of Technology, Department of Biology. Master's Student. Melbourne, Florida. 09/1976–08/1978.

PABLO HERRERA

Wildlife Biologist

Pablo Herrera is a wildlife biologist who has been working in northern California for more than 16 years. He specializes in sensitive species surveys and monitoring, and has practical experience with a variety of organisms including landbirds, waterbirds, raptors, rare plants, fungi, bryophytes, amphibians, and small mammals.

Pablo is an approved environmental compliance monitor by the California Department of Fish and Wildlife and has experience with assisting construction projects with environmental regulations through all phases of construction.

Years of Experience

- Professional start date: 05/1996
- ICF start date: 09/2009

Education

- BS, Wildlife Biology (minor in botany), Humboldt State University, 1999

Training

- Giant Garter Snake Workshop, The Wildlife Society, 2011
- Southwestern Willow Flycatcher Survey Training, Southern Sierra Research Station, 2010
- Rare Pond Species Survey Techniques Workshop, The Wildlife Project, 2010
- Overview and Care Training, Oiled Wildlife Care Network, 2008
- Northern Goshawk Survey Training, Forest Service, 2002
- Red Tree Vole Survey Training, Forest Service, 2001
- Rare Bryophyte Survey Training, Forest Service, 2001
- Sensitive Fungi Survey Training, Forest Service, 2000

Professional Memberships

- Wintu Audubon Society
- Sacramento-Shasta Chapter of The Wildlife Society

Project Experience

Transportation—Roads, Bridges, and Highways

Bella Diddy Biology—Caltrans, Shasta County, California

Served as biological technician/GIS analyst. Assisted with the collection of wetland delineation GIS data to meet Corps requirements. Produced detailed maps and tables for delineation reports.

Forest Highway 171 Environmental Permitting—Butte County Association of Governments and Quincy Engineering, California

Served as wildlife biologist. Conducted protocol-level surveys for California spotted owl and northern goshawk prior to construction of road project.

SR 99 Bridges Bird Exclusion Netting—Caltrans, Tehama County, California

Served as wildlife biologist. Monitored and repaired bird exclusion netting prior to bridge construction project.

I-5 Dana to Downtown Bald Eagle Nest Mitigation and Monitoring—Caltrans District 2, Redding, California

Served as wildlife biologist. Conducted eagle nest monitoring, and nest camera installation. ICF assisted Caltrans with ESA and Bald and Golden Eagle Protection Act requirements by monitoring a bald eagle nesting pair adjacent to the SR 44 Bridge over the Sacramento River in conjunction with the I-5 Dana to Downtown bridge project in Redding. Our work fulfilled the federal and state construction monitoring requirements and also addressed the needs of the surrounding community for which the bald eagles are an important issue. ICF developed a monitoring schedule primarily to determine reproductive success of the pair of eagles during

construction. Field nest monitoring also served to document eagle behavior in reaction to potential disturbance by construction activities. In 2008, a video camera was installed above the nest. In addition to video monitoring, field checks were also undertaken during certain times of sensitive nesting periods and construction practices.

SR 299 Buckhorn Closure Northern Spotted Owl Surveys—Caltrans, Trinity and Shasta Counties, California

Served as wildlife biologist. Designed and implemented biological surveys for the northern spotted owl to meet USFWS survey protocol requirements. Coordinated with other agencies and landowners to develop efficient project design and sharing of survey results.

SR 101 Richardson Grove Surface Transportation Assistance Act Marbled Murrelet Protocol Surveys, Training of Personnel, and Monitoring—Caltrans, Humboldt County, California

Served as wildlife biologist. Designed biological surveys for the marbled murrelet to meet USFWS survey protocol requirements. Coordinated with other agencies for project coverage and implementation. Developed worker environmental training materials.

SR 299 Green Point Sink Botanical Surveys and Wetland Delineation—Caltrans, Humboldt County, California

Served as biological technician/GIS analyst. Assisted with the collection of wetland delineation and GIS data to meet Corps requirements. Produced detailed maps and tables for delineation reports.

Energy

Transmission Line Project Resource Monitoring and Biological Support Services—Western Area Power Administration, Sutter and Sacramento Counties, California

Served as wildlife biologist. Located, monitored, and implemented nest buffers during transmission line work for multiple bird species, including red-tailed hawk, Swainson's hawk, red-shouldered hawk, great horned owl, great egret, and killdeer

San Luis Reservoir Wind Project—NextEra Energy Resources, LLC, Merced and Stanislaus Counties, California

Served as wildlife biologist. Conducted helicopter surveys for nesting golden eagle and other raptors. Located multiple golden eagle nests and other nesting raptor species, including bald eagle, red-tailed hawk, great horned owl, Swainson's hawk, prairie falcon, American kestrel, burrowing owl, and yellow-billed magpie.

Tehachapi Renewable Transmission Project Biological Consulting Services—SCE, San Bernardino, California

Served as wildlife biologist. Conducted morning and evening protocol surveys for burrowing owl along transmission line corridor. Located multiple burrowing owl colonies in suburban and ranch lands.

Palermo-East Nicolaus Reconstruction Project Biological Services—PG&E, California

Served as wildlife biologist. Conducted surveys for nesting birds along a 50-mile transmission line corridor. Located multiple nesting raptor species including red-tailed hawk, red-shouldered hawk, Swainson's hawk, white-tailed kite, Cooper's hawk, great horned owl. Other species nests located included great egret, great blue heron, western kingbird, yellow-billed magpie, western, cliff, western blue bird, marsh wren and red-winged blackbird colonies.

Wildcat Nesting Bird Survey—PG&E, Shasta and Tehama Counties, California

Served as wildlife biologist. Conducted nesting bird surveys along approximately one mile of pipeline prior to soil remediation project. Established a no disturbance buffer area for an active nest to comply with the Migratory Bird Treaty Act.

Battle Creek Salmon and Steelhead Restoration Project Environmental Compliance Monitoring—Reclamation, Shasta and Tehama Counties, California

Served as environmental compliance monitor. Conducted worker environmental education program training of all on-site personnel. Monitored all construction activities to ensure the compliance with environmental regulations and project commitments. Conducted protocol-level surveys as wildlife biologist for listed wildlife species including VELB, bald eagle and other raptors, Vaux's swift, California black rail, special status riparian birds and bats. Conducted noxious weed surveys, baseline oak tree surveys and rare plant surveys. Annually conducted two area search surveys for nesting riparian bird species at five construction sites. Mapped species location using auditory detection and visual observations of yellow warbler and yellow-breasted chat. Conducted preconstruction survey at five dam sites. Located four individuals over the course of surveys. Assisted with the completion of the implementation plan and compilation with project documentation for successful permit application to FERC. Preformed analysis of potential impacts and aerial photo habitat delineations for mitigation agreements. Assisted with the developing mitigation measures and agency coordination to reduce the potential for take or disturbance of birds protected under the Migratory Bird Treaty Act.

Avian Monitoring of the Trinity River Restoration Program, US Bureau of Reclamation, Trinity County, California

Served as wildlife biologist. Conducted bird research for cooperative US Forest Service project utilizing varied bird survey techniques, including mist-net capture stations, variable radius point counts, area search censuses, migration counts, relevee vegetation surveys, spot mapping and activity budgets. Performed statistical analyses of bird data to assist in the adaptive management of restoration design and implementation.

Kunkle Reservoir Dam Vegetation Maintenance Project– PGE, Paradise, California

Served as environmental compliance monitor and wildlife biologist. Performed CCalifornia red-legged frog habitat assessment, preconstruction nesting bird surveys and assisted in production of wetland delineation report. Assisted PGE staff with the development of work environmental awareness training materials and presentation. Monitored construction activities to ensure that sensitive biological resources were not disturbed and that construction activities complied with all environmental policies.

Forestry

Petersburg Pines Fuel Reduction EA/Decision Notice/FONSI—Forest Service, Klamath National Forest, California

Served as wildlife biologist. Prepared a BA and BE to address potential effects of the proposed fuels reduction project on northern spotted owl, northern goshawk, and multiple special-status species.

Eddy Gulch Late Successional Reserve Surveys—Forest Service, Klamath National Forest, California

Served as wildlife biologist. Conducted protocol-level surveys for northern spotted owl, northern goshawk, and landbirds. Located multiple spotted owl activity centers and a northern goshawk nest location during the course of the surveys.

Arcata-Klamath Demographic Monitoring—Forest Service, Humboldt, Del Norte, Trinity, Siskiyou, and Shasta Counties, California

Served as wildlife biologist. Conducted landbird research utilizing varied bird survey techniques, including mist-net capture stations, variable radius point counts, area search censuses, migration counts, relevee vegetation surveys, spot mapping, activity budgets, and raptor nest monitoring (peregrine falcon and bald eagle). Nests located include approximately five song sparrow, three spotted towhee, four yellow warbler, six yellow-breasted chat, and four black-headed grosbeak. Conducted landbird research utilizing varied bird survey techniques including mist-net capture stations, variable radius point counts, area search censuses, migration counts, relevee vegetation surveys, spot mapping, activity budgets, and raptor nest monitoring. Determined identification of the vast majority of riparian bird species by song and call. Captured and determined age and sex of riparian bird species (68 species/800 individuals).

Late Successional Reserve Surveys—Forest Service, Klamath National Forest, California

Served as wildlife biologist. Conducted protocol-level surveys for northern spotted owl. Located 25 spotted owl activity centers during the course of the surveys.

Six Rivers National Forest Northwest Forest Plan Surveys—Forest Service, Humboldt, Del Norte, and Trinity Counties, California

Served as biological science technician. Implemented Forest Service Northwest Forest Plan protocols for rare fungi, rare bryophytes, the Del Norte salamander, and the Oregon and Sonoma red tree voles.

South Discovery Timber Harvest Plan—PG&E, Nevada and Placer Counties, California

Served as wildlife biologist. Conducted protocol-level surveys for California spotted owl, great grey owl, and northern goshawk. Coordinated with foresters to ensure that harvest areas did not impact spotted owl activity center locations.

Publications

Ralph, C. John, Margaret J. Widdowson, Robert I. Frey, Pablo Herrera, and Brian P. O'Donnell. An overview of a Landbird Monitoring Program at Tortuguero, on the Caribbean coast of Costa Rica. Pages 831-843 in Ralph, C. John and Terrell D. Rich, editors. Bird

Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference. 2002 March 20-24; Asilomar, California. U.S.D.A. Forest Service. Albany, California. 2005.

Solano, Alejandro and Pablo Herrera. Segundo registro de la Pardela Cenicienta Calonectris diomedea (Procellaridae: Aves) en las costas caribeñas de Centroamérica. Asociación Ornitológica de Costa Rica. San Jose, Costa Rica. 2005.

Environmental Training and Lecturing

Herrera, Pablo and C. John Ralph. Life styles of resident and migrant birds in a Caribbean Costal Forest in Costa Rica. IV North American Ornithological Conference, Veracruz, Mexico. 2006.

Herrera, Pablo. Willow Flycatcher Habitat. Status, Regulations and Survey Methodology for the Willow Flycatcher in North Coast California. Arcata, California. 2005.

Herrera, Pablo. Bird Extraction and Processing. 1st Advanced Bird Banding Course. San Andres Island, Colombia. 2005.

Recognition and Commendations

Received two Outstanding Achievement Awards for “outstanding contribution to crew training, supervision, and species identification” while biological science technician for Forest Service, Six Rivers National Forest.

Employment History

ICF International. Wildlife Biologist. Sacramento, California. 09/2009–Present.

Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory. Wildlife Biologist. Arcata, California. 08/2002–09/2009.

Forest Service, Klamath National Forest, Scott River Ranger District. Wildlife Biologist and Project Coordinator. Fort Jones, California. 03/2002–08/2002.

Forest Service, Six Rivers National Forest, Supervisor’s Office. Biological Science Technician. Eureka, California. 10/2000–03/2002.

LBJ Enterprises. Wildlife Biologist. Eureka, California. 04/1996–05/2001.

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EDUCATION

M.Sc. Environmental Science/Terrestrial Ecology, Western Washington University, Huxley College, Bellingham, WA. 1992.

B.A. Environmental Studies/Biology, Middlebury College, Middlebury, VT. 1986.

EXPERIENCE

International Exchange Program Manager, Experience International, Everson, WA. 6/2006 – 8/2011.

Managed international exchange program in agriculture and natural resources. Matched foreign students and professionals with U.S. businesses, nonprofits, and government agencies for mutually beneficial internships and training programs. Supervised staff. Maintained and developed relationships with overseas partner exchange programs and universities. Networked with agricultural and natural resource managers in the U.S.

Wildlife Biologist, Integral Consulting, Framatome ANP, & self-employed. 3/2002 – 5/2006.

Reviewed wildlife population data from Prince William Sound, Alaska. Worked on team conducting independent assessment of the reported effects of an oil spill on wildlife and shellfish populations 15 years after the spill. Contracted to assist with wildlife data analysis and reporting for client seeking Federal Energy Regulatory Commission (FERC) relicensing of hydropower plant in Eastern Washington. Reported status of wildlife habitat and potential impacts of hydropower plant on small mammal, reptile, amphibian, and bird populations.

Wildlife Biologist and Program Manager, Boateng & Associates, Inc., Mercer Island, WA. 1997-2000 and 2001-2002.

Managed U.S. Forest Service contracts for environmental consulting firm. Provided wildlife expertise. Supervised part-time staff of hydrologists, biologists, forestry engineer, silviculturist, and geologist. Managed subcontractors. Reviewed projects for impacts to wildlife and habitat. Wrote and edited environmental assessments and sections of environmental impact statements. Designed project mitigations to protect soil, water, fish, and wildlife resources. Reviewed proposed projects for compliance with Endangered Species Act and Northwest Forest Plan. Supervised collection of field data. Wrote and edited biological assessments. Developed marketing materials and proposals.

Environmental Liaison, Huxley College of the Environment, Bellingham, WA. 2000-2001.

Coordinated program between Huxley College faculty and U.S. Army Corps of Engineers. Facilitated cross-cultural dialogue between academic and engineering professionals. Presented and interpreted environmental research proposals to Army

Corps personnel as first step in initiating cooperative project work. Provided professional services to Army Corps, including National Environmental Policy Act (NEPA) review and technical assistance with Master Planning.

Wildlife Consultant, Parametrix, Inc., URS Greiner Inc., and self-employed. 1995-1997.

Environmental Impact Statement: Analyzed impacts of proposed development on wildlife species and habitats. Reviewed project for compliance with King County Sensitive Areas Code. Conducted analysis according to NEPA and SEPA regulations. Wrote sections of environmental impact statements.

Ecological Risk Assessment: Assisted with ecological risk assessments. Developed informational papers describing the transfer of contaminants through terrestrial food chains. Assisted with food chain modeling of contaminated sites. Collected information on bioaccumulation of PCBs, heavy metals, and organic compounds. Researched ecological background information on marine and terrestrial species.

Bald Eagle Monitoring: Monitored nesting bald eagles, collected data on foraging locations and interspecific interactions, supervised field assistant, analyzed data and wrote monitoring report.

Marbled Murrelet Surveys: Conducted marbled murrelet surveys on federal lands.

Watershed Analysis: Co-wrote wildlife module for Deer Creek Watershed Analysis. Presented findings at team meetings and advised land owners in prescriptions for management of wildlife and habitats.

Database Development: Developed relational database for marbled murrelet habitat data.

Wildlife Biologist, Mt. Baker-Snoqualmie National Forest, Sedro Woolley, WA. 1988-1995.

Elk Ecology: Managed elk home-range and habitat study. Wrote study plan, designed data collection, developed funding proposals, recruited study cooperators, funding partners, and local volunteers. Radio-collared and tracked elk. Supervised field assistants. Maintained database. Analyzed data. Produced final reports. Developed habitat management strategies based on study results.

Threatened and Endangered Species Management: Monitored and inventoried spotted owl and marbled murrelet populations on National Forest lands. Coordinated and supervised wildlife survey crews. Administered and inspected wildlife survey contracts. Wrote biological assessments and environmental assessments. Participated in Section 7 consultation process.

Education Program: Developed and presented slide shows, public information sessions, and classroom activities as educational and public involvement components of the District Wildlife Program.

Environmental Assessment: Led interdisciplinary team in development of environmental assessment for habitat enhancement projects. Conducted public scoping. Ensured NEPA compliance. Wrote environmental assessment.

District Wildlife Program: Researched and wrote sections of watershed analysis. Developed and maintained databases related to various wildlife resources. Assessed habitat. Conducted extensive habitat mapping project. Surveyed other wildlife species and habitats. Implemented habitat enhancement program, including building, installing, and monitoring nesting boxes, nesting platforms and roosting structures. Interpreted aerial photo images and silvicultural data for habitat features.

Appendix B

Expansion Area Vegetation Polygon Data (Morrison and Wooten 2010)

Data was provided to Washington State Parks and Recreation Commission in digital format and are not presented in this report.