



United States Department of Agriculture
Forest Service

Waucoma

Huckleberry Enhancement

Botany Report

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1.0 Introduction

This report addresses the rare botanical species that are documented or suspected to occur within the general project area. It also addresses huckleberry (*Vaccinium* spp.) ecology, growth and predicted effects of the proposed action on huckleberry. Only those species which may be directly, indirectly, or cumulatively affected by the proposed actions are considered. There are no known occurrences of federally listed endangered or threatened botanical species on the Mt. Hood National Forest (the Forest) and the Forest has no habitat recognized as essential for listed plant species recovery under the Endangered Species Act. The actions proposed have direct, habitat-disturbing or habitat-enhancing effects to the target species discussed below. Project design criteria (PDC) and mitigations would be employed to reduce potentially negative direct effects of these actions to acceptable and potentially beneficial results. This report confirms that the proposed activities are compliant with Northwest Forest Plan direction and other law and policy.

2.0 – Analysis Framework

2.1 - Resource Indicators and Measures

The purpose of this Report is to document Forest Service programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered or sensitive (TES) species and their habitats. The species considered in this report are listed as sensitive by the Pacific Northwest (Region 6) Regional Forester (revised March 2019) as well as species included in the 2001 Record of Decision Amendments to the Survey and Manage Standards and Guidelines (henceforth, the 2001 ROD) (USDA, USDI 2001). These are species for which population viability is of concern, as evidenced by current or predicted downward trends in population numbers or density, or by concerning trends in habitat availability that would reduce a species' distribution. This evaluation is completed to determine whether a proposed action, or taking no action, would result in a loss of viability of any native or desired non-native species, or a trend toward those species becoming federally listed.

This specialist report discusses the existing condition and analyzes the effects of the proposed action and alternatives on target species, TES species, and survey and manage species within the Waucoma Huckleberry Enhancement (Waucoma) project area. This report analyzes sensitive species that are documented or suspected to occur within the general biophysical area where the project would occur. Only those species which may be directly, indirectly, or cumulatively affected by the proposed actions are considered. Species that are not suspected to occur within the analysis area, or are eliminated from consideration due to other factors, are not described and are not considered in the detailed effects analysis. However, information on these species is available at the district offices of the Mt. Hood National Forest, upon request.

2.2 - Methodology

A pre-field analysis is used to determine the probability that TES species/Survey and Manage species, and/or their respective habitats are located within or adjacent to the project area, and to determine the extent and intensity of previous survey efforts. Information from the pre-field review, in conjunction with the project description, is used to determine the need and intensity of field surveys and, in part, fulfills the standards and procedures for conducting a biological evaluation (FSM 2672.42).

A complete list of previous and historical surveys for TES/Survey and Manage species in the project area was determined by querying the Forest Service's Natural Resource Manager's Threatened, Endangered, and Sensitive Plant Species database (NRM TESP-IS and by examining historical survey forms, maps, planning and project records and electronic botanical databases.

The following sources were consulted for the pre-field review:

- Regional Forester's Sensitive Species List (updated March 2019). (Available at the Interagency Special Status Sensitive Species Program website [<http://www.fs.fed.us/r6/sfpnw/issssp/>] of the Pacific Northwest Region.)
- Rare threatened and endangered species of Oregon (Oregon Biodiversity Information Center (ORBIC) August 2016).
- The Forest Service's Geographic Information System (GIS) corporate database: NRM TESP-IS.
- Species Fact Sheets provided by the Interagency Special Status Sensitive Species Program website [<http://www.fs.fed.us/r6/sfpnw/issssp/>] of the Pacific Northwest Region.
- USFS personnel and District botany records.
- Literature, reports, conservation plans, conservation assessments, and species descriptions on file at the Hood River Ranger District Office or referenced in this report.

There are no known occurrences of federally listed endangered or threatened plants on the Mt. Hood National Forest and the forest has no habitat recognized as essential for listed plant species recovery under the Endangered Species Act. There are over 200 plant, bryophyte, lichen and fungi TES/Survey and Manage species which were determined to have historic known sites or suitable habitat within the project area and adjacent watersheds. See Appendix 1 for the full list of species considered during the pre-field review and the summary of findings.

Multiple surveys were conducted within the project area for botanical species in the R6 Sensitive Species List and 2001 ROD (using the 2003 Annual Species Review list) during the 2018 and 2019 field seasons. Field surveys were conducted using the intuitive controlled method. All survey protocols for Survey and Manage species were followed and in compliance with regional guidelines (Van Norman 2012). The Survey and Manage standards and guidelines (USDA/USDI 2001) require equivalent-effort surveys for Category B fungal species (rare, pre-disturbance surveys not practical) when National Environmental Policy Act (NEPA) decisions or decision documents are to be signed for habitat-disturbing activities in old-growth forest if strategic

surveys are not considered completed. All the stands for which this condition applied within the project area were surveyed in the spring and fall of 2018 and in the spring of 2019. Surveys are planned for fall of 2019. For forests west of the Cascades, two rounds of spring surveys and two rounds of fall surveys are needed. It is recommended that surveys consist of two visits, approximately two weeks apart (Van Norman 2012). Survey timing and completion was dependent on weather and accessibility to the sites.

3.0 – Analysis of Botanical Resources

3.1 – Existing Condition

The Waucoma project area is within high elevation, moist forested conditions that would historically have been dominated by Pacific-silver fir (*Abies amabilis*), western hemlock (*Tsuga heterophylla*) and mountain hemlock (*Tsuga mertensiana*) trees. The most prevalent plant association within this project area is that of Pacific-silver fir and bigleaf huckleberry (*V. membranaceum*), along with other component species, such as Queen’s cup beadlily (*Clintonia uniflora*) or beargrass (*Xerophyllum tenax*).

This project area has been subject to many types of past disturbances. It has a long history of timber removal, targeted species planting, wildfires and wildfire suppression. In recent years, many of the stands have closed in, resulting in dense, shaded understory.

Certain areas with old growth characteristics were identified in the planning area. These areas were determined to have stands of trees with an average age of over 180 years. The Region 6 Interim Old Growth Definition document (USDA 1993) was used to provide this determination. This follows national and regional guidance. These stands were dominated by mountain hemlock, Pacific-silver fir, or Douglas-fir which were planted following past management activities. The stands have large down woody material and layers of litter or duff.

The project area includes potential habitat or known sites for several species of TES/Survey and Manage bryophytes, lichens, fungi and vascular plants. For additional information on any of the species considered, please reference Appendix 1.

The project area includes several rocky outcrops or talus slopes. These sites are being buffered (essentially removed) from proposed action activities, thus all TES species associated with exposed rock or talus slopes will not be discussed further in this analysis.

3.1.1 - Huckleberry

There are several species of huckleberry which occur in the Pacific Northwest. Within this project planning area, three species have been documented: bigleaf huckleberry, Alaska huckleberry (*V. alaskense*), and red huckleberry (*V. parvifolium*), and others may also occur. For the purposes of this project, the following analysis focuses on bigleaf huckleberry. This species is particularly known for its taste and productivity and is a well-known food resource for humans and wildlife. This species is the dominant huckleberry within the planning area.

Research regarding management, cultural, recreational and wildlife use has focused primarily on this species. Further mention of huckleberry within this report will refer to bigleaf huckleberry, unless otherwise noted.

Huckleberry occur in open and forested habitats between approximately 3,000 and 5,400 feet elevations in the Pacific Northwest (Yang 2008). They have greatest potential on cool, mesic sites with minimal overstory (Dahlgreen 1984) and are commonly associated with mountain hemlock, subalpine fir (*Abies lasiocarpa*), Pacific-silver fir and Douglas-fir (*Pseudotsuga menziesii*). Huckleberry shrubs are most common within open, early seral stands, and plants are generally most productive on sites that have experienced disturbance in the past (Anzinger 2002, Friesen 2016). Huckleberry shrub occurrence and productivity gradually decrease as canopy cover closes (Minore 1972, Anzinger 2002, Friesen 2016). In late seral stands, huckleberry shrubs can grow beneath a partially closed forest canopy or in sunny openings (French 1999, Friesen 2016), but as a forest moves towards climax stand conditions the loss of huckleberry is inevitable. Multiple reports express concern about the decrease of huckleberry within its historic range due to forest succession following a lack of disturbance; primarily due to wildfire suppression (Minore 1972, Anzinger 2002). Field validation on the Gifford Pinchot National Forest found that huckleberry cover was greater when the canopy cover is less than 30%, but no greater than 50% (Hudec 2018). Huckleberry appear to benefit from sparse canopy cover, which protects them from exposure and extreme temperatures (Anzinger 2002). Huckleberry are most productive in sites with slow stand development (Anzinger 2002).

Huckleberry are able to reproduce both by seed and by vegetative production from rhizomes (Ingersoll 1990) and would re-sprout from the root crown or rhizomes if the upper plant is killed or damaged during a disturbance (Minore 1975, Dahlgreen 1984). Reproduction from seed is rare under most natural conditions (Anzinger 2002, Friesen 2016), and populations are usually maintained through clonal vegetative expansion (Ingersoll 1990).

As the canopy has closed in around the Waucoma planning area, the presence and productivity of huckleberry have declined. Huckleberry is still persistent across this planning area, but the conditions it is often found in are not optimal for growth and production. Canopy cover across much of the project area is greater than 50%, and while huckleberry is consistently found within most of these stands, the bushes are small and vegetative.

3.1.2 – Vascular Plants

No TES/Survey and Manage vascular plant species are known from the project area, and none were found during field surveys. Habitat for several species was identified during field surveys. The majority of species suspected from this project area are limited to riparian areas, seeps or springs.

The project area includes numerous seeps and springs, often associated with western redcedar (*Thuja plicata*) or Alaska yellow-cedar (*Callitropsis nootkatensis*). There are also several perennial or ephemeral streams within the project area. The suspected species occur within riparian or moist habitats on soil or organic material.

3.1.3 – Bryophytes and Lichens

No TES/Survey and Manage bryophytes or lichens are known from the project area, and none were found during field surveys. Habitat for several species was identified during field surveys. The majority of species suspected from this project area are limited to riparian areas, seeps, or springs. The remaining species are terrestrial or epiphytic. These species were surveyed for during 2018-2019 survey efforts.

The project area includes numerous seeps and springs, often associated with western redcedar or Alaska yellow-cedar. There are also several perennial or ephemeral streams within the project area. The suspected species occur within riparian or moist habitats on soil, rock, or organic material.

TES/Survey and Manage terrestrial bryophytes and lichens are typically associated with large, decaying downed wood or the bases of large conifer trees, or are found with other mosses in moist sites. These species are found in old-growth forests both east and west of the Cascades and require decaying material and undisturbed soil for habitat.

The suspected TES/Survey and Manage epiphytic species are all lichens. Epiphytic lichens grow in the furrowed bark or on the branches of large conifers in moist or dry habitats, or on hardwood trees near riparian areas. These species are found in old-growth forests both east and west of the Cascades and often require large host trees for habitat.

3.1.4 - Fungi

There were no historic sites for TES/Survey and Manage fungal species within the Waucoma project area. This project area has potential habitat for over 150 fungal species within stands which were determined to be over 180 years of age. There is a reasonable likelihood that these species occur in the project area, but habitat requirements for the majority of those listed are poorly understood or are too broad. The known or potential species are either litter/wood saprobes or form beneficial mycorrhizal associations with living trees. To analyze these habitats, equivalent-effort surveys for fungi were conducted on approximately 75 acres of the project, where habitat-disturbing activities are proposed in forested stands over 180 years of age and were required according to 2001 ROD direction. During these surveys, new sites were discovered for *Clavariadelphus ligula*.

Litter and wood saprobes feed on dead and decaying organic material. This plays a crucial role of decomposition in ecosystems. These fungi require downed woody material of varying size and decay classes or leaf/needle and twig litter to grow and sustain themselves. Wood saprobes may be limited in distribution to the particular source of decaying wood, but litter saprobes may extend over a larger area via mycelial networks. See Appendix 1 for a list of known or suspected fungi species which may occur in these forested habitats on the crest of the Cascades.

Mycorrhizal fungal species form mutually beneficial symbiotic associations with the roots of plants and trees. This connection allows fungi to absorb carbohydrates from the host plant,

while the host receives minerals from the fungi. The increased surface area formed around the plant's roots by the fine fungal network also allows for increased water absorption. Many plants rely upon these fungi for nutrient and water uptake. The species considered here are known to be associated with members of the pine family such as true firs or Douglas-fir, and western redcedar or Alaskan yellow-cedar. See Appendix 1 for a list of known or suspected fungi species which may occur in these forested habitats on the crest of the Cascades.

3.2 – Environmental Consequences

3.2.1 - Direct and Indirect Effects of No Action

With no action, there would be no direct effects to any of the target sensitive species. In the short term, the forest stands within the project area would remain as described above. There would be potential indirect effects to these species as a result of no action. The dense growth of the trees in much of this area results from a lack of natural disturbance and from human fire suppression. As such, there is a risk of a high intensity wildfire occurring within this area. If a fire were to burn through this landscape, the loss of sensitive species individuals and habitat would be likely. Many areas would be returned to early-seral stand conditions, which do not favor the sensitive species of concern and may instead promote the growth of invasive weed species, further reducing the diversity and ecological function of this area.

With no action, huckleberry species would be directly and indirectly affected. Huckleberry density and fruit production would continue to decline over time as tree canopy increases, resulting in the eventual loss of huckleberry from those stands. This is a species which prefers early-seral, open grown conditions. If a stand-replacing fire occurred and returned this area to an early-seral condition, the huckleberry would potentially return.

3.2.2 - Direct and Indirect Effects of Proposed Action

The proposed action includes timber removal, piling and burning of slash and associated actions, such as temporary road construction and road maintenance. The proposed action elements have direct negative or beneficial impacts on targeted species. PDC are included to reduce negative effects on sensitive species or avoid habitats.

The proposed action elements may also have indirect effects on species. The use of equipment or vehicles during project implementation has a risk of invasive weed introductions, which can alter or degrade sensitive species habitat. PDC are in place to prevent the introduction of invasive or undesired species.

Huckleberry

The proposed action would enhance huckleberry growing conditions by reducing canopy cover within treatment areas to an average of approximately 30% canopy cover within upland stands. Within riparian reserves, canopy cover would be maintained at a higher level to meet riparian

condition objectives. A variety of vegetation treatments would be utilized to create desired conditions and meet the objectives for huckleberry enhancement.

Historically, huckleberry fields were created or maintained by uncontrolled wildfires or other disturbance (Minore 1978). This was prior to active fire suppression and management. Huckleberry plants are able to survive low to moderate severity fires (Bradley et al 1992) but may grow too slowly to take advantage of the nutrient flush following a fire event (Friesen 2016). This project does not propose to include prescribed fire as a tool for huckleberry enhancement. The existing stand and fuels conditions are not appropriate to safely utilize fire on this landscape. See the Fuels report for more information regarding this topic.

Understory plant species generally respond to stand thinning with increased biomass and cover, particularly in clonal species and woody shrubs. The removal of canopy cover increases light, water, nutrient availability, and soil temperature. The fruit production of huckleberries appears to be more closely associated with weather and climactic conditions, but under canopy cover exceeding 30%, berry production would also decline (Minore 1984, Barney 1999). This is presumably because shading prevents flower formation. In a study by Martin (1979) fruit production was not correlated with the percent cover or height of huckleberry shrubs, which suggests that vegetative growth and fruit production respond to different environment influences. Fruit production may be more strongly influenced by physical characteristics, such as precipitation, temperature, aspect, etc. It may take several years for huckleberry seedlings or vegetative shoots to begin flowering and producing fruit (Minore 1984, Barney 1999). Another study found that the removal of the overstory with minimal disturbance to the huckleberry shrubs appeared to increase berry production (Minore 1979).

The proposed action elements focus on enhancing the vegetative growth of huckleberry. While berry production is a desired response to these treatments, there are other factors which may determine the fruit response following treatments. Annual weather conditions appear to be the biggest determining factor on yearly berry production (Minore 1979), but the physical site characteristics (i.e., precipitation, temperature, aspect) would determine whether huckleberry shrubs persist at a site.

The proposed action would have a beneficial impact on huckleberry species within the planning area.

Vascular Plants

The vascular plant species considered in this analysis are *Botrychium lunaria*, *Botrychium minganense*, *Botrychium montanum*, *Carex comosa*, *Carex diandra*, *Carex lasiocarpa* var. *americana*, *Carex retrorsa*, *Lycopodiella inundata*, and *Diphasiastrum complanatum*. These species are associated with seeps, springs, wetlands, and riparian edges along streams or rivers. Treatments are proposed in approximately 129 acres of Riparian Reserves, which may contain habitat. The proposed treatments would avoid and buffer moist habitats and areas directly adjacent to waterways and would minimize soil disturbance and compaction to meet forest standards.

Bryophytes and Lichens

There are two TES/Survey and Manage bryophytes which occur on soil and/or rotten logs in older, moist forests: *Brotherella roellii* and *Tetraphis geniculata*. One Survey and Manage lichen occurs on downed woody debris, rotting logs, moss and soil in these habitats: *Peltigera pacifica*. For these terrestrial species, the removal or destruction of dead and decaying logs and large conifers by timber harvest, road or trail construction, or fire are all direct effects and would remove both individuals and habitat.

A diversity of downed woody materials would be maintained on-site to meet the standards for soil protection and sensitive mollusk species habitat. This would serve to protect an acceptable amount of habitat for terrestrial bryophytes and lichens. The project does not propose to remove large, old-growth trees unless operator safety, or spacing, and competition are a concern. All snags would be retained to protect wildlife habitat, unless they pose a safety concern. This would protect epiphytic species in appropriate habitat.

There are several TES/Survey and Manage epiphytic lichen species which grow on large, older conifers. These species are: *Bryoria subcana*, *Calicium abietinum*, *Chaenotheca chysocephala*, *Chaenotheca ferruginea*, *Chaenotheca subroscida*, *Chaenothecopsis pusilia*, *Hypogymnia duplicata*, *Hypogymnia vittata*, *Lobaria linita*, *Microcalicium arenarium*, *Nephroma bellum*, *Nephroma isidiosum*, *Nephroma occultum*, *Pannaria rubiginosa*, *Pseudopsyphegella rainieriensis*, *Stenocybe clavata*, *Tholurna dissimilis* and *Usnea hesperina*. There are also TES/Survey and Manage lichens which are epiphytic on the bark of hardwoods in riparian areas: *Cetrelia cetrarioides*, *Collema nigrescens*, *Dendrisocaulon intricatum*, *Leptogium cyanescens* and *Leptogium teretiusculum*.

For epiphytic species, the removal or destruction of large conifers or hardwoods by timber harvest or temporary road construction, are direct effects and would remove both individuals and habitat. Large, dead snags are also important habitat for certain epiphytic species.

The TES/Survey and Manage bryophytes which occur in riparian zones, on soil, rock, and within splash zones are: *Diplophyllum plicatum*, *Racomitrium aquaticum*, *Rhizomnium nudum*, *Schistidium cinclidontium*, *Schistostega pennata* and *Trematodon asanoi*. There are also two Survey and Manage lichen species which occur in riparian zones: *Dermatocarpon meiphyllum* and *Leptogium rivale*. These species are associated with seeps, springs, wetlands, and riparian edges along streams or rivers, or may occur directly in the water. Treatments are proposed in approximately 129 acres of Riparian Reserves, which may contain habitat. The proposed treatments would avoid and buffer moist habitats and areas directly adjacent to waterways, and would minimize soil disturbance and compaction to meet forest standards.

Fungi

Threats to fungi occur at many levels, from direct impacts to the substrates on which fungi grow to larger-scale, indirect impacts such as global climate change or pollution. The requirements for fungal habitat are not well understood. In addition to providing a food source for saprobic fungi,

down woody debris and litter may function to retain moisture and provide refugia for fungal species, especially in dry sites. In addition, the size of this down woody material is important. Having a wide size range of material, from large logs to small twigs, and a variety of decay classes would decrease the homogeneity of the site and increase the fungal diversity. Management actions which threaten fungi include intense removal of hosts, woody material and litter, or management of a site which changes the microclimate. The fungal organism can be directly destroyed when machinery churns and breaks up the soil where these species reside. The mushroom is only a fruiting body. Each fungi persists as a thread-like network of fungal mycelia within the soil. Regional effects to fungi, and mitigation measures to minimize these effects were considered during the 2000 Final Supplemental Environmental Impact Statement (2000 Final SEIS) for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA/USDI 2000) and are discussed below.

The effects of the proposed action to fungi species tiers to the analysis in the 2000 Final SEIS. Management of these species under the 2001 ROD includes the protection of known sites, "equivalent-effort surveys" for Category B fungi in proposed habitat-disturbing projects in old-growth forests, and "Strategic surveys". Although these mitigations would still result in a moderate level of uncertainty that there would be adequate habitat to maintain these species, this management is intended to "provide a reasonable assurance of species persistence" within the Northwest Forest Plan area of Oregon, Washington, and northern California. As described below, the proposed action is consistent with the 2001 ROD and the proposed action is not expected to have significant effects, beyond those already analyzed in the 2000 Final SEIS.

Effects to the known and potential fungi species within this project area were analyzed on pages 241 through 252 in the 2000 Final SEIS. For many of these species the analysis concluded that "while there is a moderate level of uncertainty due to the rarity of the species, and the lack of knowledge of species population biology and the unpredictable nature of disturbance events, all alternatives considered in the Final SEIS would provide inadequate habitat (including known sites) to maintain these species." That analysis is incorporated here by reference.

As described below, there is no new information or changed circumstances that would substantially change the effects anticipated in the 2000 Final SEIS. The proposed action applies all mitigation measures for this type of project as expected in the 2000 Final SEIS and adopted in the 2001 ROD.

The predicted rate of habitat disturbance on federal lands in the Northwest Forest Plan area is within that analyzed in the 2000 Final SEIS. The predicted rate of habitat loss (i.e. late-successional forest) due to management activities is described on Pages 180-181 in the 2000 Final SEIS: "...the likelihood that an activity modifying late-successional forest will occur within the range of a truly rare or localized species population must be viewed in light of the relatively conservative degree of modification of late-successional forest projected to occur within the Northwest Forest Plan Area. For example, management activities (timber harvest and prescribed fire) are projected to modify approximately 3 percent of the late-successional forest within the area over the next decade."

The Northwest Forest Plan 15-year Monitoring Report on Status and Trends of Late-Successional and Old-Growth Forests (Moeur 2011) concluded that late-successional old growth areas decreased on federal lands by an estimated 1.9 percent plan-wide over the monitoring period (1994 – 2008). This loss of habitat was from a variety of sources, mostly wildfire. Actual losses from management activities were <0.5%. This is substantially less than the 3% predicted in the 2000 Final SEIS. The effects to these species are well within what was anticipated in the 2000 FSEIS, even with the impacts from this project. Since the objective of the Survey and Manage mitigation is related to the Forest Service viability provision to provide for viable populations across the planning area, management consistent with the Survey and Manage Standards and Guidelines would also meet Forest Service Sensitive species policies to not result in a trend towards listing or a loss of species viability.

Validated sites for sensitive fungi which are located within the project boundaries would be managed according to management recommendations within existing protocol and the 2007 Conservation Assessment for Fungi (Cushman 2007). These sites would be incorporated into patch retention areas and would be buffered from ground disturbing activity, including skid trails, landings, and piling. In the short term, the proposed action may reduce habitat for sensitive mycorrhizal fungi due to host tree removal and a reduction in moisture retention capabilities due to the drying effect of overstory removal. To meet habitat concerns for all other areas and species, a diversity of downed woody materials would be maintained on-site to meet the standards for soil protection and sensitive mollusk species habitat. Soil disturbance is also limited by the forest plan standards for soil protection. This disturbance remains a risk for species. Soil compaction resulting from harvesting equipment or the creation of temporary roads and landings can reduce tree root growth and availability for fungi (Amaranthus 1994). There is also an optimal amount of organic debris and of moisture and too little or too much of either can be detrimental (Harvey 1981). If mastication or chipping methods are applied in these areas, it would still maintain the large down woody material, and would be scattered to avoid excessive deposition. If pile burning is applied, the known sites for fungi would be avoided.

3.2.3 - Cumulative Effects

The area analyzed for cumulative effects was within the Lower West Fork Hood River, Odell Creek–Hood River, and Grays Creek-Columbia River 6th field subwatersheds. This serves to include the appropriate habitats for target sensitive species as well as the habitats targeted for improvement during these proposed actions. The temporal scale of this cumulative effects analysis includes past thinning projects on both federal and private property, utility corridor operations and maintenance, and future thinning and associated actions proposed as part of this analysis.

Target species within this area have been indirectly impacted through changes to natural stand characters and reduction in species diversity. Continuing use of this area for travel corridors and recreation have spread weed propagules which may also alter sensitive habitats. The harvest of timber and other activities associated with this project, as well as continuing harvest activities

on neighboring private property may have a cumulative effect on undetected rare plants, fungi, bryophytes and lichens. The proposed treatment area for the Waucoma project would affect less than 10 percent of the combined acreages of the three watersheds. Project Design Criteria are in place to protect known sites and sensitive habitats associated with wetlands. Cumulative effects would not be substantial and would not result in a loss of species viability.

3.2.4 - Degree to Which the Purpose and Need for Action is Met

The purpose and need for huckleberry enhancement is well-met through this proposed action. Conifer shading and vegetation encroachment to existing and otherwise future huckleberry fields within the Waucoma planning area have created conditions that are no longer favorable to long-term huckleberry production and growth. There is a need to maintain an ecologically well distributed huckleberry understory across the planning area to achieve overall stand health that would ensure or provide for functioning stand conditions over time. This project location provides an excellent opportunity, and ecologically suitable area to achieve this need. The purpose of the project is to create and maintain current and future huckleberry habitat across the landscape to benefit traditional, cultural, and recreational uses.

If the forest did not address the need for landscape level stand management in this area huckleberry production would continue to decline.

3.2.5 - Degree to Which the Alternatives Address the Issues

No issues that would drive alternatives to the proposed action were identified during the analysis process, or through public comments. The only alternatives are the existing condition and the proposed action. The proposed action was altered to address concerns brought forward during scoping and during specialist analyses (specifically related to wildlife, aquatic, and recreation resources).

These changes to the proposed action still meet the purpose and need for huckleberry enhancement.

3.3 - Consistency with Management Direction

This project is consistent with the following Forest Service Policy, laws and regulation, which provides guidance for the persistence of threatened, endangered and sensitive species and their habitats. PDC are in place to protect known species sites, and to minimize the effects to habitats.

Forest Service Policy

- FSM 2672.1 - Sensitive Species Management. "Sensitive species of native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing. There must be no impacts to sensitive species without an analysis of the

significance of adverse effects on the populations, its habitat, and on the viability of the species as a whole. It is essential to establish population viability objectives when making decisions that would significantly reduce sensitive species numbers.”

- FSM 2670.22(2) - “Maintain viable populations of all native and desired non-native wildlife, fish and plant species in habitats distributed throughout their geographic range on National Forest System lands.”

Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) Direction

- FW-148, 149 and 150 – “Management activities shall preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species. The diversity of plants and animals shall be at least as that which would be expected in a natural forest; the diversity of tree species shall be similar to that existing naturally in the allotment area (36 CFR 219.27).”
- FW-162 – “Habitat management should provide for the maintenance of viable populations of existing native and desired non-native wildlife, fish (36 CFR 219.19) and plant species (USDA Regulation 9500-4) well distributed throughout their current geographic range within the National Forest System.
- FW-174 - “Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670.”
- FW-175 – “Habitat for threatened, endangered, and sensitive plants and animals shall be protected and/or improved.”
- FW-176 – “Biological Evaluations (FSM 2672.4) shall be prepared for all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened or sensitive species.”

The project is consistent with the 2001 Survey and Manage Record of Decision. All surveys included consideration of botanical species in table 1-1 of the 2001 Survey and Manage Record of Decision.

NFMA Implementing Regulations

- 36 CFR 219.19 - “Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations would be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals could interact with others in the planning area.”
- The 1983 USDA Departmental Regulation 9500-4 provides further direction to the Forest Service, expanding the viability requirements to include plant species: “Habitats for all existing native and desired non-native plants, fish, and wildlife species would be managed to maintain at least viable populations of such species. In achieving

this objective, habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species throughout its geographic range . . . Monitoring activities would be conducted to determine results in meeting population and habitat goals.”

3.4 – Summary of Effects

With no action, species would continue to adapt and respond to changing stand dynamics. There would continue to be a slow loss of huckleberry plants across this landscape, but it would not contribute toward the listing of huckleberry species. It could reduce the availability of huckleberry as a resource for wildlife, recreationists and first foods. The recreational use and maintenance of trails and roads, and utility maintenance for irrigation district infrastructure would continue to occur. This would have no impact on sensitive vascular plants, bryophytes, lichens and fungi.

The proposed action may directly impact individuals or habitat for sensitive plants, bryophytes, lichens and fungi, but would not lead toward federal listing or loss of viability. There would be beneficial impacts to huckleberry populations as a result of this proposed action. Research suggests that treatments to reduce canopy cover to approximately 30 percent result in enhanced huckleberry growth and would likely result in additional berry production as well.

Table 1. Summary Comparison¹

Resource Element	Existing Condition	Proposed Action
Huckleberry	MIIH	BI
TES Vascular Plants	NI	MIIH
TES Bryophytes and Lichens	NI	MIIH
TES Fungi	NI	MIIH

¹ NI = No impact; MIIH = May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species; WOFV = Will impact individuals or habitat with a consequence that the action may contribute to a trend towards federal listing or cause a loss of viability to the population or species; BI = Beneficial impact.

5.0 - References Cited

Amaranthus, M.P. and D.A. Perry. 1994. The functioning of ectomycorrhizal fungi in the field: linkages in space and time. *Plant and Soil* 159: 133-140. (cited in text as (Amaranthus 1994))

Anzinger, D. 2002. Big Huckleberry (*Vaccinium membranaceum*), Ecology and Forest Succession, Mt Hood National Forest and Warm Springs Indian Reservation, Oregon. Master of Science Thesis, Oregon State University, Corvallis, OR. 121 pages. (cited in text as (Anzinger 2002))

Barney, D.L. 1999. Growing western huckleberries. Sandpoint, Idaho Research & Extension Center. 1999 University of Idaho. 28pp. (cited in text as (Barney 1999))

Bradley, A.F., W. C. Fischer, and N.V. Noste. 1992. Fire ecology of the forest habitat types of eastern Idaho and western Wyoming. Gen. Tech. Rep. INT-290. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 92 p. (cited in text as (Bradley 1992))

Cushman, K. and R. Huff. 2007. Conservation Assessment for Fungi Included in Forest Service Regions 5 and 6 Sensitive and BLM California, Oregon and Washington Special Status Species Programs. USDA Forest Service and USDI Bureau of Land Management. Portland, Oregon. (cited in text as (Cushman 2007))

Dahlgreen, M.C. 1984. Observations on the ecology of *Vaccinium membranaceum* Dougl. on the southeast slope of the Washington Cascades. Seattle, WA: University of Washington. 120 p. Thesis. (cited in text as (Dahlgreen 1984))

French, D. 1999. Aboriginal control of huckleberry yield in the Northwest. In: Boyd, Robert, ed. *Indians, fire, and the land in the Pacific Northwest*. Corvallis, OR: Oregon State University: 31-49. (cited in text as (French 1999))

Friesen, C. 2016. Ecology and management of big huckleberry literature review. Unpublished. USFS R6 Ecology Program, September 2016. Accessed at <https://ecoshare.info/2018/06/19/ecology-and-management-of-big-huckleberry/> (cited in text as (Friesen 2016))

Harvey, A.E., M.F. Jurgensen and M.J. Larsen. 1981. Organic reserves: importance to ectomycorrhizae in forest soils of western Montana. *Forest Science* 27:442-445. (cited in text as (Harvey 1981))

Hudec, J. 2018. Gifford Pinchot National Forest huckleberry management strategy. Internal report. Accessed at <https://pinchotpartners.org/2017/12/01/draft-huckleberry-management-strategy/> (cited in text as (Hudec 2018))

Ingersoll, C.A. and M.V. Wilson. 1990. Buried propagules in an old-growth forest and their response to experimental disturbances. *Canadian Journal of Botany*. 68: 1156-1162. (cited in text as (Ingersoll 1990))

Martin, P.A. 1979. Productivity and taxonomy of the *Vaccinium globulare*, *V. membranaceum* complex in western Montana. Missoula, MT: University of Montana. 136 p. Thesis. (cited in text as (Martin 1979))

Minore, D. 1972. The wild huckleberries of Oregon and Washington -- a dwindling resource. PNW-143. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 20 p. (cited in text as (Minore 1972))

Minore, D. 1975. Observations on the rhizomes and roots of *Vaccinium membranaceum*. United States Forest Service Research Note PNW-261. (cited in text as (Minore 1975))

Minore, D. 1984. *Vaccinium membranaceum* berry production seven years after treatment to reduce overstory tree canopies. *Northwest Science*. 58(3): 208-212. (cited in text as (Minore 1984))

Minore, D. and M.E. Dubrasich. 1978. Big huckleberry abundance as related to environment and associated vegetation near Mount Adams, Washington. Research Note PNW-322. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 8 p. (cited in text as (Minore 1978))

Minore, D., A.W. Smart, and M.E. Dubrasich. 1979. Huckleberry ecology and management research in the Pacific Northwest. Gen. Tech. Rep. PNW-93. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 50 p. (cited in text as (Minore 1979))

Moeur, M., J.L. Ohman, R.E. Kennedy, W.B. Cohen, M.J. Gregory, Z. Yang, H.M. Roberts, T.A. Spies, and M. Fiorella. 2011. Northwest Forest Plan—the first 15 years (1994–2008): status and trends of late-successional and old-growth forests. Gen. Tech. Rep. PNW-GTR-853. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 48 p. (cited in text as (Moeur 2011))

Oregon Biodiversity Information Center. 2016. Rare, Threatened and Endangered Species of Oregon. Institute for Natural Resources, Portland State University, Portland, Oregon. 130 pp. Accessed at <https://inr.oregonstate.edu/orbic/rare-species/rare-species-oregon-publications> (cited in text as (ORBIC 2016))

USDA Forest Service. 1993. Region 6 interim old growth definition for Douglas-fir series, grand fir/white fir series, interior Douglas fir series, Lodgepole pine series, Pacific silver fir series, Ponderosa pine series, Port-Orford-cedar and tanoak (redwood) series, subalpine fir series, Western hemlock series. Portland, OR. (cited in text as (USDA 1993))

USDA Forest Service and USDI Bureau of Land Management. 2000. Final Supplemental Environmental Impact Statement for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (November 2000). Portland, OR. (cited in text as (USDA/USDI 2000))

USDA Forest Service and USDI Bureau of Land Management. 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (January 2001). Portland, OR. (cited in text as (USDA/USDI 2001))

Van Norman, K. and R. Huff. 2012. Survey & Manage Category B Fungi Equivalent-Effort Survey Protocol, Version 1.0. Portland, OR. U.S. Department of Interior, Bureau of Land Management, Oregon/Washington and U.S. Department of Agriculture, Forest Service, Region 6. 22 pp. (cited in text as (Van Norman 2012))

Yang, S. et al. 2008. Colonization genetics of an animal-dispersed plant (*Vaccinium membranaceum*) at Mount St. Helens, Washington. *Molecular Ecology* 17:731-740. (cited in text as (Yang 2008))