

Appendix E – Species Viability Evaluation

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Appendix E – Species Viability Evaluation

Introduction

The USDA Forest Service is mandated to provide and manage habitats to maintain viable populations of existing native and desired non-native wildlife, fish, and plant species.

A species viability evaluation (SVE) was conducted as part of the Forest Plan revision process. This evaluation analyzed potential impacts on the maintenance of the viability of existing native and desired non-native species related to the activities expected from the four alternatives developed for Forest Plan revision. The evaluation was updated in September and October 2005, following modification of the preferred alternative, Alternative 3-Modified.

The SVE process is a structured and reasoned series of judgments about projected amounts and distributions of habitat and the likelihood that such habitat would allow populations of species, that may be at risk, to remain well-distributed at set time periods into the future. The SVE provides an estimate of the likelihood that a population will persist in a given geographic distribution for a given period of time. Specifically, the species viability evaluation is focused on those species and rare landscapes that are at “risk” and need to be addressed in the final Forest Plan (herein referred to as Forest Plan).

This process is not a quantitative population viability analysis because it does not employ explicit models of genetic or demographic risk to species. However, the SVE meets the essential criterion of a population viability analysis.

Species Viability Evaluation Process

This species viability evaluation is a ten step process. The following is a summary of the steps:

1. **Description of the ecological context:** The ecological context description summarizes features and information such as ecological units, landtype associations, aquatic resources, Forest Plan management area (MA) prescriptions, vegetation cover type composition, structure, and age at various points in time, ecological disturbance processes and patterns, habitat relationships, seral stage distribution, existing protected areas such as old growth, wilderness, and limitations or threats (Cleland et al. 2004a). This information provides the backdrop, or ecological foundation, describing the conditions relevant to providing and managing wildlife, aquatic organisms, and plant species viability.
2. **Identify species at risk:** Questionnaires were sent to over one hundred experts from other governmental organizations (federal, state, and tribal), non-governmental organizations, academia, and consulting firms asking for their input on species to add to the SVE list. In addition to suggestions from outside expert opinion, species with

documented occurrences within the Ottawa National Forest's (the Ottawa) boundaries with a known viability risk because of their low abundance and distribution, downward population trend, habitat decline, or overall population vulnerability were identified. Species that are federally threatened, endangered, or proposed for listing by the USDI Fish and Wildlife Service, and known or thought to potentially occur on the Ottawa were automatically included in the species viability evaluation. Most species currently on the Regional Forester's Sensitive Species list for the Ottawa were also included in the SVE. Other species were included on the list if there was a documented or probable occurrence within the Ottawa and they met the viability risk criteria described above. For example, a number of birds were included based on their Partners in Flight (PIF) ratings, and a few lichens were included based on a draft rare lichen list for Michigan. Some documented rare species were not included in the SVE if an included species uses the same habitat and would be subject to the same risks. The final overall list of species was agreed upon by biologists, botanists, and aquatic ecologists from the three Michigan National Forests (Hiawatha, Huron-Manistee and Ottawa). This step was conducted in the late summer and fall of 2002.

There are other species on the Ottawa that are not at substantial viability risk, but are of special interest for varying reasons. Other Forest Plan revision processes and planning efforts were used to address these species and their relevant issues. The SVE process is neither designed, nor appropriate, to address these important species.

A few ecological communities at risk were also identified for the three Michigan National Forests, based on Michigan Natural Features Inventory (MNFI) classification of community types.

3. **Collect information on the species at risk:** Information on species taxonomy, conservation status, life history, historic and present range, risk factors, limiting factors or threats, population and habitat trends, and conservation measures was collected by the Michigan Natural Features Inventory (MNFI) and private contractors and stored in an SVE database developed by MNFI under contract to the three Michigan National Forests. This information was derived from sources including, but not limited to, peer reviewed literature, MNFI records, NatureServe, Michigan Odonata Survey, published floras such as Flora of North America and Voss' Michigan Flora, Forest Service conservation assessments, and expert opinion. Data was also collected for the SVE communities, primarily from MNFI community abstracts and files, and from Ottawa experts.
4. **Development of species groupings:** A number of methods of grouping were considered, including grouping by habitat; peripheral or central in range; shared threats or risk; sensitivity to management activities; "F" ranks, which are an estimation of rarity of the species at the Forest level; and combinations of these categories using cluster analysis. It was determined that habitat was the most appropriate method for several reasons. First, habitat is the factor that would be most affected by Ottawa management activities. Second, changes in habitat amounts are easily quantifiable through the Ottawa's combined data system (CDS) for vegetated stands and ecological classification system (ECS) for aquatics and wetlands (although amounts of these habitats are unlikely

to change substantially). Plants and animals were grouped separately because plants often have somewhat different habitat requirements than animals, but there was substantial overlap. The habitat groupings used for the Ottawa SVE are: aspen/birch, bog/fen, caves/mineshfts, grasslands/dry openings, jack pine, lowland conifer/boreal forest, marsh, northern hardwood/hemlock/maple, oak/oak-pine, moist openings (non-wetland); pine barrens, pond/lake/beach/shorelines, red/white pine, riparian/lowland hardwood, rivers/streams, rock/rock outcrops, and shrub/scrub wetlands. The SVE communities were each evaluated separately.

- 5. Compare species needs to 1986 Forest Plan:** Species habitat needs were compared by Ottawa biologists, botanists, silviculturalists, and ecologists to MA allocation and management direction (standards and guidelines) to evaluate the effectiveness of the 1986 Forest Plan to provide habitat. The panel also discussed historical conditions, using the ecological context document (Step 1), and estimated historical abundance/habitat availability for the SVE species. For the SVE, historical condition was considered to be pre-European settlement of the Ottawa area. Also evaluated was the likelihood that habitat would allow populations of species, which may be at risk, to remain well-distributed on the Ottawa over three future time periods; 20, 50, and 150 years from present. This evaluation recognized that many of the SVE species, especially plants, do not occur at secure, long-term viable levels currently (for example, less than 30 plants of a given species like the calypso orchid occur on the Ottawa).

This preliminary evaluation was completed in order to identify potential changes in Forest Plan management direction that may be needed to ensure species viability over the three time periods. If the 1986 Forest Plan was found to not provide for a species' viability where there was the possibility of doing so, the deficient areas were identified as requiring new standards, guidelines, goals, or objectives (SGGOs) to provide for species viability. The evaluation also recognized that Forest Plan direction cannot fix all obstacles to viability; for example, more rock outcrop habitat cannot be created and butternut canker (*sirococcus clavigignenti-juglandacearum*) is as yet incurable. This preliminary evaluation process was completed in June 2003.

SVE communities were also evaluated and ranked. Forest soil scientists assisted the SVE panel in ranking communities.

- 6. Development of management direction:** Forest Plan management direction (SGGOs) focusing on the key risks and limiting factors for species and community viability was developed to provide for species viability needs based on Step 5 of the process. These species at risk proposals were incorporated into the Notice of Intent for Forest Plan revision. SGGOs were normally developed for application Forestwide, but a number were developed for species (e.g. Canada lynx, Kirtland's warbler, and northern goshawk) in specific management areas.

7. **Incorporate management direction into Forest Plan revision alternatives:** New management direction for species viability was incorporated into Alternatives 2 through 4, where it did not vary by alternative. This direction was not included in Alternative 1, which is a ‘modernized’ version of the 1986 Forest Plan.
8. **Species Viability Evaluation panel:** Ottawa biologists, botanists, silviculturalists, and aquatic ecologists and a wildlife ecologist from the Forest Service Eastern Region evaluated species viability against each alternative over three time periods; 20, 50, and 150 years from present. SVE outcomes were determined by comparing a number of factors against each alternative. They include:
 1. How much habitat for the target species would be created by these alternatives;
 2. Do any other elements of the alternatives differ that would affect the species outcome rating (e.g. OHV access);
 3. Do any proposed standards and guidelines benefit the species (e.g. riparian protection for aquatic species) or harm the species;
 4. How abundant, and how well distributed, on the Ottawa is the species;
 5. Were there any factors beyond the control of the Forest Service that would limit the outcome for a species (e.g. Ottawa is at edge of range for species, natural succession has changed conditions on Forest, etc.).

Consideration was also given to other factors identified in the SVE database (for example, changes in wintering habitat for neo-tropical migrant birds, invasive species, land use changes outside the Ottawa, etc.). After considering all these factors, each species was given an outcome rating indicating whether suitable ecological conditions would exist to provide for species viability under each alternative and time period (see Tables E-1 and E-2). The outcome ratings ranged from A to E (see Summary of Outcomes section for definitions) and were based on the amount and distribution of suitable ecological conditions for each species under each alternative. Outcome A indicated little risk to viability and Outcome E indicated a high risk to viability and the likely loss of that species from the Ottawa over time. Note that many E-ranked species were given that ranking for the historical condition as well as for all time periods under all alternatives. Many of these species are on the edge of their range on the Ottawa, or require special habitats which are in limited supply on the Ottawa, thus they are never likely to be common and their viability will always be at risk.

Cumulative effects were considered in the SVE analysis. A list of effects was generated, including the following:

- Fragmentation/parcelization on adjacent ownerships
- Increasing road density.
- Invasives (plant/animals)/insects/diseases/parasites
- Increased human use – direct disturbance
- Off-Forest winter range issues (migratory birds)

- Mine closures
- Land management policies across ownerships
- Habitat loss – global (e.g., potential climate change impacts)
- Fire suppression
- High deer populations
- Toxins/pollutants

For each SVE species, cumulative effects from this list that might affect viability were recorded. These effects, however, were not included in the outcome ratings.

Step 8 was conducted in August 2004. SVE communities were also evaluated, with a soil scientist assisting the species panel.

Following internal and public review of the Proposed Forest Plan and Draft Environmental Impact Statement (DEIS), and receipt of comments, the preferred alternative, Alternative 3, was modified. The SVE species and community outcomes under Alternative 3-Modified were reviewed and updated where the modifications affected the ratings. This step was conducted in September and October 2005. More detailed discussion for changes in outcome ratings under Alternative 3-Modified is presented in the Results section of this appendix.

9. **Environmental documentation:** The Final Environmental Impact Statement (FEIS) for the Forest Plan, as well as a Biological Evaluation (BE) and Biological Assessment (BA) were prepared including descriptions of the alternatives, affected environment, and environmental consequences. Analysis was updated for Alternative 3-Modified using new information obtained in the interim (for example, more occurrences of some rare species were found in summer 2005, requiring updates to the BE). Very few outcomes changed since habitat availability is not the limiting factor for most of the SVE species, and changes in cover type are the main modification of Alternative 3-Modified.
10. **Monitoring:** The Forest Plan includes information on how viability will be monitored (see Forest Plan Chapter 4, Monitoring and Evaluation) and the process of incorporating the results of the monitoring into improved management to better provide for viability.

Summary of Outcomes

Outcome Definitions

Outcome A. Suitable ecological conditions are broadly distributed and of high abundance across the historical range of the species within the planning area. The combination of distribution and abundance of ecological conditions provides opportunity for continuous or nearly continuous interspecific interactions for the species.

Outcome B. Suitable ecological conditions are either broadly distributed or of high abundance across the historical range of the species within the planning area, but there are gaps where suitable conditions are absent or only present in low abundance. However, the disjunct areas of suitable ecological conditions are typically large enough and close enough to permit dispersal among subpopulations allowing the species to interact as a metapopulation across its historical range within the planning area.

Outcome C. Suitable ecological conditions are distributed frequently as patches and/or exist at low abundance. Gaps where suitable ecological conditions are either absent, or present in low abundance, are large enough that some subpopulations are isolated, limiting opportunity for species interactions. There is opportunity for subpopulations in most of the species range to interact as a metapopulation, but some subpopulations are so disjunct or of such low density that they are essentially isolated from other populations. For species for which this is not the historical condition, reduction in overall species range from historical within the planning area; may have resulted from this isolation.

Outcome D. Suitable ecological conditions are frequently isolated and/or exist at very low abundance. While some of the subpopulations associated with these ecological conditions may be self-sustaining, there is limited opportunity for population interactions among many of the suitable environmental patches. For species for which this is not the historical condition within the planning area, reduction in overall species range from historical conditions within the planning area may have resulted from this isolation.

Outcome E. Suitable ecological conditions are highly isolated and exist at very low abundance, with little or no possibility of population interactions among suitable environmental patches. This results in a potential for extirpations within many of the patches, and little likelihood of recolonization of such patches. There has likely been a reduction in overall species range from historical within the planning area, except for some rare, local endemics that may have persisted in this condition since the historical period.

Results

There was little difference among the alternatives in their ability to ensure species viability for the vast majority of species. Among animals there were few A or B outcomes and for plants there were none. There were a large number of E outcomes. This is expected since the SVE selection process focuses on species already believed to be at risk, it is unlikely that many A or B (abundant and secure) outcomes would be found. This was also due to most of the species with E outcomes being limited by factors that are largely outside the control of the Ottawa. Diseases, like butternut canker which is eliminating butternut (*Juglans cinerea*), cannot be easily controlled by Forest management activities. Certain species require habitat that is limited in extent, such as rock used by male fern (*Dryopteris filix-mas*) or mineshafts/caves used by the eastern pipistrelle bat. Many of the species are on the edge of their range, such as the Canada lynx, Kirtland's warbler, northern goshawk, and redbreast dace, and would not be expected to substantially increase or decrease in number because of Ottawa management activities. Finally, a number of species prefer habitats that no longer exist on the Ottawa in significant amounts, such as openings and grasslands that existed after the heavy logging and fires of the late 1800s.

These species include bobolink, sharp-tailed grouse, and golden-winged warbler. As the Ottawa lands have succeeded from open land to forested land, the habitat these species prefer has become much rarer. Tables E-1 and E-2 provide a complete listing of outcome ratings for those species evaluated during the SVE process. Table E-3 provides a listing of outcome ratings for those rare ecological communities evaluated during the SVE process.

In a number of cases, the management direction proposed under Alternatives 2 through 4 was determined to have a beneficial effect on species viability, but not enough to increase the outcome (in some cases, this is shown as a '+' on the rating). This was particularly common with species on the edge of their range or in cases where a species' preferred habitat is disappearing due to natural succession, such as moving from open fields to hardwood forest. Five animals (American marten, lake sturgeon, creek heelsplitter, northern blue butterfly and northern goshawk) and three plants (two lichens and goblin gold moss) had outcomes that improved over time, reflecting expected improving conditions on the Forest. For the moss, this improvement was only expected under Alternatives 2 through 4, which add beneficial management direction. One plant, dwarf bilberry, showed a better (D) rating under Alternatives 2 through 4 than Alternative 1 (E), reflecting beneficial management direction and the increased possibility of using fire as a management tool.

Six species of animals and one plant had outcomes that declined between alternatives or changed between time periods within an alternative. The rationale for these differences in outcomes for these seven species - the black-throated blue warbler, the common loon, Lake Gogebic cisco, spruce grouse, wood turtle, black backed woodpecker, and American shoregrass - is provided in the following discussion.

Black-throated blue warbler:

The outcome rating for the black-throated blue warbler declined in the 50 and 150-year time periods in Alternatives 2 and 3-Modified. The decline was from C outcome ratings at 20 years to D outcome ratings for 50 and 150-year time periods. The main reason for assigning a D outcome rating was that Alternatives 2 and 3-Modified featured or proposed the least amount of even-aged management in the northern hardwood forest types of any of the alternatives. The black-throated blue warbler requires dense brushy understories in hardwood stands as breeding, nesting, and foraging habitats. Alternatives 2 and 3-Modified would provide less of this kind of habitat than is provided in Alternatives 1 and 4. The reduction in habitat was large enough to potentially result in a population decline. Populations of the black-throated blue warblers are declining in other portions of their range. Trends for this species are monitored through the Ottawa's Breeding Bird Census.

Common loon:

The outcome rating for the common loon declined from C to a D outcome rating in the 50 and 150-year time period for Alternative 1, and from C to D in the 150-year time period for Alternatives 2, 3-Modified and 4. The main reasons for the expected declines for the common loon were long-term projected increased shoreline development and increased recreational boating use on the privately owned lakes currently used by loons. The increased recreation use and shoreline development would disturb nesting loons leading to either abandonment of the nest or reduced loon nesting productivity. This development is beyond the control of the Forest

Service and would reduce loon populations within the Ottawa. There were some concerns that pesticide and contaminant loadings in loons are reducing breeding and nesting success in the loon population range-wide.

Black-backed woodpecker:

The outcome rating for the black-backed woodpecker declined from a D in the 20 year time period of Alternative 2 to an outcome rating of E for the 50 and 150-year time periods in Alternative 2. Alternative 2 is the only alternative in which the outcome rating declined. The main reason for the decline in outcome rating was that Alternative 2 allocated the lowest total acreage to MA 4.2a. Management area 4.2a is the only MA with a large emphasis on jack pine management. Jack pine is the primary habitat for the black-backed woodpecker and the Ottawa has a very low amount of this habitat type. A reduction in jack pine acres allocated to MA 4.2a in Alternative 2 would only provide a quarter of the habitat provided by Alternatives 1, 3-Modified and 4, and that this reduction in habitat would result in a large decline in black-backed woodpecker populations in the jack pine habitats on the Ottawa.

Lake Gogebic cisco:

The outcome rating for the Lake Gogebic cisco declined from a D at the 20-year time period to an outcome rating of an E for the 50 and 150-year time periods for all the alternatives. The main reason for the change to E ratings in the 50 and 150-year time periods for all alternatives is the effect that non-native invasive aquatic species could have on the overall habitat quality of Lake Gogebic for this fish. There are some non-native aquatic species in the lake already, and the likelihood of additional non-natives being introduced in the next 100 years was considered very high. The Lake Gogebic cisco is an endemic to the lake. Additional non-native species would reduce spawning habitat, or result in the reduction in the quality of the habitat and lower the population in the lake. The shoreline and much of the land surrounding Lake Gogebic is privately owned. The Ottawa has little ability to influence the outcome for the Lake Gogebic cisco.

Spruce grouse:

The outcome rating for the spruce grouse declined from a D in the 20-year time period of Alternative 2 to an outcome rating of E for the 50 and 150 year time periods in Alternative 2. Alternative 2 is the only alternative in which the outcome rating declined. The main reason for the decline in outcome rating was that Alternative 2 allocated the lowest total acreage to MA 4.2a. Management area 4.2a is the only MA with a large emphasis on jack pine management. Jack pine is the primary habitat for the spruce grouse and the Ottawa has a very low amount of this habitat type. The reduction in jack pine acres allocated to MA 4.2a in Alternative 2 would only provide a quarter of the habitat provided by Alternatives 1, 3-Modified and 4, and that this reduction in habitat would result in a large decline in spruce grouse populations in the jack pine habitats on the Ottawa.

Wood turtle:

The outcome ratings for the wood turtle decline from a C in the current and 20-year time periods of Alternative 1 to a D outcome rating for the 50 and 150-year time periods in Alternative 1. Alternative 1 was the only alternative which showed a decline in outcome rating. The main reason for the decline in outcome rating in Alternative 1 was that the riparian management

direction in the 1986 Forest Plan would not provide adequate protection of riparian habitat for wood turtle foraging, and would not provide adequate protection for wood turtle nesting sites. The addition of new riparian management direction in the Forest Plan is expected to prevent the outcome rating from declining in Alternatives 2, 3-Modified and 4.

American shoregrass:

The SVE outcome was projected to decline over time for one aquatic plant, American shoregrass (*Littorella uniflora*), declining from D to E at 50 years out, under all alternatives. The reasons for this projected decline include the expected increase in non-native invasive species which the Ottawa may not be able to control: rusty crayfish eat American shoregrass, and Eurasian watermilfoil can directly compete with it. Lakes are frequently re-infested with invasives by recreational users, and the waters are governed by the State of Michigan, such that the Ottawa may not be able to ensure threat-free habitats for this plant.

Table E-1. Animal SVE Outcomes (Outcomes shown at 20, 50, and 150-years from Current)

Animal Species	Current	Alternative 1			Alternative 2			Alternative 3-Modified			Alternative 4		
		20	50	150	20	50	150	20	50	150	20	50	150
<i>Aeshna verticalis</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Alasmidonta marginata</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
American marten	C	C	C	C	C	C	C	C	C	B	C	C	B
American bittern	C	C	C	C	C	C	C	C	C	C	C	C	C
Bald eagle	B	B	B	B	B	B	B	B	B	B	B	B	B
Black tern	E	E	E	E	E	E	E	E	E	E	E	E	E
Black-backed woodpecker	D	D	D	D	D	E	E	D	D+	D+	D	D+	D+
Black-billed cuckoo	D	D	D	D	D	D	D	D	D	D	D	D	D
Black throated blue warbler	C	C	B	B	C	D	D	C	D	D	C	B	B
Bobolink	E	E	E	E	E	E	E	E	E	E	E	E	E
Canada lynx	E	E	E	E	E	E	E	E	E	E	E	E	E
Canada warbler	C	C	C	C	C	C	C	C	C	C	C	C	C
Cape may warbler	C	C	C	C	C	C	C	C	C	C	C	C	C
Cerulean warbler	E	E	E	E	E	E	E	E	E	E	E	E	E
Cisco/lake herring	E	E	E	E	E	E	E	E	E	E	E	E	E
Common loon	C	C	D	D	C	C	D	C	C	D	C	C	D
Connecticut warbler	D	D	D	D	D	D	D	D	D	D	D	D	D
Eastern meadowlark	E	E	E	E	E	E	E	E	E	E	E	E	E
Eastern pipistrelle	D	D	D	D	D	D	D	D	D	D	D	D	D
Four-toed salamander	C	C	C	C	C	C	C	C	C	C	C	C	C
Golden-winged warbler	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Gomphus quadricolor</i>	C	C	C	C	C	C	C	C	C	C	C	C	C
<i>Gomphus viridifrons</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
Grasshopper sparrow	E	E	E	E	E	E	E	E	E	E	E+	E+	E+
Gray wolf	B	A	A	A	A	A	A	A	A	A	A	A	A
Henry's elfin	E	E	E	E	E	E	E	E	E	E	E+	E+	E+
Kirtland's warbler	E	E	E	E	E	E	E	E	E+	E+	E	E+	E+
Lake Gogebic cisco	D	D	E	E	D	E	E	D	E	E	D	E	E
Lake sturgeon	D	C	C	C	C	C	B	C	C	B	C	C	B

Animal Species	Current	Alternative 1			Alternative 2			Alternative 3-Modified			Alternative 4		
		20	50	150	20	50	150	20	50	150	20	50	150
<i>Lasmigona costata</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Lasmigonia compressa</i>	D	D	C	C	C	B	B	C	B	B	C	B	B
LeConte's sparrow	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Lestes eurinus</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Ligumia recta</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
Northern blue butterfly	E	E	E	E	D	D	D	D	D	D	D	D	D
Northern goshawk	D	D	C	C	D/C	D/C	D/C	D	C	C	D	C	C
Northern harrier	E	E	E	E	E	E	E	E	E	E	E+	E+	E+
Olive-sided flycatcher	C	C	C	C	C	C	C	C	C	C	C	C	C
<i>Ophiogomphus howei</i>	E	D	D	D	D	D	D	D	D	D	D	D	D
Peregrine falcon	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Pieris virginiensis</i>	C	C	C	C	C	C	C	C	C	C	C	C	C
Red-headed woodpecker	E	E	E	E	E	E	E	E	E	E	E	E	E
Red-shouldered hawk	E	E	E	E	E	E	E	E	E	E	E	E	E
Redside dace	D	C	C	C	C	C	C	C	C	C	C	C	C
Sharp-tailed grouse	E	E	E	E	E	E	E	E	E	E	E	E	E
Short-eared owl	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Somatochlora foricipata</i>	C	C	C	C	C	C	C	C	C	C	C	C	C
<i>Somatochlora minor</i>	C	C	C	C	C	C	C	C	C	C	C	C	C
Spruce grouse	D	D	D	D	D	E	E	D	D+	D+	D	D+	D+
Trumpeter swan	D	C	C	C	C	C	C	C	C	C	C	C	C
Upland sandpiper	E	E	E	E	E	E	E	E	E	E	E+	E+	E+
Whip-poor-will	D	D	D	D	D	D	D	D	D	D	D	D	D
Wood thrush	E	E	E	E	E	E	E	E	E	E	E	E	E
Wood turtle	C	C	D	D	C	C	C	C	C	C	C	C	C
Yellow rail	E	E	E	E	E	E	E	E	E	E	E	E	E

Table E-2. Rare Plant SVE Outcomes (Outcomes shown at 20, 50, and 150-years from Current)

Plant Species	Current	Alternative 1			Alternative 2			Alternative 3-Modified			Alternative 4		
		20	50	150	20	50	150	20	50	150	20	50	150
<i>Asplenium rhizophyllum</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Adlumia fungosa</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Amerorchis rotundifolia</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Anzia colpodes</i>	E	E	E	D	E	E	D	E	E	D	E	E	D
<i>Armoracia lacustris</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Astragalus canadensis</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Astragalus neglectus</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Bidens discoidea</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Botrychium hesperium</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Botrychium lunaria</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Botrychium minganense</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Botrychium mormo</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Botrychium oneidense</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Botrychium pallidum</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Botrychium rugulosum</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Bryum cylophyllum</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Calamagrostis lacustris</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Caloplaca parvula</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Calypso bulbosa</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Carex assiniboinensis</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Carex backii</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Cetraria aurescens</i>	E	E	E	D	E	E	D	E	E	D	E	E	D
<i>Crataegus douglasii</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Cynoglossum virginianum var. boreale</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Cypripedium arietinum</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Cystopteris laurentiana</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Dentaria maxima</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Disporum hookeri</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Dryopteris expansa</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Dryopteris filix-mas</i>	D	D	D	D	D	D	D	D	D	D	D	D	D

Plant Species	Current	Alternative 1			Alternative 2			Alternative 3-Modified			Alternative 4		
		20	50	150	20	50	150	20	50	150	20	50	150
<i>Dryopteris goldiana</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Eleocharis olivacea</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Elymus glaucus</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Erythronium albidum</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Fontinalis missourica</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Galium brevipes</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Geocaulon lividum</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Geum macrophyllum</i> var. <i>macrophyllum</i> *	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Helianthus mollis</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Huperzia selago</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Juglans cinerea</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Juncus stygius</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Littorella uniflora</i>	D	D	E	E	D	E	E	D	E	E	D	E	E
<i>Malaxis brachypoda</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Menegazzia terebrata</i>	C	C	C	C	C	C	C	C	C	C	C	C	C
<i>Mimulus guttatus</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Moehringia macrophylla</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Muhlenbergia uniflora</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Myriophyllum farwellii</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Nuphar pumila</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Orobanche uniflora</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Oryzopsis canadensis</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Panax quinquefolius</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Petasites sagittatus</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Phegopteris hexagonoptera</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Polemonium occidentale</i> spp. <i>lacustre</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Polygonum careyi</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Potamogeton confervoides</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Protopannaria pezizoides</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Pterospora andromedea</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Pyrola asarifolia</i>	E	E	E	E	E	E	E	E	E	E	E	E	E

Plant Species	Current	Alternative 1			Alternative 2			Alternative 3-Modified			Alternative 4		
		20	50	150	20	50	150	20	50	150	20	50	150
<i>Pyrola minor</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Ranunculus gmelinii</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Ranunculus rhomboideus</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Salix pellita</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Schistostega pennata</i>	D	D	D	D	D	D	C	D	D	C	D	D	C
<i>Scirpus subterminalis</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Sisyrinchium strictum</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Sticta beauvoisii</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Tiarella cordifolia</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Usnea longissima</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Utricularia geminiscapa</i>	E	E	E	E	E	E	E	E	E	E	E	E	E
<i>Vaccinium cespitosum</i>	E	E	E	E	D	D	D	D	D	D	D	D	D
<i>Viola lanceolata</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Viola novae-angliae</i> var. <i>novae-angliae</i>	D	D	D	D	D	D	D	D	D	D	D	D	D
<i>Viola novae-angliae</i> var. <i>grisea</i>	E	E	E	E	E	E	E	E	E+	E+	E	E+	E+

**Geum macrophyllum* var. *macrophyllum* was rated “E” across all alternatives and time periods by the SVE panels, with no sites known on the Forest at that time. However, botany surveys conducted in summer 2005 found several occurrences of this plant, changing our knowledge of the taxon and its habitat needs. This new information results in an improved rating of “D” for all alternatives and time periods.

Table E- 3. Rare Ecological Community SVE Outcomes (Outcomes shown at 20, 50, and 150-years from Current)

Community	Current	Alternative 1			Alternative 2			Alternative 3-Modified			Alternative 4		
		20	50	150	20	50	150	20	50	150	20	50	150
Boreal forest	D	D	E	E	D	D	D	D	D	D	D	D	D
Dry northern forest	C	C	C	C	C	C	C	C	C	C	C	C	C
Hardwood conifer swamp	C	C	C	C	C	C	C	C	C	C	C	C	C
Intermittent wetland	D	D	D	D	D	D	D	D	D	D	D	D	D
Kettle	D	D	D	D	D	D	D	D	D	D	D	D	D
Pine barrens	E	E	E	E	E	E	E	E+	E+	E+	E+	E+	E+
Poor fen	B	B	B	B	B	B	B	B	B	B	B	B	B
Rich conifer swamp	D	D	D	D	D	D	D	D	D	D	D	D	D
Sand/gravel beach	E	E	E	E	E	E	E	E	E	E	E	E	E
Submergent marsh	C	C	C	C	C	C	C	C	C	C	C	C	C
Vernal pond	C	D	D	D	C	C	C	C	C	C	C	C	C

In a number of cases, the management direction proposed under Alternatives 2 through 4 was determined to have a beneficial effect on community viability, but not enough to increase the outcome. The outcome rating for boreal forest is expected to decline over time under Alternative 1, since there is no management direction to retain and enhance this type. Boreal forest is very limited on the Ottawa, since it mainly occurs farther north. Vernal ponds received a lower rating under Alternative 1 since this alternative does not include the enhanced management direction for riparian areas.