

Toohey Project

**Tofte Ranger District
Superior National Forest**

Biological Evaluation

Region 9 Regional Forester Sensitive Plants

Botanical Evaluation and Assessment:

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EXECUTIVE SUMMARY

Sensitive Species

Vascular plants, lichens, and byrophytes

Alternative 1 would have no direct, indirect, or cumulative effects to alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, Katahdin sedge, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, fall dropseed muhly, American shoregrass, dwarf water lily, club-spur orchid, Oakes' pondweed, northern bur-reed, awlwort, lance-leaved violet, *Cladonia wainoi*, large-leaved sandwort, Appalachian fir clubmoss, *Arctoparmelia centrifuga*, *Arctoparmelia subcentrifuga*, small shinleaf, cloudberry, fairy slipper, ram's head ladyslipper, *Caloplaca parvula*, *Certraria aurescens*, *Menegazzia terebrata*, *Ramalina thrausta*, *Sticta fuliginosa*, *Usnea longissima*, *Pseudocyphellaria crocata*, *Frullania selwyniana*, New England sedge, Canada yew, barren strawberry, Canada ricegrass, or *Peltigera venosa*.

The proposed activities in Alternatives 1, 2, and 3 may impact individuals of pointed moonwort, triangle grapefern, common moonwort, Michigan moonwort, pale moonwort, ternate grapefern, and least moonwort but are not likely to cause a trend to federal listing or loss of viability.

The proposed activities in Alternatives 2 and 3 may impact individuals of alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, Katahdin sedge, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, fall dropseed muhly, American shoregrass, dwarf water lily, club-spur orchid, Oakes' pondweed, northern bur-reed, awlwort, lance-leaved violet, *Cladonia wainoi*, large-leaved sandwort, Appalachian fir clubmoss, *Arctoparmelia centrifuga*, *Arctoparmelia subcentrifuga*, small shinleaf, cloudberry, fairy slipper, ram's head ladyslipper, *Caloplaca parvula*, *Certraria aurescens*, *Menegazzia terebrata*, *Ramalina thrausta*, *Sticta fuliginosa*, *Usnea longissima*, *Pseudocyphellaria crocata*, *Frullania selwyniana*, New England sedge, Canada yew, barren strawberry, Canada ricegrass, or *Peltigera venosa*.

BIOLOGICAL EVALUATION

INTRODUCTION:

This Biological Evaluation (BE) evaluates the effects of the proposed Twins Project on threatened, endangered, proposed, and Regional Forester-listed sensitive species (RFSS - U.S. Department of Agriculture (USDA) Forest Service Manual sections 2670.3, 2670.5 (3), 2672.4). Because there are no known threatened, endangered, or proposed plant species on the Superior National Forest, the species evaluated in this report include only the Regional Forester's Sensitive Species (RFSS) plants (January 10, 2007); Threatened and Endangered Species (TES) animals are covered in a separate Biological Analysis/Biological Evaluation.

The management objective is to maintain viable and well-distributed representation of all native species that occur on the Superior National Forest (National Forest Management Act Regulation 219.19 and 219.26, Secretary of Agriculture Regulation 9500-4, USDA Forest Service Manual 2670.12, 2670.22, and 2670.32, Forest Plan p. 3-4). I used the following working definitions for viability and well-distributed from Iverson and René (1997):

- viability--the likelihood that habitat conditions will support persistent and well-distributed populations over time;
- well-distributed--species and habitat distribution are based on the current and historic natural distribution and dispersal capabilities of individual species, and dispersal includes the concepts of metapopulation dynamics and gene flow.

The Toohey Project is in Cook and Lake County, about thirteen miles north of Tofte, Minnesota; in Townships 59 North, Ranges 6 and 7 West, Townships 60 North, Ranges 5, 6 and 7 West, Township 61 North, Ranges 4, 5 and 6 West, and Township 62 North, Ranges 4 and 5 West. The scope of this project is limited to vegetation management actions, fuels treatments, and connected road management actions. The Toohey Project Area encompasses about 92,174 acres of land, of which approximately 79,460 acres are National Forest System land.

The predominant landscape ecosystems in the Toohey Project Area are the Mesic Red and White Pine and Dry-mesic Red and White Pine, at 41% and 22% respectively. The following LE's are also present: Lowland Conifer within Jack Pine/Black Spruce and Dry-mesic Red & White Pine (14%); Cedar, Lowland Hardwood, Lowland Non-Forest and Upland Non-Forest (9%); Mesic Birch-Aspen-Spruce-Fir (9%); Lowland Conifer B within Mesic Red & White Pine and Mesic Birch-Aspen-Spruce-Fir (4%); and Jack Pine/Black Spruce (1%). Proposed activities include harvesting trees; removing and altering understory vegetation; and constructing, using, and closing access routes. See the Vicinity Map within the Toohey Environmental Assessment.

The overall objective of the Twins Project is to maintain and improve forest health by moving the vegetative component towards the objectives described in the 2004 Superior National Forest Land and Resource Management Plan. The Twins Environmental Assessment (EA) considers two alternatives: Alternative 1 –No Action and Alternative 2 which includes the harvest of 1,960 acres of mature forest by a variety of harvest methods (Table 1). About 12 miles of temporary roads would be developed to access harvest units. See the maps, tables and alternative descriptions in the Twins EA for site-specific locations and more detailed information.

There are a variety of other activities (Table 1 and 2) besides timber harvest that are included in this project. They will be discussed for each species that utilize habitat that will be affected by the activities. Below is a list of the other activities and the habitat they will affect.

- Create young forest stands with regeneration harvests.
- Create stands with two ages with regeneration harvests.
- Improve stand structure and within-stand diversity with intermediate harvests and interplanting.
- Restore stand conditions without harvest, such as to:
 - Plant long-lived tree species to enhance riparian areas, or
 - Mechanically prepare sites to plant and reforest areas.
- Reduce fuel hazards in wildland urban interface areas.
- Construct temporary roads to access units and obliterate the roads when activities are complete.

Table 1: Summary of Proposed Action by Primary Treatment Type

Treatment Description	Unit Acres
Creating young forest through even-aged harvest treatments	
Clearcut with Reserves	1455
Seed-Tree Cut	27
Shelterwood Cut 30 with Reserves	82
Creating or maintaining two or more age classes through uneven age harvest	
Shelterwood Cut with Reserves	376
Improving stand conditions through intermediate harvest treatments	
Thinning	20
Restoring stands through a variety of non-harvest activities	
Underplant	98
Understory Fuels Reduction	58
Mechanical Site Preparation	318
Release	61
Total of all Treatment Types	2495

Table 2: Summary of Proposed Secondary Treatment and Reforestation

Treatment Description	Unit Acres
Secondary Treatment	
Mechanical Site Preparation	373
Slash Disposal/ Mechanical Site Preparation	174
Slash Disposal	322
Site Preparation Burn	344
Underplant	155
Regeneration Method	
Natural Regeneration	1161
Natural Regeneration with Interplanting	466
Planting	435
Seeding	99
Underplanting	253

Table 3: Proposed Transportation Management Activities for the Twins Project Area

Transportation System	Alt. 2
Miles of Temporary Access (Construction of Temp. Roads)	12.0
Use of snowmobile trail as temporary access	0.5
Use of unclassified road as temporary access	0.5
Use of Special Use Road	2.7

DESCRIPTION OF AFFECTED SPECIES: VASCULAR PLANTS, LICHENS, AND BRYOPHYTES

The species evaluated include all plants on the Region 9 Regional Foresters Sensitive Species (RFSS) Plants list for the Superior National Forest (USDA Forest Service 2006). Because an RFSS list update is occurring during the Toohey Project, this analysis includes one species (*Potamogeton oakesianus* – Oakes pondweed) that is not currently on the RFSS list but which is being added. Table 4 displays all RFSS plants known or expected to occur on the Superior National Forest. Species listed in Table 4 that do not have potential habitat present and are not known to occur within the Toohey Project Area will not receive further discussion in this BE.

Table 4: Sensitive Species Known or Suspected Occurrence in the Toohey Project Area

Scientific name Common name	Potential Habitat Present in project area	Known Species Presence in project area	Habitat Summary
SENSITIVE SPECIES: Vascular Plants (Note: Unless cited otherwise, habitat descriptions are derived from information provided by the Minnesota Natural Heritage and Non-game Research Program [MNDNR 2010])			
Moschatel <i>Adoxa moschatellina</i>	No	No	Shaded damp cliffs and slopes in upland mature northern hardwood forest on North Shore
Long-leaved arnica <i>Arnica lonchophylla</i>	No	No	Cool & moist cliffs and ledges on North Shore. Arctic disjunct
Maidenhair spleenwort <i>Asplenium trichomanes</i>	No	No	In crevices of moist, mostly east-facing cliffs, ledges, and talus, Rove formation
Alpine milkvetch <i>Astragalus alpinus</i>	Yes	No	Sandy, gravelly fluctuating shorelines with sparse vegetation. Inland strand beach - sparse vegetation
Swamp beggar-ticks <i>Bidens discoidea</i>	Yes	No	Wet habitats: silty shores, hummocks in floating mats and swamps, partly submerged logs
Pointed moonwort <i>Botrychium acuminatum</i>	Yes	No	Open habitats such as old log landing, old dirt roads, borrow pits
Triangle grape-fern <i>Botrychium lanceolatum</i> var <i>angustisegmentum</i>	Yes	Yes	Northern hardwood forest, old fields, old logging roads, trails
Common moonwort <i>Botrychium lunaria</i>	Yes	Yes	Open habitats such as old log landings, sawmill sites, old building sites

Table 4: Sensitive Species Known or Suspected Occurrence in the Toohey Project Area			
Scientific name Common name	Potential Habitat Present in project area	Known Species Presence in project area	Habitat Summary
Michigan moonwort <i>Botrychium michiganense</i> (<i>hesperium</i>)	Yes	Yes	Open habitats such as old log landing, old dirt roads, gravel pits, power line corridors, borrow pits. Also beach ridges, old fields, trails, and dredge spoil dumps (Walton 2000)
Goblin fern <i>Botrychium mormo</i>	No	No	Mesic northern hardwood forest with thick leaf litter layer
Pale moonwort <i>Botrychium pallidum</i>	Yes	Yes	Open, disturbed habitats, log landings, roadsides, dunes, sandy gravel pits.
Ternate grape-fern <i>Botrychium rugulosum</i> (= <i>ternatum</i>)	Yes	Yes	Generally open habitats, such as old log landings and edges of trails.
Least moonwort <i>Botrychium simplex</i>	Yes	Yes	Generally open habitats, such as old log landings, roadside ditch, trails, open fields, base of cliff, railroad rights of way
Floating marsh-marigold <i>Caltha natans</i>	Yes	No	Perennial herb; shallow water of pools, ditches, sheltered lake margins, slow moving creeks, sloughs and oxbows, pools in shrub swamps
Fairy slipper <i>Calypso bulbosa</i>	Yes	Yes	Hummocks in northern white cedar swamps, moist to wet lowland conifer swamps, and to lesser extent in upland coniferous forests (Smith 1993)
Katahdin sedge <i>Carex katahdinensis</i>	Yes	No	In seasonally moist, gravelly/sandy soil; along shores of large and small lakes; margins of ephemeral pools; associated with seasonal flooding
New England sedge <i>Carex novae-angliae</i>	Yes	Yes	Moist woods with sugar maple, also with birch, aspen, tall shrubs; yellow birch and white spruce dominated forest
Ross' sedge <i>Carex rossii</i>	No	No	Rocky summits, dry exposed cliff faces, rocky slopes, in east Border Lakes subsection
Douglas's hawthorn <i>Crataegus douglasii</i>	No	No	North Shore rocky, gravelly streambeds/banks and open areas; and rocky borders of woods
Ram's-head lady's slipper <i>Cypripedium arietinum</i>	Yes	No	Wide variety of forests, both upland and lowland, but in MN predominantly in white cedar swamps; also in forests dominated by jack pine, red pine, or white pine

Table 4: Sensitive Species Known or Suspected Occurrence in the Toohey Project Area			
Scientific name Common name	Potential Habitat Present in project area	Known Species Presence in project area	Habitat Summary
Rough-fruited fairy bells <i>Disporum trachycarpum</i>	No	No	Semi-open jack pine forest with aspen, birch, shallow rocky soils, in east Border Lakes subsection
Linear leaved sundew <i>Drosera linearis</i>	Yes	No	Minerotrophic water tracks in patterned peatlands
Neat spike-rush <i>Eleocharis nitida</i>	Yes	No	Mineral soil of wetlands, often w/ open canopy and disturbance, such as logging roads/ditches through wetlands
Appalachian fir club moss <i>Huperzia appalachiana</i>	Yes	No	Shelves and crevices on cliff/talus/rock outcrops, and shrub dominated talus piles
Moor rush <i>Juncus stygius</i>	Yes	Yes	Shallow pools in non-forested peatlands, often in a sedge-dominated community
Creeping rush <i>Juncus subtilis</i>	No	No	Sandy lakeshore – only known occurrence in BWCAW (Gerdes 2005a)
Auricled twayblade <i>Listera auriculata</i>	Yes	No	On alluvial or lake-deposited sands or gravels, with occasional seasonal flooding, associated with riparian alder or spruce/fir forest
American shore-grass <i>Littorella uniflora</i>	Yes	No	Shallow margins of nutrient-poor lakes, seepage lakes, sandy substrate, may have fine gravel/organic soil. Fluctuating water level up to about 1 meter.
Large-leaved sandwort <i>Moehringia macrophylla</i>	Yes	No	Cliffs/rock outcrops, talus, conifer sites on shallow soils, pine plantation with rocky outcrops; usually semi-open shrub or tree canopy
Fall dropseed muhly <i>Muhlenbergia uniflora</i>	Yes	No	Wet sandy beaches, floating peat mats
Dwarf water-lily <i>Nymphaea leibergii</i>	Yes	Yes	Slow moving streams, rivers, beaver impoundments 1-2 m deep. Occurs at outer margin of emergent vegetation.
Chilean sweet cicely <i>Osmorhiza berteroi</i>	No	No	Northern hardwood forest dominated by sugar maple on North Shore.
Sticky locoweed <i>Oxytropis borealis</i> var <i>viscida</i> (= <i>oxytropis viscida</i> var <i>viscida</i>)	No	No	Slate cliffs and talus slopes in east Border Lakes subsection. Arctic/alpine disjunct
Canada Rice Grass <i>Piptatherum canadensis</i>	Yes	Yes	Sandy/gravelly soil; red pine/jack pine plantations, borders, edges, trailsides, openings (Gerdes 2005)

Table 4: Sensitive Species Known or Suspected Occurrence in the Toohey Project Area			
Scientific name Common name	Potential Habitat Present in project area	Known Species Presence in project area	Habitat Summary
Club spur orchid <i>Platanthera clavellata</i>	Yes	Yes	Floating bog mats, sphagnum, stunted conifer swamp, mixed spruce tamarack, borrow pits, winter logging roads
Western Jacob's ladder <i>Polemonium occidentale</i> <i>ssp. lacustre</i>	No	No	Primarily white cedar swamps, also mixed conifer swamps; thrives in openings (Carlson and Sather 2001)
Braun's holly fern <i>Polystichum braunii</i>	No	No	Cool, shady cliffs and slopes in northern hardwoods in North Shore Highlands subsection
Oakes pondweed <i>Potamogeton oakesianus</i>	Yes	No	Quiet, acidic waters of bogs, ponds, and lakes
Lesser wintergreen or Small shinleaf <i>Pyrola minor</i>	Yes	Yes	Black spruce swamps, and ecotone between uplands and lowland alder/conifer swamp, prefers closed canopy.
Cloudberry <i>Rubus chamaemorus</i>	Yes	No	Black spruce/sphagnum forest, acidic. Superior NF at southern edge of species range
Nodding saxifrage <i>Saxifraga cernua</i>	No	No	Cliffs, ledges, diabase cliff (calcium based feldspars). Arctic/alpine disjunct. One location in MN on open cliff.
Encrusted saxifrage <i>Saxifraga paniculata</i>	No	No	Cliffs, sheltered crevices, and ledges of north-facing cliffs; Arctic/alpine disjunct
Northern bur-reed <i>Sparganium glomeratum</i>	Yes	Yes	Floating muck mats in emergent wetland habitat such as moats, pond margins, road ditches
Awlwort <i>Subularia aquatica</i>	Yes	Yes	Beach zone of sandy nutrient-poor lakes. Shallow lake margins. Submerged or emerged, or stranded. 15-45 cm deep water, but can occur deeper. Can flower while stranded, or under other conditions.
Canada yew <i>Taxus canadensis</i>	Yes	Yes	Wide variety of uplands and lowlands, including cedar/ash swamps, talus and cliffs, northern hardwoods, aspen/birch forest (USDA Forest Service 2010)
False-asphodel <i>Tofieldia pusilla</i>	No	No	Sedge mats at edges of shoreline rock pools along Lake Superior. Arctic disjunct.
Lance-leaved violet <i>Viola lanceolata</i>	Yes	No	Sandy to peaty lakeshores; borders of marshes and bogs, damp sand ditches (USDA Forest Service 2004g)

Table 4: Sensitive Species Known or Suspected Occurrence in the Toohey Project Area			
Scientific name Common name	Potential Habitat Present in project area	Known Species Presence in project area	Habitat Summary
Barren strawberry <i>Waldsteinia fragarioides</i>	Yes	Yes	Upland coniferous and deciduous forests, in recently harvested areas, established plantations, and areas with no recent harvest
Smooth woodsia <i>Woodsia glabella</i>	No	No	Moist, north-facing cliffs along Lake Superior. Arctic disjunct.
SENSITIVE SPECIES: Lichens and bryophytes (Habitat information taken from USDA Forest Service 2000a, and Wetmore 2000 and 2001, and as cited below)			
A lichen sp. <i>Arctoparmelia centrifuga</i>	Yes	Yes	Lichen; Sunny rocks and open talus slopes (USDA Forest Service 2002a)
A lichen sp. <i>Arctoparmelia subcentrifuga</i>	Yes	No	Lichen; Sunny rocks and open talus slopes
a lichen sp. <i>Caloplaca parvula</i>	Yes	No	Smooth bark of young black ash in moist, humid old growth black ash stand (USDA Forest Service 2002c)
a lichen sp. <i>Cetraria aurescens</i>	Yes	Yes	Conifer bark in lowland conifer swamps (old cedar/black spruce - USDA Forest Service 2002d)
a lichen sp. <i>Cladonia wainoi</i> (= <i>pseudorangiformis</i>)	Yes	No	On rock outcrops and thin soil – exposed sites with lots of light (USDA Forest Service 2002e)
A liverwort sp. <i>Frullania selwyniana</i>	Yes	Yes	Lowland cedar swamps on bark of white cedar (Janssens 2002)
Port-hole lichen <i>Menegazzia terebrata</i>	Yes	Yes	Cedar swamps, especially old growth; base of cedar trees (USDA Forest Service 2002h)
a Dog lichen <i>Peltigera venosa</i>	Yes	No	Soil and moist cliffs, exposed root wads (USDA Forest Service 2002i)
a lichen sp. <i>Pseudocyphellaria crocata</i>	Yes	No	Mossy rocks, trees in partially shaded, moist, frequently foggy habitats (USDA Forest Service 2002j)
A lichen sp. <i>Ramalina thrausta</i>	Yes	Yes	Cedar swamps, especially old growth (USDA Forest Service 2002k)
a lichen sp. <i>Sticta fuliginosa</i>	Yes	No	On hardwoods in humid, old growth cedar or ash bogs (USDA Forest Service 2002l)
a lichen sp. <i>Usnea longissima</i>	Yes	Yes	On old conifers in moist situations, often in or near a conifer or hardwood swamp (USDA Forest Service 2002m)

ANALYSIS AREA AND METHODS

For sensitive plants, the area covered by the analysis of direct and indirect effects includes all lands administered by the Superior National Forest within the Toohey Project Area. This area was selected because this is where project activities will occur which cause the direct and indirect effects. The area covered by the cumulative effects analysis includes lands of all ownerships within the project area for the Toohey Project. This cumulative effects analysis area was selected because non-National Forest System lands within project area boundaries share a number of physical characteristics (e.g. soils, landforms, etc.) with adjacent National Forest System (NFS) lands. These characteristics influence land uses, which in turn influence the distribution of rare plants and rare plant habitat throughout the Toohey Project Area.

The time period for direct, indirect, and cumulative effects is ten years from the time project activities begin, because no effects of project activities will occur until implementation, and because most project activities should be completed within 10 years.

Indicators and habitat groups were used to help evaluate the potential effects of management activities on Regional Forester's Sensitive Species (RFSS) plants (Table 5). Indicator 1 describes the number of known RFSS plant occurrences affected by project activities. The remaining indicators relate to the amount of a ground disturbing activity occurring in different RFSS plant habitats. The indicators are described below for each of six RFSS plant habitat groups. RFSS plants are grouped by habitat to reduce the amount of repetition in the analysis. The habitat groups are described in more detail in the Biological Evaluation for the Superior National Forest Plan (USDA Forest Service 2004b)

Habitat group 1: RFSS plants of non-forested wetlands, shallow water, and riparian areas

Indicator: Miles of new lowland road construction on NFS lands. This indicator highlights differences between alternatives well because lowland road construction is one of the only proposed management activities that would have any direct effects to this habitat. Lowlands are considered to be lands classified as ELT 1, 2, 3, 4, 5, or 6. This indicator includes only temporary roads; no classified road construction is proposed.

Habitat group 2: RFSS plants of cliffs and talus slopes

Indicator: Acres of ELT 18 in proposed treatment units. This indicator highlights the difference between alternatives well because one component that makes up ELT 18 is cliffs and rock outcrops. The indicator provides a rough measure of how much suitable habitat would be impacted by each alternative. Because rock outcrops and cliffs are just one component of ELT 18, the actual amount of suitable habitat for this group that is impacted by project activities would be much less than shown by the indicator.

Habitat group 3: RFSS plants of upland disturbed areas (old landings, old roadbeds, etc.)

Indicators: Miles of road construction on existing grown in corridors. This indicator highlights differences between alternatives well because it provides a rough indication of impacts to the types of habitats typically occupied by species in this habitat group. Old, grown-in road corridors are one type of habitat that plants in this habitat group favor. Road construction that takes place on old, grown-in corridors that may have been used for temporary access in the past would impact suitable habitat for this group of plants. Other habitats favored by these species,

such as old openings or old log landings, are harder to quantify using our existing databases, so they will be evaluated qualitatively.

Habitat group 4: RFSS plants of forested wetlands

Indicators: Acres of lowland black spruce harvest, and miles of new lowland road construction on NFS lands. Acres of lowland black spruce harvest is a good indicator for this habitat since it provides a direct evaluation of how much lowland forest habitat is impacted by alternative. Miles of lowland road construction highlight differences between alternatives well because lowland road construction also causes direct impacts to this habitat. This indicator includes only temporary roads; no classified road construction is proposed.

Habitat group 5: RFSS plants of northern hardwood forests (sugar maple, basswood, yellow birch, red oak)

Indicator: No indicator is needed for RFSS plants of northern hardwoods because no project activities are proposed in suitable habitat for these plants.

Habitat group 6: RFSS plants of dry to mesic upland forests

Indicators: Acres of upland commercial timber harvest and miles of new upland road construction on FS lands. These indicators highlight differences between alternatives well because each provides an indication of the amount of potential impact to upland forest habitats. Miles of new upland road construction includes only temporary roads; no classified road construction is proposed.

Table 5. Indicators 1-7 used for RFSS plants effects analysis.			
Indicator	Alternative 1	Alternative 2	Alternative 3
1. Number of known sensitive plant occurrences in or next to proposed treatment units	0	12	12
2. Miles of new lowland road construction on NFS lands	0	2.1	1.5
3. Miles of new upland road construction on NFS lands	0	17.5	10.0
4. Miles of road construction on existing grown-in corridors	0	16.7	8.6
5. Acres of upland commercial timber harvest	0	8624	6628
6. Acres of lowland black spruce harvest	0	214	117
7. Acres of ELT 18 in proposed treatment units	0	10.1	10.1

SENSITIVE PLANT SURVEY RESULTS

Rare plant surveys were conducted in the Toohey Project Area in 2008 and 2010 by Forest Service contract botanists. Approximately 1,225 acres of the project area were surveyed by Forest Service contract botanists, with surveys focusing on suitable timber stands, as well as some stands selected because they represent high quality rare plant habitat. Less than 200 acres of the project area were surveyed for rare plants by Forest Service botanists. Portions of the project area were surveyed for rare lichens by University of Minnesota lichenologist Cliff Wetmore in 1999 (Wetmore 2000) and 2001 (Wetmore 2001), and University of Minnesota

graduate student Becky Knowles surveyed a portion of the project area for lichens in the genus *Peltigera* in summer 2001 (Knowles pers. comm.)

The Forest Service contract botanist found 20 new TES plant occurrences in the Toohey Project Area. Details of survey results can be found in Midwest Natural Resources (2008 and 2010). New finds include: eight populations of Canada yew, three populations of *Usnea longissima*, two populations of *Ramalina thrausta*, two populations of fairy slipper, two populations of club spur orchid, and one population each of small shinleaf, *Frullania selwyniana*, and *Arctoparmelia centrifuga*. The analysis below is performed using the results of these rare plant surveys as well as the data contained in the MNDNR Natural Heritage Database (MN DNR 2010)

All sensitive vascular and non-vascular plant species known or suspected to occur in the project area are displayed in Table 4. Twelve stands proposed for treatment in Toohey contain an occurrence of an RFSS plant.

ENVIRONMENTAL CONSEQUENCES

HABITAT GROUP 1: RFSS PLANTS OF SHALLOW WATER AND NON-FORESTED WETLANDS AND RIPARIAN AREAS

Existing Condition

The following sensitive plants use this habitat group and either occur in or have suitable habitat in the analysis area (Table 4): alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, Katahdin sedge, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, fall dropseed muhly, American shoregrass, dwarf water lily, club-spur orchid, Oakes' pondweed, northern bur-reed, awlwort, and lance-leaved violet. Moor rush, dwarf water lily, club spur orchid, and awlwort are found in the project area but are not located in any stands that are proposed for treatment in any of the alternatives. One population of clustered bur reed is found in Compartment 253 Stand 9. There are 4,220 acres of this type of wetland and riparian habitat scattered throughout the Toohey Project Area.

Direct/Indirect Effects

Alternative 1

Indicator 2 – Miles of new lowland road construction on NFS lands. There would be no ground disturbance occurring under Alternative 1. Therefore, there would be no direct or indirect effects to any of these species.

Alternative 2

Indicator 1 – Number of known sensitive plant occurrences in or next to proposed treatment units. For Alternative 2, there would be no impacts to the clustered bur-reed in Compartment 253 Stand 9 because a no harvest buffer would be placed around the wetland containing this plant.

For the other species in this habitat group that are known to occur in the project area but are outside proposed treatment stands, there would be no impacts from project activities.

Indicator 2 – Miles of new lowland road construction on NFS lands.

There are 2.1 miles of lowland road (Table 5) proposed in the project area under Alternative 2. There would be no direct negative effect of timber harvesting under Alternative 2 since aquatic, non-forested wetland, and non-forested riparian habitats would not be treated. There is a low risk that sedimentation may be an indirect negative effect of timber harvest. The open water wetland and perennial/intermittent stream mitigations would help minimize sedimentation effects on suitable habitat for these species. Lowland roads constructed under any alternative could go through some suitable habitat for this suite of species and thus impact suitable habitat, but use would be during frozen conditions (see soil operational standards and guidelines – Appendix D of EA), so no long term negative impacts are expected to suitable habitat for these RFSS plants. Less than 1% of the acreage of all wetland types would be directly impacted by creation of lowland roads under this alternative.

Alternative 3

Indicator 1 – Number of known sensitive plant occurrences in or next to proposed treatment units. For Alternative 3, there would be no impacts to the clustered bur-reed in Compartment 253 Stand 9 because a no harvest buffer would be placed around the wetland containing this plant.

For the other species in this habitat group that are known to occur in the project area but are outside proposed treatment stands, there would be no impacts from project activities.

Indicator 2 – Miles of new lowland road construction on NFS lands.

There are 1.5 miles of lowland road (Table 5) proposed in the project area under Alternative 3. The types of impacts of Alternative 3 to suitable habitat for plants in this habitat group would be similar to the impacts of Alternative 2 described above. However, alternative 3 would affect slightly less habitat than Alternative 2, based on the number of miles of new lowland road construction on Forest Service lands (Table 5).

Cumulative Effects

For Alternative 1, there would be no cumulative effects to these species since no ground disturbance would occur under Alternative 1.

There would be few cumulative effects of Alternatives 2 and 3 on these species or their suitable habitat since very little management is proposed that would affect their suitable habitat. In the past, construction and use of lowland roads and wetland draining were the two actions that probably had the biggest impacts on species in this habitat group within the cumulative effects analysis area. At present and in the future, construction and use of roads in lowlands proposed under this alternative and elsewhere in the cumulative effects analysis area, such as construction of roads associated with state timber sales or construction of roads used for accessing stands in the portion of the Silver Island or East Side Thinning Project Area that overlap the Toohey Project Area would continue to impact suitable habitat, but the proportion of total suitable habitat affected by these activities would be very small.

Summary: Project activities associated with Alternatives 2 and 3 would have only minor direct and indirect negative effects on the suitable habitat for these species. Alternative 2 would have the greatest impact on suitable habitat, followed by Alternative 3 then Alternative 1, based on the miles of new lowland road construction on NFS lands by alternative (Table 5).

Determination

For Alternative 1, the proposed activities would have no impact on alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, Katahdin sedge, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, fall dropseed muhly, American shoregrass, dwarf water lily, club-spur orchid, Oakes' pondweed, northern bur-reed, awlwort, and lance-leaved violet.

For Alternatives 2 and 3, the proposed activities may impact individuals of alpine milkvetch, swamp beggar-ticks, floating marsh-marigold, Katahdin sedge, linear-leaved sundew, neat spike rush, moor rush, auricled twayblade, fall dropseed muhly, American shoregrass, dwarf water lily, club-spur orchid, Oakes' pondweed, northern bur-reed, awlwort, and lance-leaved violet, but are not likely to cause a trend to federal listing or loss of viability.

HABITAT GROUP 2: RESS PLANTS OF CLIFFS AND TALUS SLOPES

Existing Condition

The following sensitive plants use this habitat group and either occur in or have suitable habitat in the analysis area (Table 4): *Cladonia wainoi*, large-leaved sandwort, Appalachian fir clubmoss, *Arctoparmelia centrifuga*, and *Arctoparmelia subcentrifuga*. *Arctoparmelia centrifuga* is found on a talus slope in the project area, but this is not located in a stand that is proposed for treatment.

There is a low amount of suitable habitat for species in this habitat group in the project area. It is difficult to quantify the amount of cliff/talus slope habitat in the project area. Stands in the project area classified as Ecological Landtype (ELT) 18 are composed of extremely shallow soils with bedrock outcrops. Some ELT 18 sites have rock outcrops, cliffs, and talus slope habitats that could be used by plants in this habitat group; there are 247 acres of ELT 18 in the Toohey Project Area. However, because this type of habitat also occurs as unmapped inclusions in other ELT's, it is difficult to quantify the total amount of this type of habitat in the project area.

Direct/Indirect Effects

Alternative 1

There would be no ground disturbance occurring under Alternative 1. Therefore, there would be no direct or indirect effects to any suitable habitat for species in this habitat group.

Alternative 2

Indicator 7 – Acres of ELT 18 in proposed treatment units. There are approximately 10.1 acres of mapped ELT 18 in proposed treatment units in Alternative 2 (Table 5). Harvest on mapped ELT 18 is strongly discouraged (Appendix D of EA), so project impacts to suitable habitat in mapped ELT 18 would be unlikely. However, there is probably a small amount of rock outcrop habitat that occurs as small inclusions that have not been mapped, and harvest could take place here. Some rock and cliff habitat could experience short term negative impacts as a

result of such project activities. Ground disturbance from logging activities could cause short term direct impacts to suitable habitat. Light levels could increase due to removal of the forest canopy on or next to rocky outcrops, but this would not cause any negative impacts to potential occurrences of these species, particularly *Cladonia wainoi*, which is known to occur on exposed sites with lots of sunlight (USDA Forest Service 2000a). None of the other proposed activities in Alternative 2 would impact habitat for these plants.

For the known occurrence of *Arctoparmelia centrifuga* that occurs in the project area, it is outside any proposed treatment stand and would not be impacted by project activities.

Alternative 3

Indicator 7 – Acres of ELT 18 in proposed treatment units. There are approximately 10.1 acres of mapped ELT 18 in proposed treatment units in Alternative 3 (Table 5), which is the same as Alternative 2. Therefore, the direct and indirect effects of Alternative 3 to suitable habitat for plants in this habitat group would be identical to those of Alternative 2.

Cumulative Effects

For Alternative 1, there would be no cumulative effects to these species since no ground disturbance would occur under Alternative 1.

There would be few cumulative effects of Alternatives 2 and 3 on these species or their suitable habitat since very little management is proposed that would affect their suitable habitat. Since Europeans began settling the area, there have been relatively few past actions that have impacted this habitat within the cumulative effects analysis area except for road construction and occasional timber harvest. For example, past vegetation management projects may have had some small direct or indirect impacts on cliff or rock outcrop habitat as described above. Current and future actions in the cumulative effects analysis area that could affect this habitat include both road construction and timber harvest. Construction of future roads on state lands for accessing state timber sales could impact a small amount of rock outcrop habitat, as could timber harvest on state lands. Timber harvest associated with the portion of the Silver Island or East Side Thinning Project Area that overlap the Toohey Project Area could also impact a small amount of rock outcrop habitat. However, cumulative impacts of Alternatives 2 and 3 would be minimal because these habitats are quite dispersed and only a small proportion of this suitable habitat would be affected by management activities.

Summary: Project activities associated with Alternatives 2 and 3 could have short term direct and indirect negative effects on the suitable habitat for these species. Alternatives 2 and 3 would have similar impacts to suitable habitat and both would have greater impacts on suitable habitat than Alternative 1, based on acres of ELT 18 in stands proposed for harvest (Table 5).

Determination

For Alternative 1, the proposed activities would have no impact on *Cladonia wainoi*, large-leaved sandwort, Appalachian fir clubmoss, *Arctoparmelia centrifuga*, and *Arctoparmelia subcentrifuga*.

For Alternatives 2 and 3, the proposed activities may impact individuals of *Cladonia wainoi*, large-leaved sandwort, Appalachian fir clubmoss, *Arctoparmelia centrifuga*, and *Arctoparmelia subcentrifuga*, but are not likely to cause a trend to federal listing or loss of viability.

HABITAT GROUP 3: RFSS PLANTS OF UPLAND DISTURBED AREAS

Existing Condition

The following sensitive plants use this habitat group and either occur in or have suitable habitat in the analysis area (Table 4): pointed moonwort, triangle grapefern, common moonwort, Michigan moonwort, pale moonwort, ternate grapefern, and least moonwort. It is difficult to quantify how much of this type of suitable habitat exists in the project area. All of these species except pointed moonwort are found in the analysis area. The following stands have one or more of these species: Compartment 253 Stand 5, Compartment 44 Stand 40, and Compartment 43 Stand 7. There is also a habitat improvement project proposed for a small non-forested opening in the project area that has several of these species. Brush and saplings are encroaching on this opening and degrading habitat for these species, and this project proposes to cut and remove the encroaching woody species.

Direct/Indirect Effects

Alternative 1

Indicators 4 and 5. There would be no ground disturbance occurring under Alternative 1. Therefore, there would be no direct impacts to any of these species as a result of this project. However, succession and lack of disturbance would probably diminish the amount of suitable habitat in the project area over time under this alternative (USDA Forest Service 2001a, b, c, d, and e), which could lead to long-term downward population trends for any occurrences of these species in the project area. These *Botrychium* species frequently occupy habitats where some disturbance occurred in the past, such as a log landing or old road, and they depend to some degree on disturbance to create suitable habitat.

Alternative 2

Indicator 1 – Number of known sensitive plant occurrences in or next to proposed treatment units. For the ternate grapefern in Compartment 253 Stand 5, the proposed thinning would probably impact individuals over the short term due to ground disturbance and/or burial under logging debris. However, in the long term, the site would be maintained in an open condition by the harvest activities and would be suitable habitat for this species in the future.

For the Michigan moonwort in Compartment 44 Stand 40 and Compartment 43 Stand 7, the proposed understory fuel reduction would have only minor short term impacts on the sensitive *Botrychium* species found in the stands. Ground disturbance and burial under light slash could cause short term impacts to these plants but the effects would not last long. The ground disturbance would be short duration and the slash would decompose quickly, and the *Botrychium* population would recover after these effects ended.

The habitat improvement project proposed for these species in Alternative 2 would have minor short term impacts on the species that occur there, primarily from trampling that could occur

during treatment. However, in the long term removing encroaching woody species would improve habitat for the *Botrychium* at this site.

For the other species in this habitat group that are known to occur in the project area but are outside proposed treatment stands, there would be no impacts from project activities.

Indicator 4 – Miles of road construction on existing grown-in corridors. There are no known occurrences of species in this habitat group on or near existing grown-in corridors proposed for road construction, so direct impacts to known occurrences are not expected. However, there would be direct and indirect short-term negative impacts to suitable habitat for these *Botrychium* species from road construction on existing grown-in corridors. Ground disturbance associated with road construction would cause short-term impacts to suitable habitat – some individuals could be destroyed, since they sometimes occur on old, grown-in, infrequently-used prior roadbeds. However, over the long term the majority of grown-in corridors impacted by construction would still serve as suitable habitat, since all of these considered in this project would be temporary roads that would be decommissioned once vegetation management activities are complete. Any remaining *Botrychium* individuals in treated or untreated portions of the project area could colonize this habitat. Although the biology of these *Botrychium* species is poorly understood (USDA Forest Service 2001a, b, c, d, and e), the creation of new ruderal habitats through project activities would likely perpetuate any populations of these species that may have been missed during project inventories.

Indicator 5 – Acres of upland commercial timber harvest. There are no populations of these species known from proposed treatment units, so there would be no impacts to known occurrences. There would be direct and indirect short-term impacts to suitable habitat for these *Botrychium* species from timber harvest and related activities. Ground disturbance associated with timber harvest would cause short-term impacts to suitable habitat – some individuals could be destroyed. After several years, however, new suitable habitat would be available, such as log landings. Any remaining individuals in treated or untreated portions of the project area could colonize these habitats. Although the biology of these *Botrychium* species is poorly understood (USDA Forest Service 2001a, b, c, d, and e), the creation of new ruderal habitats through project activities would likely perpetuate any populations of these species that may have been missed during project inventories.

Alternative 3

Indicator 1 – Number of known sensitive plant occurrences in or next to proposed treatment units. For Alternative 3, the same treatments are proposed as in Alternative 2 for the stands where the known *Botrychium* are located, and the effects to the known *Botrychium* occurrences would be identical to those described for Alternative 2.

For the other species in this habitat group that are known to occur in the project area but are outside proposed treatment stands, there would be no impacts from project activities.

Indicator 4 - Miles of road construction on existing grown-in corridors.

The types of impacts of Alternative 3 to plants in this habitat group would be similar to the impacts of Alternative 2 described above. Alternative 3 would affect about half as much habitat

as Alternative 2, based on the miles of road construction on existing grown-in corridors (Table 5).

Indicator 5 - Acres of upland commercial timber harvest

The types of impacts of Alternative 3 to plants in this habitat group would be similar to the impacts of Alternative 2 described above for Indicator 5. Alternative 3 would affect about 2,000 fewer acres of habitat compared to Alternative 2, based on the acres of upland commercial timber harvest (Table 17).

Cumulative Effects

Very little is known about the distribution of these *Botrychium* species within the cumulative effects analysis area. However, it is unlikely that the lack of ground disturbance associated with Alternative 1 would have any cumulative effects on suitable habitat for these species in the project area.

There would be few cumulative effects of Alternatives 2 and 3 on these species. Very little is known about the distribution of these *Botrychium* species within the cumulative effects analysis area. However, similar types of disturbance (for example, timber harvest and road building) have occurred within the cumulative effects analysis areas as have occurred within the direct/indirect effects analysis areas. These activities, while sometimes impacting suitable habitat, have also created suitable habitat at the same time. Because ground disturbing activities have created ample suitable habitat in the past and at present, and because similar types of activities will probably occur into the future, it is unlikely that there will be any cumulative effects to species in this habitat group.

Summary: Project activities would have short-term negative direct and indirect effects on suitable habitat for these species in the analysis area. Over the long-term, ground disturbance associated with these alternatives would maintain or create suitable habitat for these species. Alternative 2 would have greater impacts to suitable habitat for species in this group than Alternative 3 or 1, based on an analysis of Indicators 1, 4 and 5 (Table 5).

Determination

For Alternatives 1, 2, and 3, the proposed activities may impact individuals of pointed moonwort, triangle grapefern, common moonwort, Michigan moonwort, pale moonwort, ternate grapefern, and least moonwort but are not likely to cause a trend to federal listing or loss of viability.

HABITAT GROUP 4: RFSS PLANTS OF FORESTED WETLANDS

Existing Condition

The following sensitive plants use this habitat group and either occur in or have suitable habitat in the analysis area (Table 4): small shinleaf, cloudberry, fairy slipper, ram's head ladyslipper, *Caloplaca parvula*, *Certraria aurescens*, *Frullania selwyniana*, *Menegazzia terebrata*, *Ramalina thrausta*, *Sticta fuliginosa*, and *Usnea longissima*. *Pseudocyphellaria crocata* is analyzed here as well because local occurrences are found in open and forested peatlands. There are approximately 15,432 acres of stands typed as forested wetlands habitat in the project area.

There are known occurrences of the following species in stands proposed for treatment: *Frullania selwyniana*, *Usnea longissima*, and *Ramalina thrausta*. *Certraria aurescens* and *Menegazzia terebrata* also occur in the project area but not in any stands proposed for treatment.

Direct/Indirect Effects

Alternative 1

Indicators 2 and 6. There would be no ground disturbance occurring under Alternative 1. Therefore, there would be no direct or indirect effects to any of these species.

Alternative 2

Indicator 1 – Number of known sensitive plant occurrences in or next to proposed treatment units. For the *Frullania selwyniana*, the proposed mechanical site preparation would avoid where this rare liverwort occurs. Therefore, there would be no impacts to this species.

For the *Ramalina thrausta* and the *Usnea longissima* (which both occur in the same stand), project activities would avoid these occurrences. Therefore, there would be no impacts to these species.

For the other species in this habitat group that are known to occur in the project area but are outside proposed treatment stands, there would be no impacts from project activities.

Indicator 2 – Miles of new lowland road construction on NFS lands. Alternative 2 proposes 2.1 miles of lowland road construction (Table 5). Lowland temporary roads constructed through forested wetlands would potentially cause minor direct negative impacts from direct physical disturbance of the sensitive plants, although impacts would be greatly minimized because construction and use would be under frozen conditions. Lowland temporary roads constructed through forested wetlands would also cause indirect negative impacts (i.e. increased light levels or small changes in hydrology that cause changes in vegetative composition) to some suitable habitat for these species. Again, for these temporary winter roads, impacts such as rutting would be minimized because construction and use would be during frozen conditions. For this alternative, much less than 1% of the acreage of all forested wetlands would be directly or indirectly impacted by creation of lowland roads, so impacts to this suitable habitat would be minimal. Road construction through lowland cedar and black ash stands would be avoided when possible, but when avoidance is not possible, another RFSS plant survey specific to the lowland road construction would be conducted.

Indicator 6 – Acres of lowland black spruce harvest. For Alternative 2, approximately 214 acres of lowland black spruce harvest are proposed (Table 5). These stands are good suitable habitat for small shinleaf, cloudberry, and *Pseudocypbellaria crocata* but poor habitat for the other species in this habitat group. Lowland black spruce harvest would cause indirect impacts to suitable habitat for these three species, although no known RFSS plant populations would be affected. For example, the increased light levels resulting from timber harvest could have minor negative effects on these species. However, impacts to suitable habitat would be minimized because harvest would occur only during frozen conditions when plants are dormant. Only

approximately 1.4% of suitable lowland forest habitat would be affected by lowland black spruce harvest, thereby further demonstrating the minimal impacts to suitable habitat.

No lowland white cedar, black ash, or mixed conifer stands are proposed for harvest. These lowland forest types are suitable habitat for the other RFSS species in this habitat group (i.e. fairy slipper, ram's head ladyslipper, *Calopluca parvula*, *Certraria aurescens*, *Frullania selwyniana*, *Menegazzia terebrata*, *Ramalina thrausta*, *Sticta fuliginosa*, and *Usnea longissima*.) There would be no timber harvest-related impacts to these species in Alternative 2.

Alternative 3

Indicator 1 – Number of known sensitive plant occurrences in or next to proposed treatment units. For Alternative 3, the same treatments are proposed as in Alternative 2 for the stands where the known lowland forest RFSS plants are located, and the effects to these known occurrences would be identical to those described for Alternative 2.

For the other species in this habitat group that are known to occur in the project area but are outside proposed treatment stands, there would be no impacts from project activities.

Indicator 2 – Miles of new lowland road construction on NFS lands. Alternative 3 proposes 1.5 miles of lowland road construction (Table 5). The types of impacts of Alternative 3 to suitable habitat for plants in this habitat group would be similar to the impacts of Alternative 2 described above. Much less than 1% of suitable lowland forest habitat would be affected by lowland road construction, thereby further demonstrating the minimal impacts to suitable habitat. Alternative 3 would affect slightly less habitat than Alternative 2, based on the number of miles of new lowland road construction on Forest Service lands (Table 5).

Indicator 6 – Acres of lowland black spruce harvest. For Alternative 3, approximately 117 acres of lowland black spruce harvest are proposed (Table 5). The types of impacts of Alternative 3 to plants in this habitat group would be similar to the impacts of Alternative 2 described above for Indicator 6. Alternative 3 would affect about half as much suitable habitat as Alternative 2, based on analysis of Indicator 6 (Table 5).

Cumulative Effects

For Alternative 1, there would be no cumulative effects to these species since no ground disturbance would occur under Alternative 1.

There would be few cumulative effects of Alternatives 2 or 3 on these species since very little management is proposed in the habitats that they inhabit, and because such management affects a small proportion of the overall habitat. Since Europeans began settling the area, timber harvest, wetland drainage, and road construction have impacted forested wetlands and reduced the amount and distribution of this habitat within the cumulative effects analysis area (Bradof 1992, Heinselman 1996, Frelich 1998, MN FRC 1999a). More recently, timber sales on federal, State, and private lands have changed the age class distribution of lowland black spruce habitats, but have not altered the overall suitability of the habitat for species in this habitat group; see Appendix F in the EA for a summary of current and future timber harvest acres on federal and state lands. At present and in the future, construction and use of roads in lowland forests

proposed under this alternative and elsewhere in the cumulative effects analysis area, including construction of roads on state lands, would continue to impact suitable habitat, but the proportion of total suitable habitat affected by these activities would be very small. Similarly, current and future timber sales affecting lowlands on state land could change the age class of lowland black spruce forests in the project area, temporarily making some stands less suitable for this suite of sensitive plants. However, the proportion of total suitable habitat affected by these activities would be very small. On the Superior National Forest, potential impacts of these activities would be mitigated by adherence to the Forest Plan standards and guidelines, and on other ownerships the impacts would be mitigated by voluntary adherence to the best management practices (MFRC 1999b).

Summary: Project activities associated with Alternatives 2 and 3 would have only minor direct and indirect negative effects on the suitable habitat for these species. Alternative 2 would have greater impacts to suitable habitat than Alternative 3, based on an analysis of Indicators 2 and 6 (Table 5).

Determination

For Alternative 1, the proposed activities would have no impact on small shinleaf, cloudberry, fairy slipper, ram's head ladyslipper, *Caloplaca parvula*, *Certraria aurescens*, *Frullania selwyniana*, *Menegazzia terebrata*, *Ramalina thrausta*, *Sticta fuliginosa*, *Usnea longissima*, and *Pseudocyphellaria crocata*.

For Alternatives 2 and 3, the proposed activities may impact individuals of small shinleaf, cloudberry, fairy slipper, ram's head ladyslipper, *Caloplaca parvula*, *Certraria aurescens*, *Frullania selwyniana*, *Menegazzia terebrata*, *Ramalina thrausta*, *Sticta fuliginosa*, *Usnea longissima*, and *Pseudocyphellaria crocata*, but are not likely to cause a trend to federal listing or loss of viability.

HABITAT GROUP 5: RFSS PLANTS OF NORTHERN HARDWOOD FORESTS

There are only 366 acres of possibly suitable northern hardwoods habitat for the plants in this habitat group within the Toohey Project Area (Table 5). However, there is no habitat for goblin fern, Braun's holly fern, Chilean sweet cicely, or moschatel, all of which need pure maple stands. The other two species in this habitat group, New England sedge and triangle grapefern, do have suitable habitat in the project area. New England sedge occurs in one of the stands proposed for treatment, and I assume that the northern hardwood forest in the project area is suitable habitat. Triangle grapefern also occurs in a non-forested disturbed opening in the project area, and for this reason was analyzed with Habitat Group 3.

Direct/Indirect Effects

Alternative 1

There would be no ground disturbance occurring under Alternative 1. Therefore, there would be no direct or indirect effects to New England sedge habitat.

Alternative 2

Indicator 1 – Number of known sensitive plant occurrences in or next to proposed treatment units. For the New England sedge, the proposed clearcut would avoid where this rare plant has been found. Therefore, there would be no impacts to this particular New England sedge occurrence.

For Alternative 2, there are approximately 20 acres of a sparsely forested red maple stand that qualify as marginal suitable New England sedge habitat that are being mechanically site prepped and planted to white pine. Site prep and conversion to white pine could cause short and long term direct impacts to this suitable habitat, since the site probably would not support New England sedge once it has a white pine canopy – pine needle duff would probably make the site too acidic over the long term. However, there is still adequate suitable habitat in the project area and forest-wide to help maintain the viability of this species, and the 33 known New England sedge occurrences on the Forest would help maintain viability as well.

Alternative 3

Indicator 1 – Number of known sensitive plant occurrences in or next to proposed treatment units. For the New England sedge, the proposed clearcut would avoid where this rare plant has been found. Therefore, there would be no impacts to this particular New England sedge occurrence.

For Alternative 3, the same treatments affecting New England sedge habitat are proposed as were in Alternative 2. Alternative 3 would have the same effects to New England sedge as described above for Alternative 2.

Determination

For Alternative 1, the proposed activities would have no impact on New England sedge.

For Alternatives 2 and 3, the proposed activities may impact individuals of New England sedge, but are not likely to cause a trend to federal listing or loss of viability.

HABITAT GROUP 6: RFSS PLANTS OF DRY TO MESIC UPLAND FORESTS

Existing Condition

The following sensitive plants use this habitat group and either occur in or have suitable habitat in the analysis area (Table 4): Canada yew, barren strawberry, Canada ricegrass, and *Peltigera venosa*. *Peltigera venosa*, although not included as part of any habitat group in the Forest Plan BE, is analyzed with this habitat group in this BE because of its affinity for bare soil habitats such as rootwads. There are 12 known occurrences of Canada yew in stands in the project area and one occurrence in a stand proposed for treatment. There are two known occurrences of barren strawberry in the project area, one of which is in a stand proposed for treatment. There are nine known occurrences of Canada ricegrass, with two in stands proposed for treatment and one in a stand proposed for a habitat improvement project intended to benefit Canada ricegrass.

Based on the criteria in the Forest Plan BE, there are 50,457 acres of upland forest types that could serve as suitable habitat for barren strawberry in the project area. There are 31,942 acres of forest that could serve as suitable habitat for Canada yew. There are 32,062 acres of uplands

in ELT 9, 11, and 13 that could serve as suitable habitat for Canada ricegrass; this species, known from only twelve occurrences in Minnesota, occurs in sandy and sandy/gravelly soils (Gerdes 2005) such as is found in these three ELT's. It is difficult to quantify the number of acres of suitable bare soil habitat available for *Peltigera venosa*.

Direct/Indirect Effects

Alternative 1

Indicators 3 and 5. There would be no ground disturbance occurring under Alternative 1. Therefore, there would be no direct effects to any of these species, and there would be no indirect impacts to Canada ricegrass, barren strawberry, or *Peltigera venosa*. For Canada yew, the lack of timber harvest would lead to an indirect benefit for both the known yew occurrences in the analysis area as well as suitable habitat in the analysis area. Deer herbivory on Canada yew severely limits Canada yew growth and sexual reproduction, both in the analysis area (Greenlee pers. obs.) and elsewhere in the upper Midwest (Schmoller 1999). Lack of timber harvest in the analysis area under Alternative 1 would probably lead to a long term decrease in the whitetail deer population, which would be an indirect benefit to Canada yew.

Alternative 2

Indicator 1 - Number of known sensitive plant occurrences in or next to proposed treatment units. There is one Canada yew occurrence in a stand proposed for mechanical site prep in Alternative 2. For this occurrence, site prep activities could damage or uproot some individuals, but it is unlikely that the whole population in the stand would be affected. The remaining Canada yew in the stand would help maintain the population. Furthermore, there are over 400 occurrences of Canada yew across the Superior National Forest (USDA Forest Service 2010), and these occurrences would help maintain the viability of the species as a whole.

There is barren strawberry in a stand proposed for a shelterwood cut. No mitigations are proposed for this population, but pre and post treatment monitoring will be conducted to observe harvest effects on barren strawberry. Short term impacts caused by timber harvest are expected, but no long term effects are anticipated. Barren strawberry probably can tolerate some level of disturbance, judging by the fact that at least 4 of the seven known barren strawberry occurrences on the Superior are found in plantations or harvested areas. One of these was thinned in 2003 and monitored before and after thinning. Monitoring showed that there was no population decline as a result of the thinning (USDA Forest Service 2010).

For the two Canada ricegrass populations in stands proposed for treatment, there would be no impacts from timber harvest or related activities. These sites will be avoided will not be used for log landings or slash disposal. For the Canada ricegrass in a non-forested opening that is being encroached upon by brush and saplings, removal of the encroaching woody species will improve the habitat for Canada ricegrass and have a beneficial effect.

Indicator 3 – Miles of new upland road construction on NFS lands. Alternative 2 proposes approximately 17.5 miles of new upland road construction. For Canada yew, barren strawberry, Canada ricegrass, and *Peltigera venosa*, upland road construction would have direct and indirect impacts to suitable habitat for these species, but sufficient suitable habitat would remain undisturbed to ensure there is no viability risk to these species. Alternative 2 would impact less

than 1% of suitable habitat in the project area for any species in this group. New upland road construction would have minimal effects to suitable habitat for these species.

Indicator 5 – Acres of upland commercial timber harvest. Approximately 8,624 acres of upland commercial timber harvest is proposed in Alternative 2. Timber harvesting would cause direct and indirect effects to suitable Canada yew upland habitat. Clearcuts would remove the overstory and create open conditions not favored by Canada yew. However, there would be no disturbance in lowland cedar forests in the analysis area, which are also an important habitat for Canada yew. This alternative would probably at a minimum maintain the deer herd in the analysis area, so there would be continued browse pressure on Canada yew in the analysis area. There are over 400 known occurrences of Canada yew on the Superior National Forest (USDA Forest Service 2010). Despite potential impacts to suitable habitat, the known occurrences of Canada yew on the Superior National Forest would ensure that there is no risk to the viability of this species due to project activities.

For barren strawberry, ground disturbance caused by timber harvest and site preparation would have short term direct impacts to suitable habitat. However, in the long term timber harvest activities would probably have minimal effects on barren strawberry suitable habitat. Of the eight known barren strawberry occurrences on the Superior, one was found in a clearcut, and another in a red pine plantation; these occurrences suggest that the species can tolerate some level of disturbance. The red pine plantation containing one occurrence was thinned in 2003, and preliminary monitoring results show no population decline as a result of the thinning (USDA Forest Service 2005a).

For *Peltigera venosa*, timber harvest could have direct and indirect impacts to suitable habitat in the short term. Over the long term however, blowdown at the edges of clearcuts would create suitable habitat for *Peltigera venosa* in the form of the exposed dirt of rootwads. It is not likely that timber harvest in Alternative 2 would cause any viability risk for *Peltigera venosa*.

For Canada ricegrass, timber harvest could have direct short-term impacts to suitable habitat for this species. However, over the long term the effects of timber harvest to Canada ricegrass would probably be neutral to somewhat beneficial. In Michigan, the species occurs in logged areas and on road margins (Gerdes 2005). In Minnesota the species occurs in openings and clearings, along abandoned logging roads, thinned mixed pine-hardwood forest, young pine plantation, as well as unlogged red pine forest and unlogged jack pine/black spruce forest (Gerdes 2005, MNDNR 2010). Based on the habitats of known occurrences, it seems likely that timber harvest proposed in Alternative 2 in the project area would create some suitable habitat for Canada ricegrass in the long term.

Alternative 3

Indicator 1 - Number of known sensitive plant occurrences in or next to proposed treatment units. For the Canada yew, barren strawberry, and Canada ricegrass occurrences, the effects of Alternative 3 would be identical to the effects of Alternative 2 because the same actions are proposed for these stands as in both alternatives.

Indicator 3 – Miles of new upland road construction on NFS lands. Alternative 3 proposes approximately 10.0 miles of new upland road construction. The types of impacts of Alternative 3 to suitable habitat for plants in this habitat group would be similar to the impacts of Alternative 2 described above. Alternative 2 would affect slightly more habitat than Alternative 3, based on the number of miles of new upland road construction on Forest Service lands (Table 5). Alternative 3 would impact less than 1% of suitable habitat in the project area for species in this group.

Indicator 5 – Acres of upland commercial timber harvest. Approximately 6,628 acres of upland commercial timber harvest is proposed in Alternative 3. For Canada yew, barren strawberry, Canada ricegrass, and *Peltigera venosa*, the types of impacts would be similar to those described for Alternative 3 above. However, Alternative 3 would impact less acres of suitable habitat for each of these species than either Alternative 2, based on analysis of Indicator 5 (Table 5).

Cumulative Effects

For Alternative 1, there would be no cumulative effects to RFSS plants in this group since no ground disturbance would occur under Alternative 1.

There would be few cumulative effects of Alternatives 2 or 3 on these species. Since Europeans began settling the area, timber harvest (and subsequent forest type changes) and road construction are among the land uses that have most greatly impacted upland forests and altered the amount and distribution of this habitat in the cumulative effects analysis area. Some upland forest types like aspen have increased in acreage since pre-settlement times, while other forest types like red, white and jack pine have decreased (Frelich 1998). More recently, timber sales on federal and State lands have changed the age class distribution of upland forest habitats; see Appendix F for a summary of current and future timber harvest acres on federal and state lands. Construction of federal and non-federal timber harvest roads have also impacted a small proportion of suitable habitat for these species. For Canada ricegrass and barren strawberry, past, present, and reasonably foreseeable timber harvest would not have any long term cumulative impacts to suitable habitat for these species because they appear to be able to tolerate some levels of disturbance. Suitable habitat for *Peltigera venosa* (in the form of tip-ups) would continue to be created by future timber harvests. For Canada yew, future timber harvest on federal and non-federal lands would impact suitable habitat for this species, but negligible cumulative impacts would result and the viability of the species would be maintained by the existing known occurrences throughout the Superior National Forest.

Construction of future roads on state lands for accessing state timber sales or on Forest Service lands in the portion of the Silver Island or East Side Thinning Project Area that overlap the Toohey Project Area would impact suitable habitats for this suite of rare plants, but would not result in cumulative impacts because these activities would affect only a small proportion of the available suitable habitat. On the Superior National Forest, potential impacts of these activities to this suitable habitat would be mitigated by adherence to the Forest Plan standards and guidelines, and on other ownerships the impacts would be mitigated by voluntary adherence to the best management practices (MFRC 1999).

Summary: Project activities associated with Alternatives 2 and 3 would have short-term negative direct and indirect effects on suitable habitat for these species. Over the long term, however, there should be only minor impacts to suitable habitat for these species. Alternative 2 would have greater impacts to suitable habitat than Alternative 3, based on an analysis of Indicators 3 and 5 (Table 5), and both would have greater impacts than Alternative 1.

Determination

For Alternative 1, the proposed activities would have no impact on Canada yew, barren strawberry, Canada ricegrass, or *Peltigera venosa*.

For Alternatives 2 and 3, the proposed activities may impact individuals of Canada yew, barren strawberry, Canada ricegrass, or *Peltigera venosa* but are not likely to cause a trend to federal listing or loss of viability.

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