Botanical Resources Report

The Summit at Snoqualmie Master Development Plan

Prepared for:

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

and

Booth Creek Resorts

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1. Summary

This botanical report was prepared for the U.S. Forest Service (USFS) as part of the inventory of natural resources associated with the proposed Summit at Snoqualmie (The Summit) Master Development Plan (MDP). The MDP is a long-range management and development plan prepared for Booth Creek Resorts that proposes additional ski trails and facilities for The Summit ski areas (Summit West, Summit Central, Summit East) and Alpental (Figure 1). The Summit and Alpental are situated on the Mt. Baker-Snoqualmie National Forest (MBSNF) and the Okanogan Wenatchee National Forests (OWNF) in the Cascade Mountain Range at Snoqualmie Pass, Washington. Where these ski areas occur on federal land, Booth Creek operates under a Special Use Permit (SUP) administered by the MBSNF.

Since Booth Creek Resorts operates ski areas on lands within the MBSNF, all proposed projects within the SUP must comply with the MBSNF plans and policies relative to sensitive plants. These include (1) the USFS policy to manage and maintain viable populations of USFS sensitive plants (USFS 1999 and 2004) and (2) the MBSNF Land and Resource Management Plan as amended by the Northwest Forest Plan, which identifies standards and guidelines that provided benefits for Survey and Manage botanical species associated with old-growth forest (USDA 1990, USDA and USDI 1994).

Since the Northwest Forest Plan and associated Record of Decision were published, the USFS and U.S. Bureau of Land Management (USBLM) have issued an amendment for Survey and Manage species (USDA and USDI 2000). The Record of Decision for the amendment provided management strategies for Survey and Manage species (USDA and USDI 2001) as reviewed and amended in 2002 and 2003 (USDA and USDI 2002, 2003). In 2004, the USFS and USBLM issued an EIS and associated Record of Decision that removed or modified Survey and Manage plant species from the Survey and Manage designation (USDA and USDI 2004). Plants that were previously considered Survey and Manage species are now either

- Modified and reclassified as forest sensitive species as identified on the Regional Forester's sensitive plant last for Region 6, Plant species now considered forest sensitive species are included on the Regional Forester's sensitive species list for Region 6 of the USFS (USFS 1999 and 2004). or
- Are no longer considered a sensitive species by the USFS or USBLM (USFS and USBLM 2004, USDA and USDI 2004).

The purpose of this report is to document the actions Booth Creek Resorts has taken to (1) comply with the MBSNF and WNF plant programs for USFS Region 6 sensitive plants that are documented or suspected to occur on the MBSNF or OWNF, (2) determine the presence or absence of plants that were considered Survey and Manage botanical species at the time surveys were conducted, and (3) determine the presence of any other federal or state-listed threatened or endangered plant species. The report presents the study methods and results of pre-field and field investigations to identify USFS Region 6 sensitive vascular plants for the MBSNF and OWNF, species once considered Survey and Manage botanical species, and other threatened or endangered plant species. The report will be an appendix in the NEPA document prepared for the MDP.

Surveys were conducted for USFS sensitive, which includes federally-listed threatened, endangered, and candidate plant species, and for those species that were considered Survey and Manage vascular plants (ferns and herbaceous flowering plants) and nonvascular (lichens, bryophytes, and fungi) species during the period when the surveys were conducted. Surveys were conducted at the proposed MDP project areas

within the SUP and on private lands, using survey protocol approved by the USFS and USBLM. Surveys were conducted during summer field seasons in 1994, 1998, 1999, 2000, 2001, and 2003 by botanists familiar with survey protocol. Field surveys for vascular plant species were conducted in a variety of forested and nonforested plant communities. Field surveys for nonvascular plant species were conducted primarily in mature mixed conifer forests dominated by Pacific silver fir and mountain hemlock. In some cases (i.e., National Forest System Lands adjacent to Summit East), areas identified by the MBSNF and OWNF as having potential habitat for some of the targeted species adjacent to proposed MDP project areas were also surveyed.

No federally listed threatened, endangered, or candidate plant species were observed to occur in the survey area. One special-status vascular plant species, a population of swamp gentian (*Gentiana douglasiana*), was observed in the Summit West ski area. This species is on the MBSNF (USFS Region 6) sensitive plant species list and is considered a state sensitive species. One lichen species that was previously considered a Survey and Manage species with approved survey protocol, *Hypogymnia duplicata*, (as listed in the Northwest Forest Plan), was observed in the Summit East ski area during field surveys. In addition, one bryophyte species, *Schistostega pennata*, which is now considered a forest sensitive species, was observed within the survey area in forested habitat in Summit East.

2. Introduction

Booth Creek Resorts has presented a Master Development Plan (MDP) to the Mt. Baker-Snoqualmie National Forest (MBSNF) that describes long-range (10 years) management and development plans for the Alpental and Summit West, Central, and East ski areas (Sno.engineering 1998). Project elements associated with the MDP have been modified since the MDP was originally issued to reduce potential impacts to streams, wetlands, and riparian areas. Chapter 2 of the USFS EIS for the project describes the development and management plans as currently proposed. Where these ski areas occur on federal land, Booth Creek operates under a Special Use Permit (SUP) administered by the MBSNF. Implementation of the MDP cannot occur until a NEPA review of the proposed actions is complete.

As part of that process, the MDP will be reviewed by the MBSNF to ensure compliance with the MBSNF land management plans and policies relative to forest sensitive species that occur on the MBSNF (USFS 1999 and 2004). This includes compliance with:

- USFS policy to manage and maintain viable populations of USFS Region 6 sensitive plants that are documented or suspected to occur on the MBSNF (USFS 1999 and 2004).
- The MBSNF Land and Resource Management Plan as amended by the Northwest Forest Plan that identifies standards and guidelines that will provide benefits for Survey and Manage plant species associated with old-growth forest (USDA 1990, USDA and USDI 1994).
- The Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (USDA and USDI 2001), as reviewed and amended in 2002 and 2003 (USDA and USDI 2002, 2003).
- Record of Decision to remove or modify the survey and manage mitigation measure standards and guidelines in Forest Service and Bureau of Land Management Planning documents within the range of the Northern Spotted Owl (USDA and USDI 2004). The USFS and USBLM provide guidance in this document and in a memorandum for conducting surveys relative to the status of project review and surveys already conducted for the project (USFS and USBLM 2004).

For the purpose of this report, sensitive plant species include those plants listed or proposed for listing as threatened or endangered under the federal Endangered Species Act (50 CFR 17.12); candidates for possible future listing as threatened or endangered (67 FR 40657, June 13, 2002); plants listed on the USFS Regional Forester's sensitive species list for the MBSNF and OWNF (USFS 1999, 2004); and vascular plants considered endangered, threatened, or sensitive by the Washington Natural Heritage Program (WNHP 2003a).

Species previously considered as Survey and Manage plant species include both vascular species (e.g., ferns and herbaceous flowering plants) and nonvascular plants (lichens, liverworts, mosses, and fungi). At the time surveys were conducted, any Survey and Manage botanical species that would be subject to review for the MDP included (1) those species that are known to exist near proposed projects where ground disturbance would occur, and (2) those species for which field surveys (per USFS and USBLM approved survey protocol) were to be conducted in specified project areas before ground-disturbing activities occur.

2.1. Purpose of Report

The purpose of this report is to document the actions Booth Creek Resorts has undertaken to identify forest sensitive plant species within project areas proposed in the MDP. As described below, the report

presents the study methods and results of pre-field and field investigations to identify USFS sensitive species (which includes any potential federally listed threatened or endangered plant species). This botanical report will be referenced in the NEPA document prepared for the MDP.

This report includes botanical information collected from surveys conducted during the 1994, 1998, 1999, 2000, 2001, and 2003 field seasons. The information is included to provide a disclosure of botanical resources and to analyze the effects of the MDP relative to all known USFS sensitive plants and species previously considered Survey and Manage botanical species in the SUP area.

2.2. Summary of Project Description

The proposed MDP includes the replacement, realignment, and addition of chairlifts, the addition of surface lifts, development of new ski trails, widening and realignment of some existing ski trails, reestablishment of previously developed ski trails in Mill Creek, construction of additional parking areas, expansion of existing lodging facilities, construction of new overnight lodging facilities, construction of additional restaurant facilities, construction of additional maintenance facilities, and utilities to support new ski and other recreational opportunities. The proposal includes reforestation in selected areas on the lower slopes of Summit West and Summit Central.

2.3. Project Setting

The Study Area is located at Snoqualmie Pass in the MBSNF (eastern King County) and the Wenatchee National Forest (western Kittitas County). The study area covers approximately 2,900 acres situated in the Cascade Mountain Range with elevations ranging from approximately 3,000 to 5,500 feet above sea level. Average annual precipitation is 105 inches with approximately 44% of that amount occurring during December, January, and February.

The study area lies within the subalpine forest as identified by Franklin and Dyrness (1988). The subalpine forest as described by Franklin and Dyrness includes the Pacific silver fir (*Abies amabilis*) zone at elevations from approximately 3,200 to 4,900 feet and the mountain hemlock (*Tsuga mertensiana*) zone from approximately 4,200 to 5,500 feet.

Potential vegetation zones have been mapped by the MBSNF in the South Fork Snoqualmie Watershed Analysis (1995). Based on this mapping the study area lies in the transition areas between the pacific silver fir and mountain hemlock zones. The MBSNF has identified the Moist Silver Fir/Alaska Huckleberry (*Vaccinium alaskaense*) and Moist Mountain Hemlock/Alaska Huckleberry Plant Association Groups (PAG) as the primary potential natural vegetation communities to occur in or near the study area (USFS 1995). Scattered occurrences of the Wet Silver Fir/Shrub PAG are also located in the region.

The MBSNF has mapped late successional stages within the South Fork Snoqualmie watershed (USFS 1995). The OWNF and MBSNF have mapped late successional forest in the Snoqualmie Pass Adaptive Management Area (OWNF and MBSNF 1995). Based on these references, forested portions of the Alpental and The Summit ski permit areas are located in late-successional forest.

Western hemlock (*Tsuga heterophylla*), Pacific silver fir, and mountain hemlock are the common tree species in the Project Area. The Pacific silver fir zone is common from approximately 3,000 feet to 4,000 feet transitioning to the mountain hemlock zone. The mountain hemlock forest zone generally occurs above 3,400 feet. The western hemlock zone is found in the lower elevations primarily below 2,800 feet and is the least common forest type in the Project Area. Most of the forests are mixed conifer forests dominated by one of these tree species. Some natural shrub dominated areas occur in the higher elevations at Alpental.

3. Study Methods

The study approach to determining the presence of special-status plant species included consulting with MBSNF and WNF botanists, reviewing the Regional Forester's sensitive plant list, reviewing the USFS database of Survey and Manage species, and conducting field surveys. The study method is described below.

3.1. Established Agency Survey Protocol

Field survey techniques were consistent with USFS approved protocols for botanical field studies. As discussed below, floristic field surveys for sensitive vascular plants were conducted, listing all species observed within proposed project areas. In addition, surveys used field survey protocol for those species considered Survey and Manage species at the time the surveys were conducted. During the time of the surveys, the MBSNF and OWNF recommended surveys for those Survey and Manage plant species for which the Regional Ecosystem Office had officially approved survey protocols (Potash 1997).

Table 1 lists those lichen, liverwort, moss, fungi, and vascular plant species that were considered as Survey and Manage species with approved survey protocol (2003 Survey and Manage list) that are known or have the potential to occur on the MBSNF (during the time surveys were conducted).

Table 1. Vascular and Nonvascular Species That Were Considered Survey and Manage Botanical Species with Approved Survey Protocol Known or Suspected to Occur on the MBSNF and OWNF[1]

Scientific Name	Common Name
Lichens	
Dendrisocaulon intricatulum	--
Hypogymnia duplicata	--
Leptogium cyanescens	--
Lobaria linita	--
Nephroma occultum	--
Pseudocyphellaria rainierensis	--
Ramalina thrausta	--
Bryophytes	
Schistostega pennata	--
Tetraphis geniculata	--
Fungi	
Bridgeoporus (=Oxyporus) *nobilissimus*	Noble polypore
Vascular Plants	
Botrychium montanum	Mountain grape-fern
Coptis asplenifolia	Spleenwort-leaved goldthread
Cypripedium montanum	Mountain lady's-slipper
Galium kamtschaticum	Boreal bedstraw
Platanthera orbiculata var. *orbiculata*	Round-leaved bog-orchid

Sources: Potash 1997., Whiteaker et al. 1998.
[1]At the time surveys were to be conducted

3.2. Pre-field Review and Consultation with MBSNF and WNF

USFS survey protocols for vascular plants, lichen, bryophyte, and fungi species specify a trigger for implementing field surveys if ground disturbance or indirect impacts are expected and:

- The species is known to occur in the proposed project area;
- The species is known to occur in the immediate vicinity of the proposed project; or;
- The species is suspected to occur in the proposed project area because it is within the known or suspected range.

Consultation with MBSNF and WNF botanists, forest ecologists, and bryologists was initiated to identify those species considered Survey and Manage at the time surveys were conducted, with survey protocol, which could occur in the proposed project areas of the MDP. Consultation with MBSNF and OWNF also included a request for a search of the MBSNF database for Survey and Manage plant species known to exist in the SUP and immediate areas (USFS 1998 Survey and Manage Component 1 Interim Database Version 2.0). The MBSNF and OWNF were also consulted after the 1999 Draft Supplemental EIS, the 2001 Final Supplemental EIS, and the 2002 and 2003 Memorandums were issued to determine field survey requirements based on the proposed reassignment of survey status for many of the fungi, bryophyte, and vascular species with survey protocol (USDA and USDI 2000, 2001, 2002, 2003).

A pre-field review of existing information and references for USFS sensitive species was also conducted for the study area. Prior to field surveys, a botanist reviewed the USFS-MBSNF list of Region 6 sensitive plant species to identify those species that could be present in the study area. A vascular plant database search for the Snoqualmie Pass area was also conducted through the Washington Natural Heritage Program. In addition, Jones & Stokes and Calypso Consulting met with MBSNF botanists to discuss the appropriate field methods and data collection procedures. Jones & Stokes in consultation with the MBSNF also identified species Jones & Stokes would be responsible for surveying and those species the USFS botanists would survey. Nonvascular plant surveys were conducted primarily by the MBSNF in Section 16 at Summit East (other than the *Schistostega pennata* and *Hypogymnia duplicata* surveys conducted by Jones & Stokes).

3.3. Field Methods

Field methods were based on the survey protocol for vascular and nonvascular plants. Survey intensity levels 5 and 6, as described in the Standard Operations for Plant Program MBSNF (1994), were used to identify vascular plant species observed during field surveys. Field study areas corresponded to project locations as presented in the revised MDP maps along with any final planning changes provided by Booth Creek or their consultants.

A floristic survey was completed, and a species list of all vascular plants identified in the study area was submitted to the MBSNF. Therefore, all listed Survey and Manage and USFS sensitive vascular plant species were included as target species during field surveys. USFS daily botanical survey forms, maps, and MBSNF sensitive plant survey forms were completed and submitted to the MBSNF for all vascular plant surveys.

A Survey Level 1 was used to determine potential presence for nonvascular Survey and Manage botanical species. Where potential habitat was determined, survey levels 5 and 6 were used for nonvascular species. Lichen surveys included observing the boles of trees, branches on the tree, and downed branches and litter fall on the ground around the base of trees. In some cases, binoculars were used to examine tree boles. The MBSNF rating scale (% cover relative to available substrate) was used to determine species abundance. Bryophyte surveys included inspection of downed logs and root wads, examination of stream banks, and collection of material from rock, mineral soil, and decaying wood, and keying of collected

specimens in the laboratory using a compound microscope. Field surveys conducted for Survey and Manage fungal species followed the USFS approved survey protocol.

3.4. Survey Areas

Field surveys for sensitive vascular plants were conducted in potential habitat at proposed project areas defined in the MDP, alternative MDP project areas previously considered but eliminated from consideration, and include the following proposed project areas:

- Chair lift and ski trails associated with the Mill Creek chair lift at the backside of Summit East area;
- Chair lifts and ski trails associated with the Creek Run chair lift at the Summit East area;
- Silver Fir realignment and associated trail widening on USFS land at Summit Central;
- Chair lifts and surface lift alignments, cross-over ski trails, maintenance facility, at Summit West; and
- International and Pulse Gondola chair lifts (from the lower terminal to base of the rock cliffs at 4,200 feet), and the new trail clearings, and the new Sessel and St. Bernard's chair lifts (surveyed by MBSNF botanists).

In addition to these proposed MDP project sites, surveys were also conducted at two other sites where project were initially proposed in mature forest: (1) the forested area between SR906 and the lower terminals of Wildside and Easy Street chairlifts at Summit West and (2) an area immediately south and west of Beaver Lake above the Summit West ski area.

Surveys for nonvascular plants were conducted in potential habitat within the proposed MDP project areas, and throughout Section 16.

3.5. Survey Dates

Surveys for vascular plant species were conducted on the following dates: August 2-5, 1994; June 29, 30, and July 8-12, 20, 21, 28, 29, 1998; and September 2 and 3, 1999. Surveys for Survey and Manage lichen species were conducted on July 6-10, 21, 1998; October 11, 2000, and June 18, 2003. Additional surveys for Survey and Manage lichen species were conducted by the USFS on June 23, 2003. Surveys for Survey and Manage liverwort species were conducted on July 6-10 and August 13, 1998. Surveys for Survey and Manage moss species were conducted on October 11, 2000, August 30, 2001, and June 18, 2003. Surveys for Survey and Manage fungal species were conducted between May 14 and July 13, 2000. These survey dates include surveys for Survey and Manage species with USFS approved survey protocols (at that time) that have since had their management strategy amended or have been removed from the Survey and Manage list for Washington.

3.6. Survey Personnel

Vascular plant surveys were coordinated by Jones & Stokes and conducted by botanists from Jones & Stokes, Calypso Consulting, and the MBSNF.

Lichen surveys were conducted by Jones & Stokes botanists and Calypso Consulting, who have attended field training sessions sponsored by MBSNF; or had conducted surveys for other projects within the MBSNF, observed the lichens in representative habitat locations on the MBSNF, or identified collected specimens of the Survey and Manage lichen species. MBSNF botanists also participated in surveys for

one of the lichen species, *Hypogymnia duplicata*. Botanists of the WNF, the MBSNF, and Jones & Stokes conducted additional lichen surveys.

A bryologist with the required qualifications and skills to identify nonvascular plants of concern conducted nonvascular plant surveys with the USFS botanist. Jones & Stokes botanists, along with the OWNF botanists, conducted moss surveys. Surveys for fungal species were conducted consistent with the survey protocols by Jones & Stokes biologists.

4. Study Results

4.1. Pre-field Consultation and Data Review

The results of the background review revealed that no federally threatened, endangered, or candidate plant species (FR September 30, 1993 and FR February 28, 1996 [50 CFR Part 17]) are included on the MBSNF sensitive plant list (Region 6). However, data provided by U.S. Fish and Wildlife Service (USFWS) (USFWS 2002) indicate that *Spiranthes diluvialis*, a plant species listed on the OWNF sensitive plant list (Region 6), is federally listed as threatened and has the potential to occur in the vicinity of the SUP. *S. diluvialis* is known to occur in wetland complexes within drier climates and has four documented populations (Okanogan Highlands and Columbia Basin physiographic provinces) within Washington. Two plant species on the OWNF sensitive plant list, *Sidalcea oregana* var. *calva* and *Hackelia venusta*, are federally listed as endangered (WNHP 2003a). S. *oregana* var. *calva* occurs in moist meadows in open coniferous forest dominated by Douglas-fir (*Pseudotsuga menziesii*) and/or Ponderosa pine (*Pinus ponderosa*) and is not expected to occur within the SUP. *Hackelia venusta* is a local endemic in the Wenatchee Mountains (Chelan County) and is not expected to occur within the SUP area.

Five species on the MBSNF sensitive plant list are considered "species of concern" by USFWS (WNHP 2003a). Species of concern are not considered endangered, threatened, or candidate species, but whose status requires additional information (e.g., population numbers and distribution) before considering the species as a candidate for listing. The five species of concern on the MBSNF sensitive plant list are:

- *Botrychium ascendens* - presently known distribution is in northeastern Oregon and not yet known in Washington;
- *Botrychium pendunculosum* - presently known distribution is primarily in the northeastern part of the state in Ferry and Stevens Counties; however, two document occurrences are reported on the MBSNF;
- *Castilleja cryptantha* - a local endemic near Mt. Rainier that is not expected to occur in the project area;
- *Cimcifuga elata* - more commonly found in lower elevations in moist woods with low likelihood of occurrence in the project area.
- *Cypripedium fasciculatum* - presently known distribution is primarily on the eastern slopes of the Cascades on drier sites dominated by late-successional Douglas-fir or ponderosa pine overstories typical of forests further east of the Cascade crest.

Eight species, including *Castilleja cryptantha* and *Cypripedium fasciculatum* noted above, are on the WNF sensitive plant list are considered "species of concern" by the U.S. Fish and Wildlife Service (WNHP 2003a). The remaining six species of concern on the WNF sensitive plant list are:

- *Botrychium paradoxum* - presently known distribution includes Washington. This species occurs in diverse habitat, mainly montane to subalpine grasslands and forb-dominated meadows, as well as in forested habitat.
- *Delphinium viridescens* - a local endemic of the Wenatchee Mountains (Chelan and south Kittitas Counties) in the Eastern Cascades physiographic province. This species occurs at elevations from 1800 to 4200 feet in moist meadows and moist sites in open coniferous forest, springs, seeps, and riparian areas

- *Petrophyton cinerascens* - a local endemic occurring among the cliffs of the Columbia River in Chelan and Douglas counties and is not expected to occur within the SUP area.
- *Phacelia minutissima* - presently known distribution includes one site in eastern Washington (Kittitas County). This species occurs in ephemerally moist habitats at mid-elevations (4600 to 8200).
- *Silene seelyi* - a local endemic of the Wenatchee Mountains of southern Chelan and adjacent Kittitas counties. *S. seelyi* occurs in open and dry sites commonly in ultramafic (igneous) to basaltic cliffs and rock outcrops and is not likely to occur in the project area.
- *Trifolium thompsonii* - presently known as endemic to southeastern Chelan and adjacent Douglas counties on dry sites and is not likely to occur in the SUP area.

A query of the Washington Natural Heritage Program (WNHP) (WNHP 2003b) GIS database determined that three species from the MBSNF sensitive plant list have been reported to occur in or near the project area:

- *Carex pauciflora* - a state sensitive species found in sphagnum bogs of northern temperate coniferous forests with a geographic distribution in Washington that is disjunct from its range in eastern United States;
- *Galium kamtschaticum* - a state watch species found in wet places with its distribution in northern Washington approaching the geographical limits of its continuous range in Washington;
- *Gentiana douglasiana* - a state sensitive species found in bogs with its distribution in northern Washington approaching the geographical limits of its continuous range in Washington.

One additional species considered state sensitive by the WNHP (WNHP 2003b) that is not on the USFS Region 6 sensitive plant list, *Carex buxbaumii*, has been reported to occur near the project area. This species is a circumboreal species found in peat bogs and other wet places and has a scattered distribution in Washington. This species does not have federal status.

During the time when pre-field consultation occurred, the MBSNF and WNF botanists and forest ecologists determined that seven Survey and Manage lichen species, *Hypogymnia duplicata*, *Pseudocyphellaria rainierensis*, *Lobaria linita*, *Dendrisocaulon intricatulum*, *Leptogium cyanescens*, *Nephroma occultum*, and *Ramalina thrausta* had the potential to occur at the Summit and Alpental ski areas because of the presence of moist, late successional forest. Because of the potential for the presence of the seven lichen species, MBSNF and WNF recommended surveys for lichens in proposed project and adjacent areas within the SUP where mature forests or forest interspersed with mature timber dominated by Pacific silver fir or mountain hemlock provided potential habitat. Currently, only three of these species are still considered forest sensitive species on the MBSNF and OWNF (*Dendrisocaulon intricatulum*, *Leptogium cyanescens*, and *Nephroma occultum*) (USFS 2004).

Pre-field consultation with the USFS also determined that field surveys would be required for two bryophyte species, *Schistostega pennata* and *Tetraphis geniculata*, formerly considered Protection Buffer species in the Northwest Forest Plan, and with approved survey protocol set forth in the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA and USDI 2001). Based on this ROD, the MBSNF and WNF determined surveys would be required in the SUP where potential habitat exists in proposed project areas and throughout Section 16. These two species are now considered forest sensitive species on the MBNSF (USFS 2004)

4.2. Field Surveys

Because of the sensitive nature regarding USFS management to maintain the viability of special-status plant species, their exact locations and specific population sizes are not included in this document. Locations of sensitive plants have been submitted to the MBSNF and OWNF botanists.

Since the dates when field surveys were conducted, there have been modifications to some of the survey management strategies assigned to Survey and Manage species. During the time field surveys occurred, the surveys targeted species, and associated survey protocol, that were current with the MBSNF policies for forest sensitive surveys and USFS/USBLM policies for species that were considered Survey and Manage species.

4.2.1. U.S. Forest Service Sensitive Plants

Over one hundred species of vascular plants were observed within proposed MDP project areas surveyed in the Study Area. Of those plant species observed one species, *Gentiana douglasiana*, is recognized as sensitive by the USFS for the MBSNF. No USFS sensitive vascular plants listed for the OWNF were observed during field surveys.

Gentiana douglasiana - One population of *Gentiana douglasiana* was observed at an elevation of approximately 3,050 feet above sea level occurring in a small emergent, sphagnum wetland in the Summit West area of the SUP. The plants were in an open wet area dominated by herbaceous vegetation including few-flower spikerush (*Eleocharis pauciflora*), woodrush sedge (*Carex luzulina*), wandering daisy (*Erigeron peregrinus*), marsh marigold (Caltha biflora), and Sphagnum moss. The wetland is surrounded by coniferous forest. The surrounding forest is considered to be in the Mountain Hemlock/Devil's Club (*Oplopanax horridum*) - Alaska Huckleberry Association as described in the Forested Plant Associations of the MBSNF (Henderson et al, 1992). This species is considered a state sensitive species in addition to being on the USFS Region 6 sensitive species list.

In addition, one nonvascular moss species that is known to occur in late-successional forest, *Schistostega pennata*, was observed in numerous locations within Summit East (Section 16).

Schistostega pennata - Seventeen locations of *Schistostega pennata* were found within late successional coniferous forest dominated by Pacific silver fir and mountain hemlock within Section 16 of the SUP. Some of these locations were single root wads and other locations were several root wads in very close proximity with moss growing on the different rootwads.

S. pennata occurs on mineral soil in shaded pockets of overturned tree roots, where humidity is high and shading is dense (USFS and USBLM 1996) *S. pennata* was observed on mineral soil held by the upturned root wads of windthrow in Section 16. *S. pennata* was observed on windthrow scattered within the same late successional forest conditions described above for lichen species. Although in open areas, *S. pennata* occurred where the soil was moist and shaded. The moss was observed at elevations ranging from approximately 3,400 to 3,500 feet above mean sea level.

To better understand the potential occurrence of *Schistostega pennata* (and *Hypogymnia duplicata* as discussed below) in forests in and surrounding the MDP Study Area, the MBSNF developed a potential habitat model for these species. (The MDP Study Area includes the SUP and ski areas at Summit Central and Summit East.) The habitat models were developed using known locations of the species and associated modeled environmental variables to predict where on the landscape similar environmental conditions occur (Henderson and Lesher 2004). The models are a first approximation of potential habitat and have not been field verified. The most significant variables predicting *S. pennata* potential habitat within the Study Area and within a 5-mile radius were precipitation, elevation, and known plant associations at documented sites (and temperature for *Hypogymnia duplicata*). The model looks to potential natural vegetation, which is based on the site's potential ability to support a mature native forest

community, not on existing conditions. High, moderate, or low habitat potential is based on how many of the model's environmental variables are present in a given area.

Results for *Schistostega pennata* indicate 87% (2,065.60 acres) of the potential habitat within the Study Area is considered high or moderate for the moss (see Table 2). The remaining 13% (300.23 acres) is predicted to be low potential habitat. The model predicts that there is high potential habitat at The Summit and low at Alpental. However, the model portrays more potential habitat than actually exists since it does not include any measure of microsite suitability. Microsite conditions (e.g. root wads and mineral soil) for *Schistostega pennata* are not available in a GIS coverage (Henderson and Lesher 2004). Within the larger 5-mile radius, the model predicts 84% (60,266.54 acres) high or moderate potential habitat, with 16% (11,288.72 acres) low potential habitat. The model predicts more potential habitat to the west of the Study Area where precipitation is greater.

Table 2. Potential Habitat for *Schistostega pennata*

Potential Habitat (acres)	5-Mile Radius	Study Area	Known Locations[1]
Low	11,288.72	300.23	0
Mod/High	60,266.54	2,065.60	17
Total	71,555.26	2,365.83	17

[1]Represents surveyed locations of *Schistostega pennata* within the Study Area

4.2.2. Federal Listed Endangered, Threatened, or Candidate Species

No federal listed, endangered, threatened, or candidate plant species or state threatened or endangered plant species were observed in the Study Area.

4.2.3. Other Rare and Uncommon Species

One lichen species that was considered rare or uncommon, formerly known as Survey and Manage, was observed in the Study Area. The lichen, *Hypogymnia duplicata*, was observed throughout the late-successional coniferous forest dominated by Pacific silver fir and mountain hemlock in the SUP area of Summit East (Section 16). *Hypogymnia duplicata* is no longer considered a sensitive species by the USFS in Washington. However, the population at Snoqualmie Pass represents the known eastern extent of this species in the North Cascades, and there are few known populations of *H. duplicata* south of Snoqualmie Pass.

Hypogymnia duplicata, an epiphyte on trees, was observed throughout the late successional coniferous forest dominated by Pacific silver fir and mountain hemlock within Section 16 of Summit East and at a location upslope of the existing *Silver Fir* chairlift.[2] *H. duplicata* was observed in forest stands at elevations ranging from 2,850 to 3,900 feet above mean sea level. *H. duplicata* is considered to have a "rare" abundance rating where observed in the areas surveyed (using the MBSNF rating scale to determine epiphyte species relative abundance (Henderson and Lesher 2003). However, the species was observed on numerous boles of trees over an area of approximately 116 acres (see Table 3).

H. duplicata was observed on the tree boles and bases of larger branches of mountain hemlock and Pacific silver fir in late successional forest of the Mountain Hemlock/Alaska Huckleberry and Pacific Silver Fir/Alaska Huckleberry plant associations (Henderson et al. 1992). These forests are mesic to moist. The lichen was observed from 8 to 25 feet up the tree bole from ground level (resides above seasonal snow levels). Canopy cover in the overstory varies from 35 to 50% with some tree specimens

[2] The USFS approved the replacement of the *Silver Fir* chairlift with a detachable quad as a Categorical Exclusion in 2008. Although the *Silver Fir* chairlift has not actually been upgraded as of this FEIS, it is considered an existing condition in this FEIS analysis.

having a 24 to 38-inch diameter at breast height (DBH). Windthrow has created gaps in the canopy cover. Common mid-story species include saplings of Pacific silver fir and mountain hemlock that comprise approximately 25% cover. Alaska huckleberry (*Vaccinium alaskaense*) and white rhododendron (*Rhododendron albiflorum*) frequently dominate the understory. *H. duplicata* was also observed on tree trunks at the edge of cleared ski trails.

In addition to the locations of *H. duplicata* identified in the SUP, this species has also been found in old-growth Pacific silver fir and mountain hemlock forests west and north of The Summit. The USFS has conducted surveys for this species independently of the surveys conducted for the MDP. The surveys were conducted by the USFS to increase the knowledge of ecology and distribution of this lichen species, and to describe and map potential habitat.. Many locations of *H. duplicata* were documented during these surveys on the Mt. Baker-Snoqualmie National Forest (MBSNF Ecology Program and Region 6 Interagency Species Management System database).

An environmental gradient model was developed to identify potential habitat for *H. duplicata* (Lesher 2005). The model maps potential habitat and does not include stand age as a variable. However, the majority of sites (95%, n=210) where *H. duplicata* was documented on the Mt. Baker Snoqualmie NF were in old-growth stands (MBSNF Ecology Program). Field validation of this model determined the likelihood of occupancy within the mapped potential habitat classes. The validation sample showed that high likelihood habitat was occupied 68% of the time (36 of 53 plots), and moderate likelihood habitat was occupied 30% of the time (16 of 53 plots) (Lesher 2005).

This model covers approximately 1,613 acres of the MDP Study Area. The remaining 1,287 acres of the Study Area are considered to contain 'no data.' The model predicts 36% (1,051.1 acres) of high or moderate likelihood habitat for *H. duplicata* within the MDP Study Area (see Table 3). Approximately 19% (32.02 acres) is predicted to be low likelihood habitat. Less than 1% of the Study Area is considered Not Likely habitat. *H. duplicata* is primarily found on the bark of tree boles and branches in late-successional forests. In the context of the larger area evaluated (5-mile radius), the model predicts 21.5 percent (21,164 acres) high or moderate likelihood habitat and 18.6 percent (18,255 acres) low likelihood habitat. The model predicts more potential habitat existing to the west of the Study Area, where precipitation is greater.

Table 3. Potential Habitat for *Hypogymnia duplicata*

Potential Habitat (acres)	5-Mile Radius	Study Area	Survey Area
Not Likely	10,231	12.0	0.00
Low	18,255	549.9	0.00
Mod/High	21,164	1,051.1	116.52
No Data	48,569	1,287.8	0
Total	98,219	2,900.8	116.52

No Forest sensitive lichen species was observed at Alpental during surveys.

4.2.3.1. Bryophytes (Liverworts and Mosses)

Other than the *S. pennata* previously discussed, no bryophyte species previously considered Survey and Manage species in Washington were observed during surveys. A list of the species identified by the bryologist who conducted the surveys is in the analysis file with the MBSNF. All areas determined by the MBSNF and WNF to have potential habitat within the proposed project areas in the SUP were surveyed.

4.2.3.2. Fungi

Known sites of the Forest sensitive fungus species, *Bridgeoporus nobilissimus*, occur in Washington and Oregon at elevations below 4,000 feet (Hibler and O'Dell 1998). One known site is documented in the general vicinity of the Study Area. No occurrence of *Bridgeoporus nobilissimus* was observed by botanists during surveys for vascular and nonvascular plants throughout the Summit and Alpental ski areas.

5. Determination of Effects on Sensitive and Survey and Manage Plant Species

5.1. Discussion on Effects for Project Areas

There are no potential impacts to federally listed, proposed, or candidate vascular plant species from the MDP. The proposed action could result in direct impacts on *Schistostega pennata* as discussed below in Section 5.1.1. In addition, indirect impacts could potentially occur on a vascular species considered a Forest sensitive species, *Gentiana douglasiana* (see Section 5.1.2). Because the USFS did not include *Hypogymnia duplicata* in the Special Status Species Program for Washington, impacts are not discussed for this species.

The rationale for the determination of effects follows the discussion of measures to reduce potential project impacts. Overall, the proposed MDP projects are not expected to result in a significant impact on the viability of either *Schistostega pennata* or *Gentiana douglasiana*.

5.1.1. Potential Impacts on *Schistostega pennata*

Proposed MDP projects that could impact *Schistostega pennata* include:

- Creek Run chairlift and associated Trails 55, 55A, 55B, 66, and 67, and
- Trail 49 associated with the Silver Fir pod and the lower portion of the Creek Run pod.

Schistostega pennata was observed on root wads in the northern and western portion of Section 16.

Impact mechanisms that would affect *S. pennata* include the removal of root wads from areas where full clearing with no grading or glading would occur for ski trail development associated with the Creek Run pod and Trail 49 in the vicinity of Hyak Lake. Locations of *S. pennata* could remain in areas where glading would occur if selective removal of root wads were employed. *S. pennata* was observed in 17 locations within the Study Area at Summit East (Section 16). Under the proposed MDP, three known locations of *S. pennata* could potentially be removed by full clearing with no grading for development of the upper portions of Trail 66 and 67 of the proposed Creek Run pod. *S. pennata* occurs on mineral soil in shaded pockets of overturned tree roots. At the site-scale, direct impacts may be avoided or reduced by leaving in-place a downed tree supporting a known location if the root wad is at the edge of the proposed ski trail and would not interfere with skiers on the trail. A USFS botanist, or equivalent specialist, would identify root wads to remain in-place, allowing the bole of the downed tree to be removed if needed.

S. pennata requires high humidity and densely shaded mircosites (USFS and BLM 1996). Indirect impacts could occur to known locations of *S. pennata* where overstory trees are removed and microsite conditions would no longer be maintained. This includes exposure to sunlight and/or wind that may alter temperature and moisture regimes that sustain the moss. A goal of the MDP is to encourage development of and to sustain a minimum canopy cover of 70 percent within Section 16. Tree removal would be selective (field-fitted in cooperation with a USFS botanist or equivalent specialist) during construction to maintain 70% cover where it currently exists and to the extent possible field-fit trails around *S. pennata* locations. Maintaining the canopy cover in these areas would benefit known locations of *S. pennata* by maintaining existing forest conditions. Conversely, if natural blowdown occurs, it would also benefit the moss, providing potential substrate for the moss to colonize.

Potential impacts to *S. pennata* are not considered to affect the viability of the species. As discussed above, a potential habitat analysis was conducted by the USFS for *S. pennata* (Henderson and Lesher,

2004) for the Study Area and a larger area (5-mile radius) beyond the Study Area. The analysis indicates that nearly 2,366 acres of potential habitat exists in the Study Area for *S. pennata*, and that as much as 71,555 acres of potential habitat exists within the large area (5-mile radius) evaluated. Additional locations of this species were also observed outside of the MDP Study Area on National Forest System Lands. Potential habitat beyond the Study Area would not be affected by the MDP. At the site scale, 14 of the 17 sites observed at Summit East would not be affected. In addition, the USFS botanist has requested that, at a minimum, a 5-year monitoring plan be implemented to monitor the duration of known sites of *S. pennata* along newly constructed ski trails. Locations and abundance would be monitored to evaluate the species response to clearing forest canopy.

5.1.2. Potential Impacts on *Gentiana douglasiana*

Gentiana douglasiana, a USFS and State listed sensitive vascular plant species, is located in an emergent wetland at Summit West in an area that will not be directly affected by construction activities by the MDP. However, this population is located approximately 100 feet from the edge of an area proposed for clearing with no grading that would remove a small area (approximately 1 acre) of mature Pacific silver fir forest to construct a proposed lift terminal. Although this population could potentially be affected indirectly if there are changes to the vegetation surrounding the wetland, it is not considered likely. The light regime for the plants would not be altered since the trees that would be removed by the proposed construction lie to the north of the *G. douglasiana* population. In addition, wetland hydrology is supported by subsurface discharge and some surface runoff and would not be impacted by removing trees that do not intercept these sources of water. The trees are also located far enough out of the wetland area to not be a significant source of nutrient input (litterfall). Monitoring by a USFS botanist, or equivalent specialist, would be implemented to evaluate potential indirect impacts to this species from implementation of Alternative 2.

5.1.3. Potential Impacts on *Hypogymnia duplicata*

Proposed MDP projects that could impact *H. duplicata* include:

- Creek Run chairlift and associated Trails 55, 55A, 55B, 66, and 67, and
- Trail 49 associated with the Silver Fir pod and the lower portion of the Creek Run pod.

H. duplicata was observed on root on the tree boles and bases of larger branches of mountain hemlock and Pacific silver fir within Section 16 and at a location upslope of the *Silver Fir* chairlift.

Impact mechanisms that would affect *H. duplicata* include the removal of trees from areas where full clearing or glading would occur for ski trail development associated with the Creek Run pod and Trail 49 in the vicinity of Hyak Lake. Site scale impacts to*H. duplicata* could be reduced if selective removal of trees not containing *H. duplicata* were employed.

Potential impacts to *H. duplicata* are not considered to affect the viability of the species. As discussed previously, a potential habitat analysis was conducted by the USFS for *H. duplicata* (Lesher, 2005) for the Study Area and a larger area (5-mile radius) beyond the Study Area. The analysis indicates that nearly 1,051 acres of high to moderate potential habitat exists in the Study Area, and that as much as 21,164 acres of high to moderate potential habitat exists within the large area (5-mile radius). According to the current model, the Study Area is located at the limit of *H. duplicata*'s distribution in Washington (Lesher, pers. comm. 2008). In this location, *H. duplicata* occurrence is closely related to microsite conditions. Additional locations of *H. duplicata* were also observed outside of the MDP Study Area on National Forest System Lands. Potential habitat beyond the Study Area would not be affected by the MDP.

5.2. Measures to Avoid, Minimize, and Reduce Impacts

To ensure that construction-related impacts on the known locations of *Schistostega pennata* and *Gentiana douglasiana* are minimized to the fullest extent possible, the measures discussed below should be implemented:

Schistostega pennata:

- Leave windfalls trees in place that are not in direct alignment with ski trail use to provide structurally diverse habitat.
- During construction, a USFS botanist, or equivalent specialist, would assist construction crews with layout of ski trails to avoid, where possible, rootwads with *S. pennata* present. If rootwads with *S. pennata* are in direct alignment with a proposed ski trail, move the rootwad or bole of tree to a position or location that does not interfere with ski trail use.
- Maintain existing conditions at known sites outside of proposed ski trails.
- Use selective tree removal during construction and gladed trail clearing to maintain 70% overstory canopy cover where it currently exists.
- Manage the mature forest in Section 16 beyond ski trails to maintain large woody debris, maintain 70% canopy where it exists, and maintain forest habitat conditions.
- Establish a 5-year monitoring plan to record condition and abundance of the known locations of *S. pennata* within the Study Area in Section 16.
- Do not use sensitive plant locations for staging areas or storage areas during construction.
- Flag known locations near construction areas to avoid inadvertent disturbance.

Gentiana douglasian:

- Monitor the site during construction activities to ensure materials, equipment, and work crews do not encroach on the wetland where *G. douglasisana* is growing.Establish a 5-year monitoring plan to record condition and abundance of the known locations of *G. douglasiana* after construction around the site is complete.
- Place construction fence and silt fence at edge of clearing area for ski trail by the new lift terminal to restrict movement of machines and work crews in the wetland supporting *G. douglasiana*.

Hypogymnia duplicata:

- During construction, a USFS botanist, or equivalent specialist, would assist construction crews with layout of ski trails to avoid, where possible, trees with *H. duplicata* present.
- Maintain existing conditions at known sites outside of proposed ski trails.
- Use selective tree removal during construction and gladed trail clearing to the extent possible to maintain areas of *H. duplicata* where it currently exists.
- Do not use sensitive plant locations for staging areas or storage areas during construction.
- Flag known locations near construction areas to avoid inadvertent disturbance.

5.2.1. Rationale for Determination of Effects

The population of *Gentiana douglasiana* is outside proposed MDP elements; therefore with avoidance and the implementation of mitigation measures during construction and operation activities associated with the Proposed Action, there would be no impact to the viability of the species within the Study Area.

Ski trail locations occur in approximately 3 of the 17 locations of *Schistostega pennata* based on the MDP. This action would not affect the viability of the species because of it's ability to colonize new sites of exposed mineral soil (Lesher, pers comm), it's numerous known locations within the Study Area, locations of the species observed on root wads outside of the study area, the potential for additional windthrow to increase the species' area of potential habitat, and implementation of the mitigation measures.

Proposed ski trails and facilities would potentially impact individual trees known to contain *H. duplicata*, however there are numerous locations of *H. duplicata* within and outside the Study Area. The Study Area occurs of the limit of the range of *H. duplicata* within Washington and its presence is more closely tied to microsite conditions (Lesher pers. comm., 2008). Greater areas of potential habitat occur outside of the Study Area and will not be impacted by the MDP.

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The Summit at Snoqualmie

Mt. Baker-Snoqualmie/ Okanogan-Wenatchee National Forests

Figure 1
Vicinity Map