# RARE PLANT RESOURCE REPORT

# WRANGELL ISLAND PROJECT

**Wrangell Ranger District**

**Tongass National Forest**

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# INTRODUCTION

## Purpose

This report analyzes the effects of proposed actions of the Wrangell Island Project on rare plant species to support the environmental impact statement (EIS) process for the project. The definition of rare plants follows the description in Dillman and Krosse (2009). The list of rare plants is dynamic, and species may be added or dropped according to changes in conservation or taxonomic status.

The 2008 Tongass National Forest Land and Resource Management Plan (Forest Plan; USFS 2008a) includes standards and guidelines for the conservation, management, inventory, and monitoring of both sensitive and rare plant species. However, rare plants do not have the same level of protection or the same viability determinations as sensitive plant species (USFS 2008b). For example, effects of this project are analyzed for sensitive plants that are either known or suspected to occur in the project area, but effects are analyzed only for rare plant species known to occur in the project area.

The analysis of effects for the Wrangell Island Project on Alaska Region sensitive plant species is documented in the project biological evaluation for sensitive plants. Analysis of project effects on risk of invasive plant infestation is documented in the project invasive plant risk assessment. Both of these documents are included in the project record.

## 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 5,309 acres. Silvicultural prescriptions include approximately 3,528 acres of uneven-aged management (partial harvest) and 1,781 acres of even-aged management (clearcut) that will be achieved using conventional cable, shovel, and helicopter logging systems. This alternative also proposes construction of 17.2 miles of new NFS roads and 13.2 miles of temporary roads. All temporary roads would be decommissioned after timber harvest and hauling is completed.

**Table 1. Proposed activities by project alternative.**

| Alternative | Timber harvest (acres) | Road construction (miles) |
|---|---|---|
| 1 | 0 | 0 |
| 2 | 5,309 | 30.4 |
| 3 | 3,185 | 28.9 |
| 4 | 3,531 | 31.4 |
| 5 | 3,804 | 22.4 |

### 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 3,185 acres. Silvicultural prescriptions include approximately 1,484 acres of uneven-aged management (partial harvest) and 1,701 acres of even-aged management (clearcut) that will be achieved using conventional cable, shovel, and helicopter logging systems. This alternative also proposes construction of 15.7 miles of new NFS roads and 13.2 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 3,531 acres. Silvicultural prescriptions include about 1,738 acres of uneven-aged management (partial harvest) and about 1,793 acres of even-aged management (clearcut) that will be achieved using conventional cable, shovel, and helicopter logging systems. This alternative also proposes construction of 16.1 miles of new NFS roads and 15.3 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 3,804 acres. Silvicultural prescriptions include about 2,868 acres of uneven-aged management and about 936 acres of even-aged management that will be achieved using conventional cable, shovel, and helicopter logging systems. This alternative also proposes construction of 12.4 miles of new NFS roads and 7.8 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 rare 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 in a different location, 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 rare 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 was conducted to document the rare plants that 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 rare 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 rare plants in the project area (UAMH 2015, University of Washington 2015).

## Field Surveys

Botanical surveys were focused primarily in habitats of sensitive plants known or suspected to occur in the project area, but any rare plants encountered during these surveys were also documented. Areas where impacts to 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, habitat outside of but near areas of potential activity were also surveyed to search for additional sensitive or rare plant occurrences that are located the project area.

Focused (intuitive controlled) surveys were conducted in the selected areas, in which suitable habitat was identified for each species of interest and the survey focused on that habitat (Appendix A). The field surveys were conducted from 2010 to 2012 during the appropriate time of year to locate and identify rare plants, which in southeast Alaska occurs approximately mid-June to mid-August. For each survey, a complete list of plant species encountered was compiled, and any rare plant encountered was documented. 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 covering a total of 448 acres were completed within the project area. Fifty of the surveys included portions of the available harvest unit pool and potential road routes, and approximately 128 acres were surveyed within these areas. The remaining surveys were in habitats located outside the harvest unit pool. Field survey and element occurrence data, including survey routes and rare plant occurrences, were entered into the NRIS-TESP database.

## Effects Analysis

All project alternatives were analyzed to determine the direct and indirect impacts to rare plant species known 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, a risk assessment was completed using criteria related to the likelihood and consequence of effects (Appendix B) were then assessed for each proposed alternative.

### Direct and Indirect Effects

Direct effects occur at the same time and place as the activity, with adverse impact mainly a result of physical damage or destruction to individual plants. The direct effects of proposed timber harvest were analyzed by overlaying proposed timber harvest unit boundaries for each project alternative over known rare plant occurrences in the project area. Any rare plant occurrence located either wholly or partially within the harvest units was assumed to be directly impacted by the timber harvest activities. Direct effects of proposed new road construction were analyzed by overlaying proposed road segment lines

over known rare plant occurrences in the project area. 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 (Powell 2014, pers. comm.). Rare plant occurrences that were either wholely or partially located within a 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 used to account for potential indirect effects such as windthrow or hydrologic changes that may occur over the long term in areas adjacent to timber harvest or road construction. Some effects may occur beyond 50 m, but the likelihood and consequences of impacts usually decreases substantially as distance from the activity 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 rare plant occurrences in the project area. Occurrences that are located outside the harvest unit boundaries but either wholly or partially within the 50 m buffer were assumed to be indirectly impacted by the activity. 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 rare plant occurrences in the project area. Occurrences located outside the road corridor but either wholely 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. For this analysis, future actions are generally expected to occur within the next five years. The accumulation of direct and indirect effects on rare plants can affect long-term viability 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 impacts of past actions were analyzed by overlaying a GIS map of previously harvested stands and existing roads over known locations of rare plant occurrences in the project area. Impacts of present and reasonably foreseeable future actions were assessed by summarizing the actions that are occurring or likely to occur in the project area over the next five years, and evaluating their risk of impact to the known rare plant occurrences.

# AFFECTED ENVIRONMENT

Two rare plant species are known to occur in the project area: inundated clubmoss (*Lycopodiella inundata*) and threeleaf foamflower (*Tiarella trifoliata* ssp. *laciniata*). These species are both ranked by the Alaska Natural Heritage Program (AKNHP 2015) as secure globally (G5), but rare within the state (S3). Although rare plants on the Forest are usually state-ranked as imperiled (S2) or critically imperiled (S1), these two species are also considered for this analysis because their distribution in Alaska is restricted to the southern half of the Tongass which means these populations occur within the most northern extent of their ranges. No other plant species that are currently considered rare were recorded in the project area.

Inundated clubmoss occurs in peat bogs, pools in peatlands, and lake margins in lowland and montane elevations (Douglas et al. 1998). Eleven occurrences are known to occur within the project area..

Threeleaf foamflower occurs in moist forests, meadows, and stream banks from lowland to subalpine elevations (Douglas et al. 1998). Only one occurrence of this species is known to be located within the project area.

# EFFECTS ANALYSIS

## 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, rare species can also be vulnerable to impacts from less intense harvest methods because they often have specific habitat requirements such as old-growth forest structure, and even partial harvest could create conditions that inhibit the ability of these species to persist over the long term.

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 rare 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 disturbances 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 rare 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.

## Comparison of Alternatives

Under Alternative 1 (No Action), the likelihood of impacts to occurrences of rare plants is none because no timber harvest or road construction will occur. Threeleaf foamflower would not be directly or indirectly impacted by either timber harvest or road construction under any Action alternative, since the only known occurrence in the project area is located well outside of proposed harvest unit boundaries and proposed roads. Therefore, the likelihood of adverse impacts to this species from project activities is none.

Some occurrences of inundated clubmoss could be impacted under all Action alternatives (Table 3). Alternative 5 would have the least risk of impact, with two occurrences affected by timber harvest and one affected by road construction. Alternative 3 would have the next highest risk of impact, with two occurrences each affected by timber harvest and road construction, respectively. Alternatives 2 and 4 would both have the highest risk of impact, with three occurrences affected by timber harvest and two affected by road construction. It is important to note that this species occurs exclusively in nonforested muskeg habitat and would likely have little or no long-term effects from timber harvest. However, road construction in this habitat could damage or destroy individuals and affect the natural hydrology near the road corridor.

**Table 3. Number and percent of inundated clubmoss occurrences affected by timber harvest or road construction under the four Action alternatives.**

| Alternative | Timber harvest | | Road construction | |
|---|---|---|---|---|
| | Occurrences | Percent affected | Occurrences | Percent affected |
| 2 | 3 | 27% | 2 | 18% |
| 3 | 2 | 18% | 2 | 18% |
| 4 | 3 | 27% | 2 | 18% |
| 5 | 2 | 27% | 1 | 9% |

## 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 the greatest amount of habitat alteration on Wrangell Island and the Forest. Approximately 6,800 acres of past 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. Two occurrences have been indirectly affected by past timber harvest on Wrangell Island.

An extensive network of NFS roads exists on Wrangell Island. There are currently 97.1 miles of existing NFS roads on Wrangell Island. This road system was primarily constructed to support past timber harvest and thinning activities. It is uncertain if undocumented rare plant occurrences have been impacted by past road construction. It is also uncertain what the effects of past recreation, mining, or building construction activities may have had on rare plants, although these activities are limited in the project area.

Potential future timber harvests on Wrangell Island include two Forest Service projects: roadside timber sales and pre-commercial tree thinning. The amount of timber harvested is variable but can be up to 500 MBF/year. The location of harvest is also variable but is most likely to occur along existing roads on Wrangell Island. The location and extent of pre-commercial thinning projects is uncertain at this time. 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. However, the locations and extent of future offerings are not 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 sale offerings are not determined until the offering is publicized. The Earl West Cove Area timber sale will potentially harvest 535 acres of timber and 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.

Impacts due to the Forest Service projects are possible, but the likelihood is probably low, because they will be concentrated either along existing roads or in previously harvested forest. Since habitat for inundated clubmoss is non-forested muskeg, the consequence of any impacts is likely to be low. All known occurrences of this species in the project area are located on National Forest System (NFS) lands, so future activities by other entities such as the Alaska Mental Health Land Office, Alaska Department of Natural Resources, and Alaska Department of Transportation are not expected to impact this species.

## Summary of Effects

Under Alternative 1 (No Action), no timber harvest or road construction will occur. Therefore, the likelihood of adverse impacts to rare plants under this alternative is none.

Under Alternatives 2, 3, 4, and 5, the likelihood of adverse impacts to threeleaf foamflower is none, because the only known occurrence of this species is located well outside any planned area of timber harvest or road construction. The likelihood of impacts to inundated clubmoss is low, because timber harvest will not occur in the open muskeg habitat in which it occurs, although road construction could

occur near some occurrences. The consequence of impacts is moderate because ground disturbing activities could alter surface or ground water flow, which could adversely affect nearby occurrences. Therefore, the risk of adverse impacts to inundated clubmoss under Alternatives 2, 3, 4, and 5 is low to moderate.

# MITIGATION AND MONITORING

Specific direction from Forest Plan standards and guidelines for rare plants, such as using directional felling and yarding away from rare plants, is included in the management prescriptions for harvest units that may affect known rare plant occurrences. Where possible, and while meeting required road design specifications, similar mitigation measures are included in road layout and construction specifications. The implementation and effectiveness of these mitigations should be monitored during and/or after the commencement of related project activities for a period of 3 years. If any previously undiscovered rare 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 rare plants should be implemented at those sites as mitigation measures.

This report was prepared based upon presently available information. Additional analysis will be required if the proposed action or alternatives are modified in a manner that causes new effects not previously considered (FSM 2670 Supplement R10 2600-2005-1).

# REFERENCES

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# APPENDIX A: DEFINITIONS FOR FLORISTIC SURVEY TYPES

Source: Threatened, Endangered, and Sensitive Plants Survey Field Guide (USFS 2005).

| Survey type | Description |
|---|---|
| **Field Check** | The survey area is given a quick "once over" but the surveyor does not walk completely through the project area. The entire area is not examined. |
| **Cursory** | A Cursory survey is appropriately used to confirm the presence of species of interest identified in previous surveys or in the pre-field analysis. By its nature, the cursory survey is rapid, and does not provide in-depth environmental information. The entire area is traversed at least once. For example, stand condition as seen in aerial photography can be verified by a cursory survey. Also, a cursory survey can be used to determine if a plant population that had been previously documented at a site remains present or intact. |
| **General** | The survey area is given a closer review by walking through the area and its perimeter or by walking more than once through the area. Most of the area is examined |
| **Focused (Intuitive Controlled)** | The Focused, or Intuitive Controlled, survey is the most commonly used and most efficient method of surveying for TES plants. During pre-field analysis, potential suitable habitat is identified for each species of interest and the survey effort is focused in those areas. This method requires adequate knowledge of suitable habitat in order to accurately select the areas of focused searching. When conducting intuitive controlled surveys, an area somewhat larger than the identified suitable habitat should be searched to validate current suitable habitat definitions. |
| **Random** | Random surveys employ an undirected, typically non-linear, traverse through a project area. They are employed either when there is inadequate natural history information about a species to discern its suitable habitat and the surveyor is simply searching for occurrences, or when a target species is very abundant within a search area and the surveyor is attempting to make estimates of population parameters such as intra-patch variations in density or the occurrence of predation or herbivory. However, a stratified random survey may be more effective in these latter cases. |
| **Stratified Random** | This survey is most often used within known population areas of target species, or when an area to be surveyed is of unknown habitat suitability and is relatively large. Stratified random surveys employ a series of randomly selected plots of equal size within a project area that are each thoroughly searched for target species. When conducting a stratified random survey, it is important to sample an adequate number of plots that are of sufficient size if statistical inference regarding the survey area is desired. |
| **Systematic** | Typically used in limited areas where the likelihood of occurrence of a target species may be evenly distributed throughout the survey area. Systematic surveys are often employed either within focused search areas (e.g., stratified random and intuitive controlled methods), or when a project is likely to produce significant habitat alterations for species that are especially sensitive to the proposed activities. |

# APPENDIX B

Criteria for assessment of risk to sensitive plants (Stensvold 2011).

| **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. |