FINAL BIOLOGICAL EVALUATION FOR SENSITIVE PLANTS

WRANGELL ISLAND PROJECT

Wrangell Ranger District

Tongass National Forest

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INTRODUCTION

Purpose

The purpose of this biological evaluation (BE) is to analyze the effects of proposed actions of the Wrangell Island Project on federally listed threatened, endangered, or sensitive (TES) plant species. This report supports the Environmental Impact Statement (EIS) for the Wrangell Island Project which is being implemented under the 2016 Tongass National Forest Land and Resource Management Plan (Forest Plan; USFS 2016).

Forest Service policy requires that an effects analysis be conducted for activities that could affect species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS). The only plant in Alaska that is federally listed or proposed as threatened or endangered by the U.S. Fish and Wildlife Service is Aleutian holly fern (*Polystichum aleuticum*), which is listed as endangered. It is known only from Adak in the Aleutian Islands chain and is not expected to occur on the Forest; therefore, it will not be addressed further in this document.

Sensitive plants are those species identified by the Regional Forester as having potential for loss of viability, as evidenced by significant current or predicted downward trends in population numbers or density and/or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. These species are given special consideration by US Forest Service regulations and manual direction. The regulatory and policy framework concerning the management of sensitive plants is contained within Forest Service manual direction 2670. Seventeen vascular plant and one lichen species are designated as sensitive in the Alaska Region (USFS 2009).

Project Area

The Wrangell Island Project encompasses approximately 134,300 acres on Wrangell Island in southeast Alaska. The project area is located on the Wrangell Ranger District of the Tongass National Forest (the Forest). Wrangell Island is located in the Zimovia Strait Complex ecological subsection within the Alexander Archipelago of southeastern Alaska (Nowacki et al. 2001). Wrangell Island is separated from the mainland by Eastern Passage and the narrow Blake Channel. The northern end of Wrangell Island lies near the mouth of the Stikine River. To the west are Woronkofski Island and Zimovia Strait. Etolin Island is located to the west and southwest, and Deer Island and Ernest Sound lie to the south. The city of Wrangell is situated at the northern tip of the island. The topography of Wrangell Island is generally steep and mountainous, with mountain ridges separated by broad valleys and creeks.

Proposed Action and Alternatives

Five project alternatives were developed to meet the purpose of and need for the Wrangell Island project. All Action alternatives include proposed timber harvest and new road construction (Table 1).

Alternative 1: No Action

Under the no action alternative (Alternative 1) no timber harvest or other activities would occur. The no action alternative is required by CEQ Section 1502.14(d) to provide a baseline for comparing alternatives. No timber would be harvested, no roads would be constructed or reconstructed.

Alternative 2: Proposed Action

Alternative 2 is the proposed action. It is designed to provide the greatest volume of timber supply for the timber industry, while protecting scenic quality, old growth habitat and connectivity, and other resources as specified in the Forest Plan. Timber harvest would occur on approximately 4,767 acres. Silvicultural prescriptions include approximately 3,359 acres of uneven-aged management (partial harvest) and 1,408 acres of even-aged management (clearcut) that will be achieved using conventional cable, shovel, and helicopter logging systems. This alternative also proposes construction of 16.8 miles

Table 1. Proposed activities by project alternative.

Alternative	Timber harvest (acres)	New road construction (miles)
1	0	0
2	4,767	26.7
3	2,648	24.2
4	2,992	26.1
5	3,440	19.3

of new NFS roads and 9.9 miles of temporary roads. All temporary roads would be decommissioned after timber harvest and hauling is completed.

Alternative 3: Scenery

This alternative is designed to reduce the scenic effects of timber harvest by emphasizing less intensive harvest prescriptions and reducing the total acres of treatment, thereby reducing the scenic and recreational impact and maintaining wildlife habitat and connectivity while incorporating some economic considerations. Timber harvest would occur on approximately 2,648 acres. Silvicultural prescriptions include approximately 1,311 acres of uneven-aged management (partial harvest) and 1,337 acres of even-aged management (clearcut) that will be achieved using conventional cable, shovel, and helicopter logging systems. This alternative also proposes construction of 15.4 miles of new NFS roads and 8.9 miles of temporary roads. All temporary roads would be decommissioned after timber harvest and hauling is completed.

Alternative 4: Timber Economics

The objective of Alternative 4 is to maximize the economic value of the timber harvest while protecting scenic quality, old growth habitat and connectivity, and other resources as specified in the Forest Plan. Alternative 4 proposes both even-aged and uneven-aged timber harvest on suitable land with the associated roads. Timber harvest would occur on approximately 2,992 acres. Silvicultural prescriptions include about 1,572 acres of uneven-aged management (partial harvest) and about 1,420 acres of even-aged management (clearcut) that will be achieved using conventional cable, shovel, and helicopter logging systems. This alternative also proposes construction of 15.9 miles of new NFS roads and 10.3 miles of temporary roads. All temporary roads would be decommissioned after timber harvest and hauling is completed.

Alternative 5: Wildlife

This alternative is designed to protect wildlife habitat while providing an economically viable timber sale. It is similar to Alternative 3 harvest in applying less intensive harvest prescriptions than the allowable under the Forest Plan and reducing the total acres of treatment, thereby reducing the acres of wildlife affected and providing wildlife habitat connectivity. Timber harvest would occur on approximately 3,440 acres. Silvicultural prescriptions include about 2,635 acres of uneven-aged management and about 805 acres of even-aged management that will be achieved using conventional cable, shovel, and helicopter logging systems. This alternative also proposes construction of 12.7 miles of new NFS roads and 6.6 miles of temporary roads. All newly constructed roads would be closed following timber harvest activities.

METHODS

Analysis Area

The analysis area for direct and indirect effects to sensitive plants is the project area, which consists of the entirety of Wrangell Island. Direct effects are those which are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. The analysis area for cumulative effects was also constrained to Wrangell Island because of its geographic isolation from nearby lands by sea passages, which could restrict biological interactions with other sensitive plant occurrences on the

Forest. Cumulative effects are those that occur when the effects of an action are added to or interact with effects of other actions in the past, present, and foreseeable future in a particular place and within a particular timeframe.

Review of Existing Information

A review of existing information was conducted to document the sensitive plants that occur in the project area and to identify habitats likely to contain sensitive plant species that are known or suspected to occur in the project area. The Forest Service Natural Resource Information System (NRIS) database for Threatened, Endangered, and Sensitive Plants (TESP) was searched for known sensitive plant occurrences in the project area. Additionally, the University of Alaska Fairbanks ARCTOS herbarium database and the Consortium of Pacific Northwest Herbaria were also searched for other possible locations of sensitive plants in the project area (UAMH 2015, University of Washington 2015).

Suitable habitat characteristics for sensitive species that are known or suspected to occur in the project area were identified based on Stensvold (2013). Depending on the habitat requirements of each species, landscape information selected to assess potential habitat in the project area included landform, elevation, slope position, soil type, surface geology, proximity to shoreline, and vegetation cover type. Relevant geographic information system (GIS) map layers were then reviewed to help determine possible locations for sensitive plant field surveys. Map overlays provide approximate locations and will overestimate the potential habitat because they are based on the limited habitat information currently available in GIS. However, they do help discern the highest priority survey areas for field reconnaissance.

Field Surveys

Botanical field surveys were focused primarily in habitats of sensitive plants known or suspected to occur in the project area. Areas where impacts to sensitive plants or habitat could most likely occur under the action alternatives but that had not been previously surveyed were given the highest priority, such as within potential harvest units and road corridors. Where feasible, suitable habitat outside of but near areas of potential activity were also surveyed, in order to locate additional plant occurrences within the project area if possible.

Focused (intuitive controlled) surveys were conducted to search for any undocumented occurrences of sensitive plants. In focused surveys, suitable habitat is identified for each species of interest and the survey is focused on that habitat. The field surveys were conducted from 2010 to 2012 during the appropriate time of year to locate and identify sensitive plants, which in southeast Alaska occurs approximately mid-June to mid-August. For each survey, a Threatened, Endangered, and Sensitive Plants (TESP) Daily Plant Survey form was completed, and a complete list of plant species encountered on the survey route was compiled. Any sensitive plant occurrence identified in the survey was documented on a TESP Element Occurrence (EO) form. Survey routes were mapped using a hand-held global positioning system (GPS) unit. Plant identifications were based on Hitchcock and Cronquist (1973), Hultén (1968), Tande and Lipkin (2003), and Douglas et al. (1998). Taxonomic nomenclature followed the Natural Resources Conservation Service PLANTS database (NRCS 2013).

Seventy-three surveys were completed within the project area, covering a total of 448 acres. Fifty surveys included portions of the available timber harvest unit pool, and approximately 128 acres of potential sensitive plant habitat was surveyed within the unit pool. The remaining acreage surveyed was located outside potential harvest units but in potential sensitive plant habitat. Field survey and sensitive

plant occurrence data, including survey routes and sensitive plant occurrences, were entered into the NRIS-TESP database.

Analysis

All project alternatives were analyzed to determine the direct and indirect impacts to sensitive plant species known or suspected to occur in the project area. The cumulative effects of other past, present, and foreseeable future activities were also considered in determining the effects of the Wrangell Island project on these species. Using this information, the overall risk (likelihood and consequences) of effects were then assessed for each proposed alternative using a standardized risk assessment (Appendix A).

Direct and Indirect Effects

Direct effects mainly occur through physical damage to or destruction of individual plants. Crushing can cause physical injury or death to individual plants, and burying will also likely result in death. When a plant is injured, its ability to optimally produce and store food, reproduce, compete for nutrients, and resist pests and herbivores may be compromised, which can negatively affect its growth and survival in a particular location. Some plants are more vulnerable to injury than others, depending upon the growth form of the plant and the habitat in which it occurs. Quantifying direct or indirect effects on suitable sensitive plant habitat in the project area is currently not possible due to the scale of available map products and level of inventory data used to delineate rare plant.

The direct effects of proposed timber harvest were analyzed by overlaying proposed timber harvest unit boundaries for each project alternative over known sensitive plant occurrences in the project area. Occurrences located either wholly or partially within a harvest unit was assumed to be directly impacted by the activity. Direct effects of proposed new road construction were analyzed by overlaying proposed road segment lines over known sensitive plant occurrences. A 13 m (42.6 ft) buffer on either side of the road segment line was used to represent an average road corridor width of 26 m (85 ft) for forest logging roads (J. Powell, personal communication, October 28, 2013). Occurrences located either wholly or partially within proposed road corridor, were assumed to be directly impacted by road construction, including vegetation clearing and road bed preparation.

A 50 m (164 ft) buffer was chosen for this analysis to account for potential indirect effects such as windthrow or hydrologic changes that may occur over the long term in undisturbed areas due to activities in adjacent areas. Some effects may occur beyond 50 m but the likelihood and consequences usually become more limited as distance increases. Indirect effects of proposed timber harvest were analyzed by buffering timber harvest unit boundaries for each project alternative by 50 m and then overlaying this buffer on known sensitive plant occurrences in the project area. Indirect effects of proposed road construction were analyzed by buffering the 26 m width of the road corridor by 50 m and overlaying the buffered area over known sensitive plant occurrences in the project area. Occurrences located outside road corridor but either wholly or partially located within the 50 m buffer were assumed to be indirectly impacted by road construction.

Cumulative Effects

Cumulative effects result from incremental impacts of proposed actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Reasonably foreseeable actions are those that are currently planned or scheduled to occur. The accumulation of direct and indirect effects on sensitive plants can affect overall viability of the

species by reducing the numbers of individuals and the distribution of occurrences, which in turn adversely impact reproduction success, genetic variability, and resilience to future disturbances.

The direct and indirect impacts of past actions were analyzed by overlaying a GIS map layer of previously harvested stands and existing roads on known locations of sensitive plant occurrences in the project area. Impacts of present and reasonably foreseeable future actions were assessed by summarizing the effects of actions that are likely to occur in the project area generally within the next five years and evaluating their risk of impact to sensitive plants.

AFFECTED ENVIRONMENT

General Vegetation

Roughly half of Wrangell Island is productive forest land, with the rest consisting mostly of forested and nonforested wetlands and sphagnum bogs that occur on poorly drained till underlying a deep layer of organic material. Alpine vegetation and subalpine forest and meadow covers relatively small areas in the project area because most elevations on Wrangell Island are below 2,000 feet; however, a small number of proposed harvest units and road corridors occur in these zones. Mountain slopes and lower elevations are habitat for forests of western (*Tsuga heterophylla*) and mountain hemlock (*Tsuga mertensiana*), Sitka spruce (*Picea sitchensis*), western red cedar (*Thuja plicata*), yellow-cedar (*Callitropsis nootkatensis*), and shore pine (*Pinus contorta* var. *contorta*). Productive forest cover types include western hemlock and/or mountain hemlock, Sitka spruce, and mixed hemlock-Sitka spruce, and proposed timber harvest units in the project area consist of these forest types. Low productivity forest types include those that are at high elevation, have a low site index, are in muskeg, are dominated by rock cover, or are located in a recurrent slide zone. These are often open-canopied forests consisting of a mix of conifer species including western and mountain hemlock, western red cedar, yellow-cedar, and shore pine. Nonforest vegetation types include alder brush, brush, grassland, alpine, uplifted beach, muskeg-meadow, and recurrent slides/talus slopes. Low productivity forests and nonforested vegetation are generally not included in proposed harvest units, but limited areas may be included in proposed new road corridors.

Sensitive Plants

Lesser round-leaved orchid is the only sensitive plant species that is known to occur within the project area (Table 2). Eleven occurrences of lesser round-leaved orchid have been documented in the project area. Mapping conducted by the Alaska Natural Heritage Program (Dillman et al. 2015) indicates that the known occurrences of the lesser round leaved orchid occupy two distinct populations within the project area. This represents about 3 percent of the known populations within the Tongass National Forest. None of these populations are located in or near any proposed timber harvest unit or new road corridor.

Five sensitive plant and one lichen species are suspected to occur in the project area: edible thistle, mountain lady's slipper, Calder's lovage, lung lichen, Alaska rein orchid, and Henderson's checkermallow. Eleven other Alaska Region sensitive plant species are not suspected to occur, either because suitable habitat for these species does not exist in the project area or because the project area is located outside of their known or suspected geographic range of distribution. These species will not be addressed further in this document.

Table 2. Alaska Region sensitive plant and lichen species known or suspected to occur in the Wrangell Island project area.

Common name	Scientific name	General Habitat (Stensvold 2013)	Presence in project area
Alaska rein orchid	*Piperia unalascensis*	Open forest, streamside, riverbank, bog, heath, ultramafic.	Suspected. Project area contains suitable habitat within known or suspected geographic range of the species.
Calder's loveage	*Ligusticum calderi*	Forest edge, dry meadow, wet meadow, alpine and subalpine, calcareous.	Suspected. Project area contains suitable habitat within known or suspected geographic range of the species.
edible thistle	*Cirsium edule* var. *macounii*	Dry meadow, alpine and subalpine, talus slopes.	Suspected. Project area contains suitable habitat within known or suspected geographic range of the species.
Henderson's checkermallow	*Sidalcea hendersonii*	Upper beach meadows, beach/forest ecotone.	Suspected. Project area contains suitable habitat within known or suspected geographic range of the species.
lesser round-leaved orchid	*Platanthera orbiculata*	Forest edge, forest, open forest, bog.	Known. Documented occurrences in the project area.
lung lichen	*Lobaria amplissima*	Beach/forest ecotone.	Suspected. Project area contains suitable habitat within known or suspected geographic range of the species.
mountain lady's slipper	*Cypripedium montanum*	Upper beach meadow, beach forest ecotone, open forest, wet meadow, calcareous.	Suspected. Project area contains suitable habitat within known or suspected geographic range of the species.

ENVIRONMENTAL CONSEQUENCES

Effects Common to All Action Alternatives

Direct Effects

Direct effects of the project would only occur within timber harvest units and proposed road corridors and associated infrastructure such as log landings and rock quarries. Timber harvest has varying degrees of direct impacts on vegetation, depending on the harvest method used. An even-aged harvest method usually has the greatest and potentially longest impacts. The timber yarding method can cause varying impacts, with the severity correlated to the amount of soil disturbance the yarding method creates. Even-aged harvest usually results in dense regeneration of conifer saplings, which can suppress understory vegetation due to insufficient light penetration under the canopy. Pre-commercial thinning can delay the period of understory suppression, but eventually the canopy can close again and suppress most understory species. Uneven-aged harvests may have less severe and more temporary direct effects on vegetation, since a large portion of unharvested trees are left clumped or scattered across the harvest unit. However, sensitive species can also be affected by less intense harvest methods possibly as a result in changes in forest structure, including changes in light regime.

Road construction completely crushes or buries plants located in the road bed, and plants that are located along the road right-of-way can also be crushed, buried, or damaged as a result of vegetation clearing or road maintenance activities. Road construction usually affects vegetation more completely and permanently than timber harvest because it involves intense ground disturbance. Log landings and rock quarries are usually constructed adjacent to roads and are considered as part of road construction in this analysis. Excavation of rock material will crush, bury, or damage plants in the immediate location of the quarry. Since most soil is removed in the excavation process, quarries will remain in a long-term unvegetated state.

Indirect Effects

Indirect effects to sensitive plants from project activities can occur both within and adjacent to harvest units and road construction areas. Indirect effects may include changes in soil physical and chemical properties, surface and groundwater flow, solar exposure, species composition, and risk of future disturbance such as windthrow or landslides. The magnitude of indirect effects from an action can depend on many variables, including the type and intensity of the action, the distance from the action, the time since the action occurred, and the physical and biological conditions of a site. Although it is possible that indirect effects on sensitive plants could occur at long distances from an action, the probability and magnitude of effect generally decrease rapidly with increasing distance from the action.

The indirect, long-term impact of actions such as timber harvest or road building to adjacent vegetation is uncertain. Past studies of microclimate of forests adjacent to harvests indicate that edge-related microclimate effects may occur up to and beyond 200 meters from the harvest edge, with most change occurring within 20 m of the harvested edge; although the magnitude of an effect can differ among the climatic variables of interest (Chen et al. 1993, 1995; Concannon 1995; Russell et al. 2000). Because it is difficult to statistically test changes in rare or uncommon species, the actual duration and magnitude of edge effects on these species is uncertain. However, rare or uncommon species may be more susceptible than common species to disturbance or to other random effects that lead to extirpation of a population (Nelson and Halpern 2005; Heithecker and Halpern 2007). Furthermore, a lack of immediate, edge-related declines in a population does not preclude the possibility of future declines. Research on edge effects on forest vegetation adjacent to harvests indicates that changes in temperature and light availability are greatest at the edge, but decline sharply inside adjacent unharvested forest Declines among some groups of vascular and nonvascular plants is often greatest approximately 5-10 meters from the edge (Heithecker and Halpern 2007). However, frequency and intensity of disturbances such as windthrow could further compromise the edge, resulting in changes in microclimate further into the adjacent vegetation than what resulted initially from the harvest. It is important to note the limitations of these studies, particularly the short duration of sampling following harvest. Species composition could eventually return to that of the original plant community, although it may take several decades.

Summary of Project Effects

Alternative 1

Alternative 1 (No Action) will have no effect on any sensitive plant species known or suspected to occur in the project area because timber harvest and road construction would not occur.

Alternatives 2, 3, 4 and 5

Edible thistle

There are no documented occurrences of this species in the project area, but it is suspected to occur because suitable general habitat is present in the project area (Table 2). The likelihood of impacts to this species is low because timber harvest and road construction could occur in relatively small areas of subalpine forest, subalpine meadows or dry meadows. The consequence of impacts is moderate because project activities could adversely impact undocumented occurrences and associated habitat for this species. The overall effects to this species is minor because most suitable habitat in the project area would not be affected by project activities. Therefore, implementation of Alternatives 2, 3, 4, or 5 may affect edible thistle.

Mountain lady's slipper

There are no documented occurrences of this species within the project area, but it is suspected to occur because suitable general habitat is present in the project area (Table 2). The likelihood of impacts to this species is low because timber harvest and road construction could occur in relatively small areas of open forests or wet meadows and would not occur in upper beach meadows and beach/forest ecotone. The consequence of impacts is moderate because project activities could adversely impact undocumented occurrences and associated habitat for this species. The overall effects to this species is minor because most suitable habitat in the project area would not be affected by project activities. Therefore, implementation of Alternatives 2, 3, 4, or 5 may affect mountain lady's slipper.

Calder's lovage

There are no documented occurrences of this species within the project area, but it is suspected to occur because suitable general habitat is present in the project area (Table 2). The likelihood of impacts to this species is low because timber harvest and road construction could occur in relatively small areas of subalpine forests, forest edge, wet meadows, or dry meadows. The consequence of impacts is moderate because project activities could adversely impact undocumented occurrences and associated habitat for this species. The overall effects to this species is minor because most suitable habitat in the project area would not be affected by project activities. Therefore, implementation of Alternatives 2, 3, 4, or 5 may affect Calder's lovage.

Lung lichen

There are no documented occurrences of this species within the project area, but it is suspected to occur because suitable general habitat is present (Table 2). The risk of impacts to this species is none, because no timber harvest or road construction would occur within 1000 feet of the shoreline, and existing facilities will be utilized for shoreline transfer of harvested logs, thus avoiding impacts on undocumented occurrences in the beach/forest ecotone. Therefore, implementation of Alternatives 2, 3, 4, or 5 would have no effect on this species.

Alaska rein orchid

There are no documented occurrences of this species within the project area, but it is suspected to occur because suitable general habitat is present (Table 2). The likelihood of impacts to this species is low because timber harvest and road construction could occur in relatively small areas of open forest, streamside and riverbank, bogs, or heath, and no activities would not occur in upper beach meadows. The consequence of impacts is moderate because project activities could adversely impact

undocumented occurrences and associated habitat for this species. The overall risk of effects to this species is minor because most suitable habitat in the project area would not be affected by project activities. Therefore, implementation of Alternatives 2, 3, 4, or 5 may affect Alaska rein orchid.

Lesser round-leaved orchid

Eleven occurrences of lesser round-leaved orchid have been documented in the project area. The project area is located at the edge of the known range of this species on the Forest, so occurrences may be more susceptible to changes in climatic conditions than at other locations on the Forest. However, no known occurrences will be directly or indirectly impacted by project activities. The likelihood of adverse impacts to this species is moderate because timber harvest and road construction could occur in relatively large areas of forest and relatively small areas of forest edge, open forest, and bogs, but no known occurrences would be either directly or indirectly affected. The consequence of impacts is moderate because project activities could adversely impact undocumented occurrences and associated habitat for this species. The overall risk of effects to this species is minor to moderate. Although no known occurrences of this species will be directly or indirectly affected by timber harvest or road construction, timber harvest would occur in relatively large areas of forested land and may impact undocumented occurrences of this species in suitable habitat; however, not all of forested areas are likely provide the specific habitat conditions required by this species. Therefore, implementation of Alternatives 2, 3, 4, or 5 may affect lesser round-leaved orchid.

Henderson's checkermallow

There are no documented occurrences of this species within the project area, but it is suspected to occur because suitable habitat is present. The risk of adverse impacts is none because no harvest activities or road construction would occur within 1000 feet of the shoreline, where the upper beach meadow and beach/forest ecotone habitat for this species occurs. Therefore, implementation of Alternatives 2, 3, 4, or 5 would have no effect on this species.

Cumulative Effects

On Wrangell Island, activities causing past and present disturbance to vegetation are largely a result of timber harvest, road construction, special uses, and dispersed recreation. Timber harvests and road construction have contributed most to the past disturbances on Wrangell Island and the Forest. Approximately 7,490 acres of timber harvest has occurred in the project area. Past harvest areas can be found over much of the island, including areas that are currently in Land Use Designations (LUDs) where timber harvest is no longer allowed. Timber harvests can alter habitat quality for sensitive plants such as lesser round-leaved orchid, whose suitable habitat are most commonly found in old growth forests. The effects on sensitive plants may be dependent on the length of time since harvest as well as the harvest method. Forest stands harvested by less intensive methods (e.g. selective tree, helicopter yarding) may require fewer years to recover than those harvested by more intensive methods (e.g. clearcut, shovel yarding).

An extensive network of National Forest System (NFS) roads exists on Wrangell Island. This road system was primarily constructed to support past timber management activities. There are currently 99.5 miles of existing NFS roads on Wrangell Island. It is uncertain if sensitive plants have been lost or damaged due to past road construction. However, road construction usually involves intense ground disturbance, and any sensitive plants in the road corridor would likely have been destroyed, and likely would have long-term impacts on suitable habitat in or near the road corridor, especially from permanent roads. It is

also uncertain what the effects of past recreation, mining, or building construction activities may have had on sensitive plants. These activities have been infrequent in the project area and are not likely to have contributed to substantial loss of sensitive plants or their habitat, and no substantial changes in the frequency of these activities are anticipated.

Present activities that could impact sensitive plant species in the project area include timber harvest, road construction, and other land development actions. At present, no such projects are being implemented on NFS lands in the project area, except for small roadside timber 'micro-sales'. Although some timber harvest may currently be occurring on private or state-owned lands in the project area, the level of impact is uncertain, because information on sensitive plant occurrences or habitat on non-NFS lands is not available.

Several future activities are planned within the project area, both on NFS lands and on other land ownerships. For the purposes of this analysis, foreseeable future timber harvests are generally those that are expected to occur within the next five years. Potential future timber harvests on NFS lands on Wrangell Island include two Forest Service projects: roadside timber sales and pre-commercial tree thinning. The annual amount of roadside timber harvested is variable but can be up to 500 MBF/year. The location of harvests is also variable but is most likely to occur along existing roads on Wrangell Island. The location and extent of pre-commercial thinning is uncertain at this time, but will always occur in previously harvested stands that have a dense regrowth of young trees. Impacts to sensitive plants are possible due to these activities, but the risk is relatively low, because these activities will be concentrated either along existing roads or in previously harvested areas, which have already been impacted by previous activities. However, undocumented occurrences that have already been indirectly affected by past activities could be further impacted.

The Alaska Mental Health Trust Land Office (AMHT) has initiated timber harvest in the project area totaling 104 acres, with 0.6 miles of road construction. AMHT also conducts an annual land sale program which could impact lands in the project area. The locations and extent of future timber offerings have not yet been determined. The Alaska Department of Natural Resources - Division of Forestry has published a five-year Schedule of Timber Sales (2013-2017). The amount of annual offerings are not determined until the offering is publicized. The Earl West Cove Area timber sale will potentially harvest 535 acres of timber and a construct 4.4 miles of roads. The State is still in the process of completing its Alaska Statehood Act of 1959 entitlement selections for the 16,683 acres of NFS land identified near Thoms Lake/Thoms Place on Wrangell Island. Some of this land could be eventually harvested, but the amount and location are undetermined. All of the foreseeable road construction work in the project area by the Alaska Department of Transportation is concentrated around the city of Wrangell and the airport. The potential impacts of these activities on sensitive plant occurrences and their habitat on non-NFS lands are uncertain, because the final locations and extent of activities is not currently known, and information on sensitive plant occurrences and habitat on non-NFS lands is generally lacking.

None of the 11 occurrences of lesser round-leaved orchid documented in the project area have been directly affected by past timber harvest. Two occurrences have been indirectly affected by past timber harvest. No known occurrences have been directly or indirectly affected by past road construction on NFS lands. It is important to note that quantifying the magnitude of actual effects from past activities requires monitoring the changes to affected occurrences and their habitat over time; this information is not available from past activities in the project area. Some locations where activities such as timber harvest occurred many decades ago may have recovered some or all of their undisturbed habitat characteristics. Areas with more recent or more intense harvests may not recover their previous habitat characteristics for decades into the future. Some highly modified areas, such as permanent roads and rock quarries, may never recover from the original disturbance.

Of the total area occupied by the 61 known populations of lesser round-leaved orchid throughout the Tongass, 44 percent are located within non-development land-use designations (LUDs) where timber harvest in not planned and 56 percent are located within development LUDs (Dillman et al. 2015). The old-growth conservation strategy provides for large reserves of old-growth habitat, in particular within the non-development LUDs; resulting in conservation of at least 40 percent of the known populations of lesser-round leaved orchid and their associated habitat across the Forest. On Wrangell Island, two populations are known to exist, representing about 3 percent of the populations within National Forest System lands on the Tongass National Forest.

MITIGATION AND MONITORING

Since no known sensitive plant occurrences will be directly or indirectly affected under any alternative, mitigation measures to protect sensitive plants are not necessary. If any previously undiscovered sensitive plants are encountered in timber harvest units or road construction areas at any time prior to or during implementation of this project, Forest Plan standards and guidelines that are designed to protect sensitive plants shall be implemented as mitigation measures. The implementation and effectiveness of any such mitigations should be monitored during and after the commencement of related project activities.

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Appendix A

Criteria for assessment of risk to sensitive plants (Dillman et al. 2009).

Factor 1. Likelihood of Adverse Effect from a Particular Activity	
NONE	Activity will not affect habitat or population. (No further risk assessment needed).
LOW	Activity controllable by seasonal or spatial restrictions and is not likely to affect habitat or populations.
MODERATE	Activity not completely controllable or intense administration of project needed to prevent adverse effects on habitat or population. Adverse effects may occur.
HIGH	Activity not controllable and adverse effects on habitat or populations likely to occur.

Factor 2. Consequence of Adverse Effect from a Particular Activity	
LOW	None, or questionable adverse effect on habitat or population. No cumulative effects expected.
MODERATE	Possible adverse effects in habitat or on population. Cumulative effects are possible.
HIGH	Obvious adverse effects on habitat or population. Cumulative effects are probable.